Climate Investment Funds

PPCR/SC.10/6
April 13, 2012

Meeting of the PPCR Sub-Committee
Washington, D.C.
April 30, 2012

Agenda Item 7

STRATEGIC PROGRAM FOR CLIMATE RESILIENCE FOR THE KINGDOM OF TONGA

Proposed Decision by PPCR Sub-Committee

The Sub-Committee reviewed document PPCR/SC.10/6, *Strategic Program for Climate Resilience for the Kingdom of Tonga,* a country participating in the Pacific Regional Program, and

a) endorses the SPCR as a basis for the further development of the project foreseen in the strategic program and takes note of the requested funding of USD 15 million in grant funding;

b) reconfirms its decisions on the allocation of resources, adopted at its meetings in June 2010 and 2011, that a range of funding for the regional program, consisting of strategic programs for the participating countries and a regional component, should be used as a planning tool in the further development of project and program proposals in participating countries to be submitted to the PPCR Sub-Committee for PPCR funding approval, recognizing that the minimum amount of the range is more likely and that the upper limit of the range will depend on availability of funding. The range of funding agreed for a regional pilot program is USD 60-75 million in grant resources, and USD 36 million in other concessional resources. The Sub-Committee reconfirms its call for contributors and other countries, MDBs and other development partners to seek to mobilize additional resources to allow the full funding of the SPCR;

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

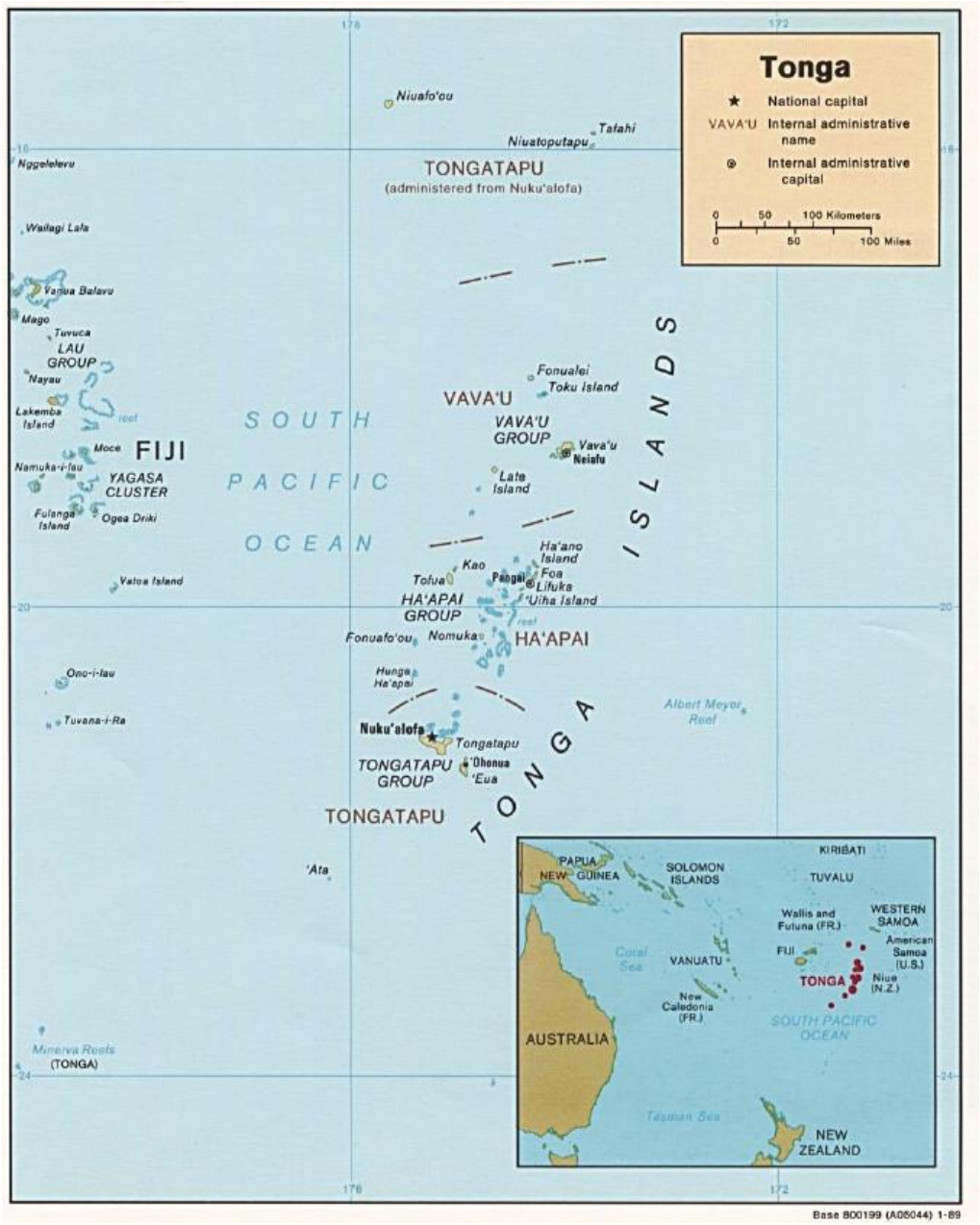
d) approves a total of USD $750,000 in PPCR funding as a preparation grant for the proposed project to be developed under the SPCR with the following 3 components, implemented by the ADB:

    i. *Capacity Building to Support Transformation to Climate Resilient Development Path;*
    ii. *Sustainable Climate Change Financing*;
    iii. *Building Ecosystem Resilience and Climate Proofing Critical Infrastructure (including coastal protection systems).*

e) takes note of the estimated budget for project preparation and supervision services for the project listed in the SPCR and approves a first tranche of funding for such preparation and supervision services to be provided by the ADB in the amount of USD 199,375;

f) requests the Government of the Kingdom of Tonga and the ADB to take into account written comments submitted by Sub-Committee members by May 11, 2012, in the further development of the program.

Strategic Program for Climate Resilience



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ABBREVIATIONS

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
CCA	Climate Change Adaptation
CCCC	Cabinet Committee on Climate Change
CCIP	Climate Change Implementation Plan
CEO	chief executive officer
CER	country environment review
CERMP	Cyclone Emergency and Risk Management Project
CIF	Climate Investment Funds
COP	Conference of the Parties
CROP	Council of Regional Organisations of the Pacific
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSO	civil society organization
DCCEE	Australian Department of Climate Change and Energy Efficiency
DFID	United Kingdom Department for International Development
DRR	disaster risk reduction
DRM	disaster risk management
DMF	design and monitoring framework
EA	executing agency
EU	European Union
GDP	gross domestic product
GEF	Global Environment Facility
GIS	geographic information system
GPS	global positioning system
HDI	Human Development Index
IFC	International Finance Corporation
IPET	Institute of Professional Engineers
ICCAI	International Climate Change Adaptation Initiative
INC	Initial National Communication to the UNFCC
IUCN	International Union for the Conservation of Nature
JICA	Japan International Cooperation Agency
JNAP	Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management 2010–2015
MAFFF	Ministry of Agriculture and Food, Forests and Fisheries
MDB	multilateral development bank
MECC	Ministry of Environment and Climate Change
MLSNR	Ministry of Lands, Survey and Natural Resources
MoFNP	Ministry of Finance and National Planning
MOH	Ministry of Health
MOT	Ministry of Transport
MOW	Ministry of Works
NECC	National Environment Coordinating Committee
NEMC	National Emergency Management Committee
NEMO	National Emergency Management Office
NEMP	National Emergency Management Plan
NGO	nongovernment organization
NIIP	National Infrastructure Investment Plan
NSDP	National Strategic Development Plan
NSPF	National Strategic Planning Framework 2009–2019
PARD	Pacific Department of the Asian Development Bank
PASAP	Pacific Adaptation Strategy Assistance Program
PIAC	Pacific Infrastructure Advisory Centre
PIFACC	Pacific Island Framework for Action on Climate Change (2006–2015)

PIGGAREP	Pacific Islands Greenhouse Gas Abatement through Renewable Energy Project
PMU	program management unit
PRIF	Pacific Region Infrastructure Facility
PPCR	Pilot Program for Climate Resilience
PUMA	Planning and Urban Management Agency
RTSM	Regional Technical Support Mechanism
SCF	Strategic Climate Fund
SNC	Second National Communication to the UNFCCC
SPC	Secretariat of the Pacific Community
SPCR	Strategic Program for Climate Resilience (PPCR Phase II)
SPREP	Secretariat of the Pacific Regional Environment Program
TCCI	Tonga Chamber of Commerce and Industry
TDDF	Tonga Strategic Development Framework
TMS	Tonga Meteorological Service
TSDF	Tonga Strategic Development Framework (2011–2014)
TWB	Tonga Water Board
TWG	Technical Working Group on Climate Change
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USP	University of the South Pacific
WBG	World Bank Group

Summary of Tonga's Strategic Program for Climate Resilience		
1. **Country/Region**:	Tonga	
2. **PPCR Funding Request (in USD million):**:	*Grant:* $15 million	*Loan:*
3. **National PPCR Focal Point**:	Asipeli Palaki, Director Climate Change and Environment Ministry of Environment and Climate Change (MECC)	
4. **National Implementing Agency** (Coordination of Strategic Program)**:**	Ministry of Environment and Climate Change (MECC) Ministry of Finance and National Planning (MoFNP)	
5. **Involved MDB**	Asian Development Bank	
6. **MDB PPCR Focal Point and Project/Program Task Team Leader (TTL)**:	PPCR – Focal Point : Daniele Ponzi (ADB)	TTL: Anne Witheford (ADB)

Description of SPCR:
This Kingdom of Tonga Strategic Program for Climate Resilience (SPCR) will support *transformational* change by enabling implementation of Tonga's national strategy to integrate climate change adaptation (CCA) and related disaster risk management (DRM), making Tonga more resilient to climate change and climate-related disasters. It will sustain the burgeoning transformational change that began with the development of Tonga`s Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management 2010–2015 (JNAP) by providing the strategic human, technical, and financial inputs needed to implement JNAP activities, thereby supporting the Government's poverty alleviation goals. The SPCR is a package of closely linked, mutually supporting, and phased interventions that together provide the framework required to place Tonga on a climate-resilient development path at the national, island, and community levels in vulnerable economic sectors. The SPCR will (i) build capacity; (ii) provide information, tools, and legislative frameworks needed for informed climate change risk management; and (iii) provide access to resources (technical, human, financial) to address the climate change risk management priorities of the Government, as well as those of vulnerable communities. This will lead to a progressive increase in the resilience of ecosystems and infrastructure that are the foundations of the country's sustainable development aspirations. The SPCR will complement (not duplicate) major CCA and related DRM initiatives ongoing and planned in Tonga. It is based on a clear analysis of the value that can be added to CCA/DRM work in the country. The SPCR will catalyze increased collaboration in building resilience to climate change and disaster risk reduction (DRR) between ADB, the JNAP Secretariat, and Tonga infrastructure agencies (which implement the National Infrastructure Investment Plan) at the national level. It will in turn promote collaboration between Tonga SPCR national stakeholders and other Pacific countries and regional organizations. The enhanced collaboration achieved in development of this SPCR will further improve coordination and harmonization of national and regional CCA and DRM responses.

(a) Key Challenges related to Vulnerability to Climate Change/Variability:
Tonga, with a combined land and sea area of 720,000 square kilometers (km^2), is an archipelago of 172 named islands, of which 36 islands with a total area of 670 km^2 are inhabited. Most of Tonga's atoll islands, including the main island, are very flat with an average altitude of 2–5 meters above sea level, and are hence highly vulnerable to sea level rise, flooding from storm surges, tsunami inundation and impacts from climate change. Tonga's *Initial Communication to the United Nations Framework Convention on Climate Change (UNFCCC)* (July 2005) reported that all key sectors are likely to be significantly affected by climate change, with major environmental, economic, and social consequences. Particular concerns included impacts on agricultural production, water supply, and coastal resources.

The effects of climate change are exacerbating natural hazards such as tsunamis, cyclones, coastal flooding, and droughts. Low-lying areas of the islands are affected by rising sea levels, and extensive tidal flooding damages coastal villages and critical infrastructure. Impacts of sea level rise will adversely affect groundwater supplies, agricultural production, and food security. Climate change will increase the incidence of heavy rainfall, causing flooding and prolonged ponding of water, amplifying health risks associated with water-borne and vector-borne disease. Since the country depends on rainwater for

domestic use and the production of marine/terrestrial produce for export, increased incidence of severe drought will seriously affect Tonga's revenue-earning capacity, people's health, livelihoods, water and food supplies, as well as socioeconomic development. Warmer seas during El Niño events will continue to affect Tonga's fishing industry, resulting in significant declines in exports of fish and other marine products. Increases in temperature continue to cause increases in heat stress and asthma, while also reducing soil moisture and fertility, affecting agricultural production and food security. Coral bleaching events are becoming common due to increases in sea temperature, resulting in coral mortality, destruction of habitats for reef species, and reduction in diversity of reef species, which affects fisheries production and food security. Tropical storms and cyclones continue to cause severe damage to crops and food supply, infrastructure, tourist resorts, natural ecosystems, and buildings, and disrupt essential services, thus affecting the health and well-being of the people along with considerable financial loss.

While there is country commitment and a solid national strategy - the JNAP - to address climate change and related disaster risk management challenges facing Tonga, efforts to date at mainstreaming climate change risk management have been severely resource-constrained. Impediments to a more effective response are: (i) a limited pool of qualified and trained experts to mainstream CCA/DRM at local community, sectoral, and national levels; (ii) inadequate information, tools, and legal frameworks; and (iii) challenges in accessing adequate climate change financing.

(b) Areas of Intervention – Sectors and Themes

SPCR support will be provided through three components. The components will be mutually reinforcing and will together achieve the purpose of the SPCR. First, through support provided under component 1 (capacity building to support transformation to a climate resilient development path), Tonga will develop a pool of qualified, trained personnel who are capable of mainstreaming climate change and related disaster risk reduction at community, sector and national levels. Second, through support provided under component 2 (sustainable climate change financing), Tonga will develop a "fast start" climate change financing framework which will support priority CCA/DRM interventions in vulnerable communities, primarily for climate-proofing activities, and provide a social safety net for these communities. Third, through support provided under component 3 (building ecosystem resilience and climate proofing critical infrastructure) Tonga will develop a climate-resilient national infrastructure investment plan (NIIP) and pilot an enabling framework for climate proofing of critical ports infrastructure. Tonga is in the process of updating its current NIIP and will integrate CCA/DRM approaches into this revision. The enabling framework will provide an approach that can be adapted across a range of infrastructure assets.

(c) Expected Outcomes from the Implementation of the SPCR

The overall outcome of the SPCR will be enhancement of Tonga's resilience to climate change and climate-related disasters through strengthened capacity, increased knowledge and information, and enhanced access to finance and technical support. Key outcomes are:

1. establishment in Tonga of a pool of trained and qualified specialists to support CCA and DRM mainstreaming activities at national and sectoral levels and within vulnerable communities and economic sectors;
2. communities and NGOs (i) trained to map, evaluate, and manage climate change risks autonomously; (ii) able to access technology and finances to "climate-proof" critical community infrastructure; and (iii) reducing their vulnerability to climate change through active engagement in community early warning systems and community-based interventions to address food security concerns;
3. legal establishment and effective operation of Tonga's Climate Change Trust Fund, and prospective establishment of a climate change and disaster risk microfinance and micro-insurance program for farmers, fishers, and vulnerable communities, in particular women;
4. water resources inventory, supported by improved hydro-meteorological and coastal monitoring and data collection, providing knowledge and information for informed decision-making to guide effective climate change risk management of the water sector at national and community levels;
5. strengthened knowledge, capacity, and access to information on CCA and DRM to support risk management measures and "climate proofing" of critical infrastructure;
6. CCA and DRM integrated into Tonga's physical and financial planning processes at the national, island, and community levels;
7. coastal fisheries more resilient to impacts from climate change; and
8. critical coastal infrastructure less vulnerable to impacts from climate change and disasters.

7.	
Result	**Success Indicator(s)**
1. Improved integration of CCA and DRM through mainstreaming of CCA and DRM (facilitated by a pool of trained and qualified specialists) into Tonga's development strategies, plans, and policies at the national and sector levels and within vulnerable communities, including through vulnerability mapping, adaptation planning, and critical infrastructure planning.	a) Number of development plans that integrate climate change adaptation and disaster risk reduction (including gender dimension) and include measures that reduce and/or improve the management of climate change related related risks. b) Budget resources (at all levels) consistent with effective management of climate change risks across sectors and regions, including financing from external sources. c) Number of train-the-trainer programs implemented and subsequently rolled-out in training programs. d) Number of training programs undertaken to assist vulnerable communities and civil society to undertake community-level climate change vulnerability mapping, adaptation planning and disaster risk management. e) Coverage of community early warning systems.
2. Increased capacity to integrate CCA and DRM into Tonga's country or sector development strategies, and physical planning and development processes, that improve the resilience of vulnerable coastal ecosystems to climate change impacts while climate proofing existing critical infrastructure.	a) Adoption and enforcement of policies and sector-specific legislation that integrates CCA and DRM into physical planning and development processes. b) Number of line ministries and/or functional agencies updating or revising country or sector development strategies to address climate change risks (moving from "outside management" to country ownership) at the country level. c) Evidence of an enacted legal framework for CCA and DRM. d) Number of hydro-meteorological and coastal monitoring stations established. e) Climate change risks to critical infrastructure addressed in the National Infrastructure Investment Plan (NIIP). f) Number of communities practicing ecosystem based climate-resilient fisheries/agriculture.
1. Increased knowledge and awareness of climate change risks and impacts (e.g., through climate change modeling, climate change impact assessments, evaluation of adaptation options) in government, education sector, private sector, and civil society.	a) Coverage (comprehensiveness) of climate change risk analysis and vulnerability assessments of vulnerable sectors and communities disaggregated by sector, geographical area, sex, communities, and locations.). b) Number of Tonga government technicians/managers who acquire expertise and skills in climate change risk management disciplines, including advanced degrees facilitated through scholarships awarded. c) Water resource inventories undertaken successfully in support of an Integrated Coastal and Water Resource Management Plan.
2. Improved access to knowledge products and information on CCA and DRM at the local, national, and regional to support climate-resilient development planning, and implementation.	a) Relevance (demonstrated by complementing and integration with other initiatives) and quality (stated by external experts) of knowledge assets (e.g., publications, studies, knowledge sharing platforms, learning briefs, communities of practice, etc.) created. b) Documentary evidence of use knowledge and learning. c) Documentary evidence of use of expertise available under the Regional Technical Support Mechanism.
3. Access to the "fast start" climate change financing framework to support priority	a) Legal establishment and effective operation of a Climate Change Trust Fund; and the launch of the

projects in vulnerable communities and sectors; and to provide a social safety net for vulnerable communities to address impacts from climate change on livelihoods and food security thereby supporting poverty alleviation.	"Small Grants" program. b) Launch of climate change and disaster risk microfinance and micro-insurance programs for farmers, fishers, and vulnerable communities, in particular women.

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

Project/Program Concept Title	**MDB**	**Requested PPCR Amount ($)**[1]			**Expected co-financing ($)**	**Preparation grant request ($)**	**Total PPCR request**
		TOTAL	**Grant**				
Component 1 - Capacity Building to Support Transformation to a Climate Resilient Development Path	ADB	$3.8m	$3.8m			$750,000	$3.8m
Component 2 – Sustainable Climate Change Financing	ADB	$5.2m	$5.2m				$5.2m
Component 3 – Building Ecosystem Resilience and Climate Proofing Critical Infrastructure (including coastal protection systems)	ADB	$6 m	$6m				$6.0m
	TOTAL	$15m	$15m			$750,000	$15m

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

9. **Timeframe** (tentative) – Approval Milestones
Components 1–3: Project Preparation Grant Agreement signed between Government of Tonga and ADB by June 2012; detailed project preparation June–October 2012; ADB Board approval November 2012; Grant Agreement signed between Government of Tonga and ADB November 2012.
10. **Key National Stakeholder Groups involved in SPCR Design**[2]:
Ministries of Planning and Finance, national climate change focal points, national sector agencies, vulnerable communities (including women), civil society (including private sector).
11. **Other Partners involved in Developing Tonga's SPCR:**
Pacific Islands Forum Secretariat (PIFS), Secretariat of the Pacific Regional Environment Programme (SPREP), Secretariat of the Pacific Community (SPC), Forum Fisheries Agency (FFA), Australia (Australian Agency for International Development [AusAID] and Department of Climate Change and Energy Efficiency), United Nations Development Programme (UNDP).

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

INTRODUCTION

1. Based on recommendations of an Independent Expert Group, Tonga has been selected as one of the countries to participate in the Pilot Program for Climate Resilience (PPCR), under the Strategic Climate Fund (SCF), a multi donor trust fund within the Climate Investment Funds (CIF). The Pacific PPCR has four components: country activities in three countries (Papua New Guinea, Samoa, and Tonga) and a regional component. The PPCR will provide financing through multilateral development banks (MDBs) to support PPCR interventions. Proposals for PPCR funding will be prepared jointly by the recipient country, or regional organizations in the case of the regional component, and the relevant MDBs. The Asian Development Bank (ADB) is the designated lead MDB in Tonga.

2. The goal of the PPCR is to help countries transform to a climate-resilient development path, consistent with national poverty reduction and sustainable development goals. As a pilot program supporting learning-by-doing, Tonga's PPCR ultimately aims to increase the integration of climate resilience into development. The PPCR will complement - yet go beyond - currently available adaptation financing by providing financial support for programmatic approaches to upstream climate resilience in development planning, core development policies, and strategies.[3]

3. Tonga has been provided with technical assistance to undertake the design and development of this strategic program for climate resilience (SPCR). The SPCR builds on the comprehensive, inclusive, and country-driven process used to develop Tonga's Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management 2010–-2015 (hereafter, referred to as JNAP). The SPCR provides the framework for implementation of PPCR Phase II and will support, through mentoring and capacity building of local counterparts, the incorporation of enhanced resilience to climate change and climate variability in the National Infrastructure Investment Plan (NIIP, 2010). It will also support resilience-building in vulnerable communities, including the climate proofing of community infrastructure and other planning, budgeting, capacity building, and financing initiatives.

1. BACKGROUND AND RATIONALE

1.1 Country Context

Geography and Socioeconomic Situation

4. The Kingdom of Tonga lies between the Coral Sea and the South Pacific Ocean, located in the Central South Pacific between 15° and 23° 30' south and 173° and 177° west. Tonga, with a combined land and sea area of 720,000 square kilometers (km^2), is an archipelago of 172 named islands, of which 36 islands with a total area of 670 km^2 are inhabited. There are four clusters of islands extending along a north-south axis: Tongatapu and 'Eua in the south, Ha'apai in the middle, Vava'u in the north, and Niuafo'ou and Niua

[3] PPCR objectives are to: (a) pilot and demonstrate approaches for integration of climate risk and resilience into development policies and planning; (b) strengthen capacities at the national levels to integrate climate resilience into development planning; (c) scale-up and leverage climate resilient investment, building upon other ongoing initiatives; (d) enable learning-by-doing and sharing of lessons at the country, regional and global levels; and (e) strengthen cooperation and capacity at the regional level. (Ref: Guidance Note on PPPCR Regional Programs. Climate Investment Funds. 6 April 2009)

Toputapu in the far north. Nuku'alofa, the capital, is situated on Tongatapu, the largest island. Tongatapu and 'Eua are limestone capped islands that, with several low islands, form the Tongatapu group. The southern part of the Vava'u group is composed mainly of high volcanic and elevated limestone islands with reef communities or fringing reefs. Ha'apai has high volcanic and low limestone islands. The Niua islands are high volcanic islands surrounded by fringing and barrier reefs.

5. Tonga's location is at the subduction zone of the Indian-Australian and the Pacific tectonic plates and within the 'ring of fire' where intense seismic activity occurs. It is 200 km to the west of the Tonga Trench, a source of tsunamis. Most of its atoll islands including the main island are very flat with an average altitude of 2–5 meters above sea level. They are, hence, highly vulnerable to flooding from storm surges, tsunami inundation, and impacts of climate change.

6. Tonga has a population of just over 101,990 (Population Census, Department of Statistics, Tonga, 2001). Tongatapu is the most populous and has the highest population density, with 71% of the total population. Vava'u has 15%, Ha'apai 7%, 'Eua 5%, and the Niua islands (2%). Over the past 60 years, Tonga's population growth has steadily declined from an average annual growth rate of 3.6% in 1956–1966 to 0.4% in 1996–2006. The country's ranking on the Human Development Index (HDI) is 99 out of 182 countries. There is high adult literacy rate (99%), high gross enrolment rate in primary and secondary schools (78%), high life expectancy (71 years), and relatively high gross domestic product (GDP) per capita ($3,748).[4]

7. Water is a limited resource in Tonga; there is no surface water apart from a few salty lakes on the islands of Tofua and Niuafo'ou. The main source of water is rainwater collection or a thin freshwater lens within the highly porous limestone substrate on most islands. The volcanic island of 'Eua obtains water from caves high above sea level. Many small islands in Ha'apai and Vava'u rely entirely on rainwater tanks for water supply.

8. Agriculture is a key sector in Tonga, providing subsistence and income support for the majority of the population. The sector employs a third of the workforce and accounts for at least half of the country's export earnings. Since the 1950s, Tonga has experienced continuous rise and fall in key export crops, including copra, bananas, watermelon, capsicum, vanilla, and—most recently—squash.

9. Tonga's marine and coastal resources, which include complex and vulnerable ecosystems (including mangroves, coral reefs and sea grasses, beaches, and the diverse species that occupy the coastal habitats), provide livelihoods for many Tongans. The reefs and lagoons are the prime sites for subsistence fishing, and provide a wide range of shellfish and other marine life for consumption or production of shell handicrafts for sale to tourists.

10. The tourism industry is a major contributor to the economy and creates valuable income and foreign exchange earnings. It creates employment through accommodation facilities, restaurants, travel agents and tour operators, and through providing a market for local handicrafts, fishing, and farming products. On average 43,000 tourists arrive annually in Tonga. Tourism also provides economic benefits to the private sector which provides support services in the form of transportation, professional/technical services, and products from retailers and wholesalers.

11. Tonga has no petroleum resources to fuel national energy needs. The limited access to energy continues to present a barrier to Tonga's social and economic development and the alleviation of poverty. Tonga's immediate available energy resources are its depleting

[4] United Nations Development Programme. 2009. *Human Development Report.* New York.

wood stock, abundant coconut residues, and solar energy. The country has no hydroelectric or geothermal potential. Electricity generation is based on costly imported diesel. The country is increasingly reliant on imported petroleum products to satisfy its commercial energy needs. By 2001, imported petroleum products provided 54% of the total energy requirement, with biomass—for households and agricultural processing—amounting to 43%. In 1992, Petroleum imports were worth $3 million (equal to 30% of total imported goods), climbing to $17 million by 2000. Tonga finances the country's huge import costs mostly from remittances (50%–60%), exports (10%–15%), overseas development assistance, and tourism.

Vulnerability to Climate Change and Natural Disasters

12. **Climate.** Lying within the southeast trade wind zone of the South Pacific, the climate of Tonga is tropical. Strong winds are not common except during the passage of tropical cyclones in summer (November–April) and gales from eastward moving high-pressure systems during winter (May–October). There is a pronounced wet season (also the cyclone season) and a dry season that runs from May to October. Rainfall during the wet season contributes two thirds of annual precipitation. The wettest months are January, February, and March when rainfall can greatly exceed 250 millimeters (mm) per month and daytime humidity reaches 75%. During the dry season, rainfall is less than 250 mm per month and humidity is 67%. The annual mean rainfall for the five meteorological stations in Tonga in 1971–2007 was: Tongatapu 1,721 mm, Vava'u 2,150 mm, Ha'apai 1,619 mm, Niua Foou 2,453 mm, and Niua Toputapu 2,374 mm.

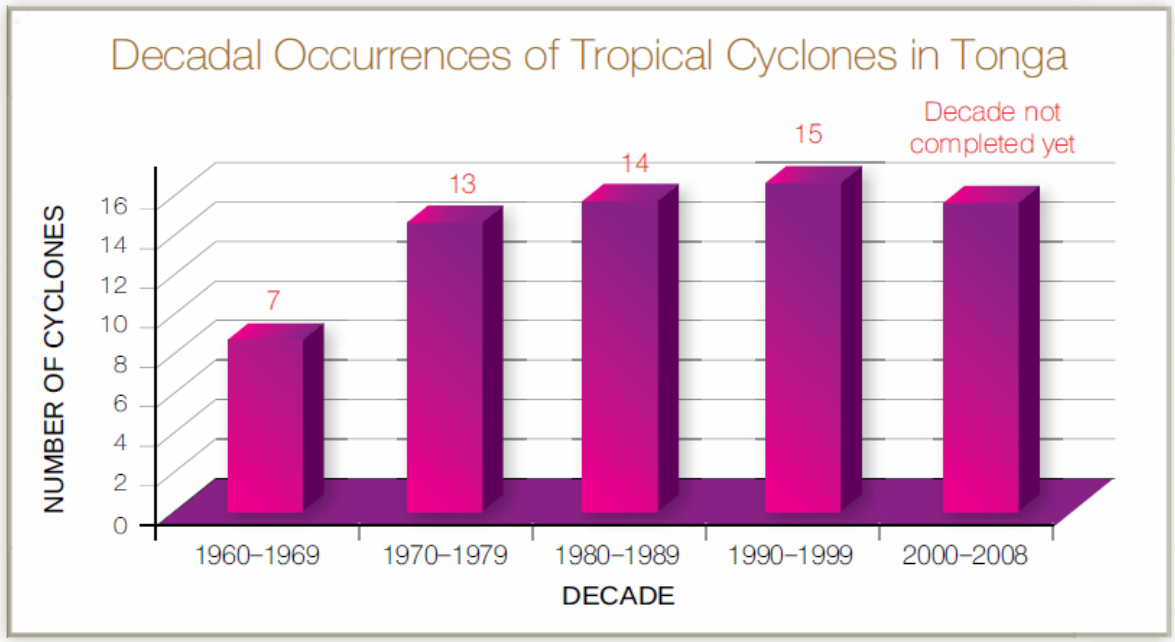
13. Temperatures across the Kingdom show increasing daily and seasonal variations with increasing latitude. Mean annual temperatures vary from 26˚C at Niuafo'ou and Niua Toputapu to 23˚C on Tongatapu, with diurnal and seasonal ranges of 6˚C and 2˚C and 6˚C and 5˚C, respectively. During the hot wet season (November–April), average temperature is 25–26˚C and in the dry cool season (May–October) is 21–24˚C. Climate records for 1971–2007 for Nuku'alofa, Ha'apai, Vava'u, and Niua Toputapu suggest there has been an increase of 0.4–0.9˚C in annual mean temperature throughout the island groups since the 1970s. Data from the Nuku'alofa tide gauge over this period indicate a slight increase in sea temperature.

14. **Climate Change and Climate Variability.** Tonga's Initial Communication to the United Nations Framework Convention on Climate Change (UNFCCC) (July 2005) reported that all key sectors were likely to be significantly affected by climate change, with major environmental, economic, and social consequences. Particular concerns included impacts on agricultural production, water supply, and coastal resources.

15. This was confirmed by Tonga's Second National Communication, which was approved by Cabinet in 2010. Among the key issues identified through the vulnerability and assessment (V&A) process, situation analysis, and consultations, the following climate change related risks were identified: increased average temperature, reduced overall rainfall, more freqent occurrence of intense rainfall, rise in sea level, and increased frequency of extreme events, including intense tropical cyclones.

16. There is an increasing trend in the occurrence of tropical cyclones in Tonga on a decadal basis, and also evidence that the intensity of cyclones in the country has increased since the 1980s. Commonwealth Scientific and Industrial Research Organisation (CSIRO) studies confirm these trends.

Figure 1: Decadal Occurrences of Tropical Cyclones in Tonga (1960–2008)



Source: Tonga Meteorological Service.

17. **Natural Disasters.** Tonga is highly vulnerable to volcanic and tsunami hazards because of its geographical location and geological constitution. Volcanic and tsunami hazards are triggered by earthquake events and often result in extensive damage.

18. **Climate Change Impacts.** The effects of climate change have exacerbated naturally occurring hazards, such as cyclones, coastal flooding, and droughts as well as the impacts of geological hazards such as earthquakes, volcanic eruptions, and tsunamis.

19. Low-lying areas of the islands are affected by rising sea levels, with extensive tidal flooding affecting coastal villages, particularly on Nuku'alofa. Impacts of sea level rise will affect groundwater supplies and agricultural production. Increased incidence of coastal erosion from storm surge together with increased denudation of mangroves and coastal trees present serious concerns for Tonga, particularly since the resilience of natural ecosystems has been compromised by illegal mining of beach sands, off-shore sand dredging for construction purposes, and live coral removal.

20. Tonga continues to receive heavy rainfall, causing flooding and prolonged ponding of water, with health risks including outbreak of water- and vector-borne diseases such as dengue fever. The country's agricultural sector is also affected because some crops cannot tolerate the changing climatic conditions. Heavy rainfall also increases surface runoff and this has resulted in the pollution of coastal areas and lagoons due to sediments and debris being washed into these areas. Most of the traditional root crops in Tonga, such as cassava, taro, and yams, have been disastrously affected due to their sensitivity to dry weather. This in turn has affected food security and related customary practices.

21. Livestock, fisheries, and community health in the islands of Ha'apai and Vava'u, and the Niua islands are extremely vulnerable due to the small size of the islands, their dependence on rainwater, and the high salinity levels of groundwater.[5] Since Tonga depends on primary produce from land and sea for export, periods of severe drought seriously affect

[5] During the 1997/98 El Niño event, the Government spend over T$200,000 in shipping water to the islands in the Ha'apai group, resulting in the diversion of scarce resources that could be used for other socioeconomic development purposes.

the country's revenue earning capacity, people's livelihoods, and food supply. Periods of drought cause health and sanitation problems due to increased air-borne dust and water shortages, since most Tongan residents are heavily dependent on open rainwater catchments for drinking purposes. These are exposed to dust and contamination from a variety of sources, causing diarrhea and respiratory and skin diseases.

22. Higher sea temperature during the El Niño event in 1997–98 affected the fishing industry and resulted in a T$2.8 million (18.7%) decline in exports of fish and other marine products. Increases in temperature continue to cause increases in heat stress and asthma, while also reducing soil moisture and fertility, affecting agricultural production and food security.

23. Episodes of coral bleaching are increasing and their occurrence is becoming common due to increases in sea temperature. A severe coral bleaching event in Tongatapu and the Ha'apai group in 2000 resulted in coral mortality, destruction of habitats for reef species, and reduction in diversity of reef species. This in turn affected the fisheries sector and food security.

24. Sea level has increased by about 6.4 millimeters per year on average since records started in 1993, resulting in increased incidents of coastal erosion. This compounds other vulnerabilities affecting the coastal zone, including low elevation, increasing denudation of mangroves and coastal trees, illegal mining of beach sands, dredging of offshore sand dunes for construction purposes, and live coral removal. A noticeable result of these processes is loss of coastal land and infrastructure. Much of the northern coastline of Hahake from Niutoua to Nukuleka villages is severely eroded, and much of the roadways in the villages of Kolonga, Manuka, and Nukuleka are threatened by coastal erosion. Low-lying coastal villages with elevations less than 2 meters above sea level in the Nuku'alofa area—including Popua, Tukutonga, and the small islands of Nukunukumotu—are currently affected by sea level rise resulting in tidal inundation, particularly during spring tides. Critical infrastructure on Ha'apai is also under threat from erosion, including the hospital in Lifuka and the telecommunications tower. Sea level rise also affects groundwater supplies and agricultural production, particularly in low lying coastal areas throughout the country.

25. Tropical storms and cyclones continue to cause severe damage to crops and food supply, infrastructure, tourist resorts, natural ecosystems, and buildings; and disrupt essential services and the health and well-being of Tongans. They also cause considerable financial loss.[6]

26. The social and economic dislocation that will result from climate change is extreme, with Tonga's vulnerability to climate change further increased by the fact that the country's economy is based largely on agriculture. Over 58% of economically active Tongans are reliant on primary production for livelihoods. Tourism, fisheries, and forestry are also important contributors to GDP and are also being adversely impacted by climate change and associated rises in sea level.

[6] Tropical Cyclone Isaac in 1982 caused damage of T$18.7 million, while Cyclone Waka in 2002 severely damaged the islands of Niuafoou, NiuaToputapu, and Vava'u causing T$104.2 million in damage. Tropical Cyclone Rene (2010) caused T$19.4 million damage to agricultural crops, T$15.6 million damage to residential houses, and T$3 million in damage to roads and causeways.

1.2 Existing Development Plans and Programs

National Approach to Climate Change Adaptation and Disaster Risk Management

27. Tonga has pioneered an approach to climate change adaptation which is being replicated and expanded in other vulnerable Pacific island countries including the Cook Islands, Nauru, and Republic of the Marshall Islands. Tonga's approach is to address current vulnerability to existing extreme events as the mechanism to build resilience to climate change impacts. In the context of limited resources and ability to undertake climate change modeling and research, decision making on priority adaptation interventions is proceeding. Tonga has embarked on a national program to incorporate climate change adaptation (CCA) and disaster risk management (DRM) into development planning. The integration of CCA and DRM through a single harmonized framework (conceptual, financial, and institutional) also has the effect of addressing pressing resource constraints faced by Tonga and similar small island countries.

28. The Tonga Strategic Development Framework (TSDF) 2011–2014 drives Tonga's development and resource allocation. Over the past three decades, the Government of Tonga, being conscious of the country's vulnerability to natural disasters, has made a conscious effort to incorporate environmental issues and disaster risk management into its national planning and development programs, as evidenced in the National Strategic Development Plan (NSDP) and the TSDF. The outcome of Objective 7 of the TSDF calls for the integration of environmental sustainability, DRM, and CCA into all planning and implementation of programs. However, the Government is also conscious of its limited capacity to allocate sufficient resources to sustainably address CCA and DRM issues.

29. There is no Cabinet-endorsed government strategy for climate change adaptation formally in place yet in Tonga. However, the Ministry of Environment and Climate Change (MECC) has, with inputs from some other ministries, developed Tonga's Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management 2010–2015 (JNAP), with assistance from the South Pacific Regional Environment Programme (SPREP) and the Secretariat of the Pacific Community (SPC) Applied Science and Technology Division (SOPAC).

30. Tonga's JNAP, approved by Cabinet in July 2010, outlines several strategic goals: (i) improved good governance (mainstreaming and strengthening CCA/DRM institutional policy frameworks), (ii) enhanced CCA/DRM technical capacity and awareness, (iii) improved CCA/DRM analysis/assessments, (iv) enhanced community preparedness and resilience, and (v) strong CCA/DRM partnerships across government and with nongovernment organizations (NGOs) and civil society organizations (CSOs). The JNAP is in alignment with the National Strategic Planning Framework (NSPF). The JNAP is also consistent with regional CCA/DRM strategies, including the Pacific Plan, Pacific Islands Framework for Action on Climate Change 2006–2015 (PIFACC) and Pacific Disaster Risk Reduction and Disaster Management Framework for Action (2005–2015). Annex 1 shows JNAP key priorities and activities.

31. Tonga has established an institutional framework for mainstreaming climate change adaptation and disaster risk management (Annex 2). While this institutional framework is a milestone in the development of an integrated approach to CCA and DRM, there is still significant need for capacity building and resources (human and financial) to ensure JNAP implementation at the national, sector, and community levels and to provide support to vulnerable sectors.

Assistance from development partners

32. Tonga's national approach to CCA is being supported by development partner assistance that focuses in the main on funding, or filling technical gaps in, Tonga's own program. Australian government programs, including the A$150 million International Climate Change Adaptation Initiative, offer Tonga access to improved scientific information and understanding, strategic planning and vulnerability assessments, capacity building for agencies and individuals, and coordinated assistance in implementation and funding of adaptation measures. The United Nations Development Programme (UNDP) is providing assistance with capacity building, including technology needs assessment and strategic action plans, such as the National Biodiversity Action Plan. UNDP–Global Environment Facility (GEF)-funded projects are supporting many of Tonga's international obligations, including preparation of national communications on climate change and providing support to communities through a small grants program. GIZ, working through the Secretariat of the Pacific Community (SPC), is funding a regional program, with Tonga as one of the pilots, which aims to strengthen Tonga's capacity to cope with the impacts of climate change, especially in such sectors as agriculture, forestry, fisheries, tourism, education, and energy.

33. In addition to the above, other donors and nongovernment organizations (NGOs) include European Union, Japan International Cooperation Agency, Government of France, and International Union for the Conservation of Nature. In parallel with donor programs, Tonga is also receiving support for a wide range of programs funded by multilateral development banks (mainly the Asian Development Bank and World Bank), targeted at sectors, which include, inter alia, infrastructure, energy, transport, communications, education, and urban development. Annex 3 provides an overview of the main development partner initiatives on CCA and related DRM.

34. While a range of assistance is being provided, Tonga's current capacities and resources fall short of those required to deal with its climate change vulnerabilities in a systematic and integrated way in order to achieve the JNAP goal of enhanced resilience to climate change and related disaster risk reduction. Close coordination with development partners in the design and implementation of PPCR supported investments will ensure complementarity and avoid duplication of effort.

1.3 Participatory Process and Ownership in Developing the SPCR

35. In line with PPCR guidelines, the design of the SPCR was based on a participatory approach, emphasizing country ownership and collaboration of government, civil society (including private sector and NGOs) and communities, as well as development partners. Each stakeholder group plays a distinct role in planning and implementation of CCA and related DRM initiatives in Tonga. The Government prioritizes and drives the CCA and related DRM integration effort into national planning and budgeting processes, but resources and capacity are limited such that support is required. At the local level, coastal communities are directly impacted by climate change and have particular concerns and needs. The private sector also has an important role to play in ensuring businesses respond to climate change risks and impacts, and there are opportunities in providing CCA goods and services to communities and government. The participatory consultation process undertaken during development of the SPCR discussed these differing roles, concerns, and needs, which are reflected in the approach of the proposed SPCR investments. See further details in Annex 4.

36. As one key part of the participatory process, extensive broad-based national consultative workshops were conducted. These workshops included representatives from

government agencies, civil society and NGOs, and private sector groups[7] and built on the inclusive and country-driven process used to develop Tonga's JNAP. The workshops determined where the PPCR program could add value to Tonga's integrated approach to CCA and DRM and how the PPCR would best support mainstreaming of CCA and DRM in development planning, including scaled-up action toward climate resilience.

37. A five-step process was followed to identify systematically the priority areas for PPCR support. These steps and their outcomes are described below.

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

- **Step 2: Assessment of Climate Change Risk** to estimate, evaluate, and rank climate change risks affecting individual vulnerable communities and sectors (Annex 5). The assessment used a multiple criteria analysis[8], to identify the priority risks from climate change, shown in Table 1. The assessment was particularly valuable as it refined the vulnerability assessment undertaken through the JNAP process and served to provide, for the first time, a ranking and rationalization of priorities.

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

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

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[7] While several attempts were made to engage the private sector through the International Finance Corporation (IFC), this met with limited success as IFC advised that it was not able to participate in SPCR development consultations and missions.

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

The assessment of capacity for adaptation also highlighted Tonga's considerable progress in implementing Stage 1 adaptation measures. However, Stage 2 and Stage 3 adaptation measures require considerable work and resources. The need to integrate CCA and DRM considerations into infrastructure design, building codes, and physical/coastal planning processes was also identified as an urgent priority. Broad-based capacity building was also identified as a critical need.

- **Step 4: Definition of Priority Action Needs/Investments** was undertaken by national stakeholders to ensure that SPCR investments met priority needs while complementing ongoing programs and existing sectoral and thematic strategies. Eight thematic working groups identified priority needs for the following sectors: water, agriculture/forestry/fisheries/food security, health, private sector, infrastructure, energy, coastal resources, and finance/economic. This process identified priority investment options required to support Tonga's integrated CCA/DRM approach. These priority investment options were shared with development partners and regional agencies to determine gaps and develop the proposed SPCR investment program and components. Donors provided input on current and planned programs that addressed these needs in order to identify where PPCR could provide additional priority support (Annex 6).

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

38. For the design of implementation modalities and to ensure sound, transparent, and timely management of PPCR supported investments, the Government of Tonga, multilateral development banks, development partners, and regional organization representatives identified effective implementation arrangements, including the need for establishing a program management unit (PMU). The need for a PMU was reiterated during the Second Joint Programming Mission, which took place in Nuku'alofa from 5-9 March 2012.

39. The institutional framework, approach and key activities undertaken to develop the SPCR are summarized below in Figures 2 and 3.

Figure 2: Framework for SPCR Preparation

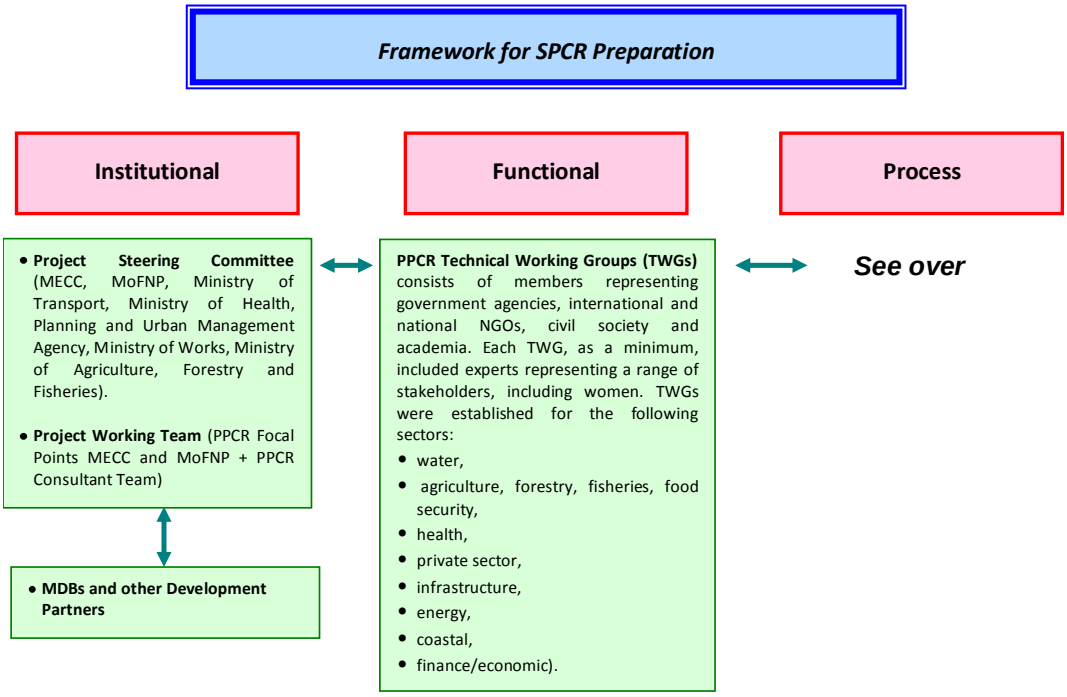

Figure 3: Methodical Approach to SPCR Preparation in Tonga

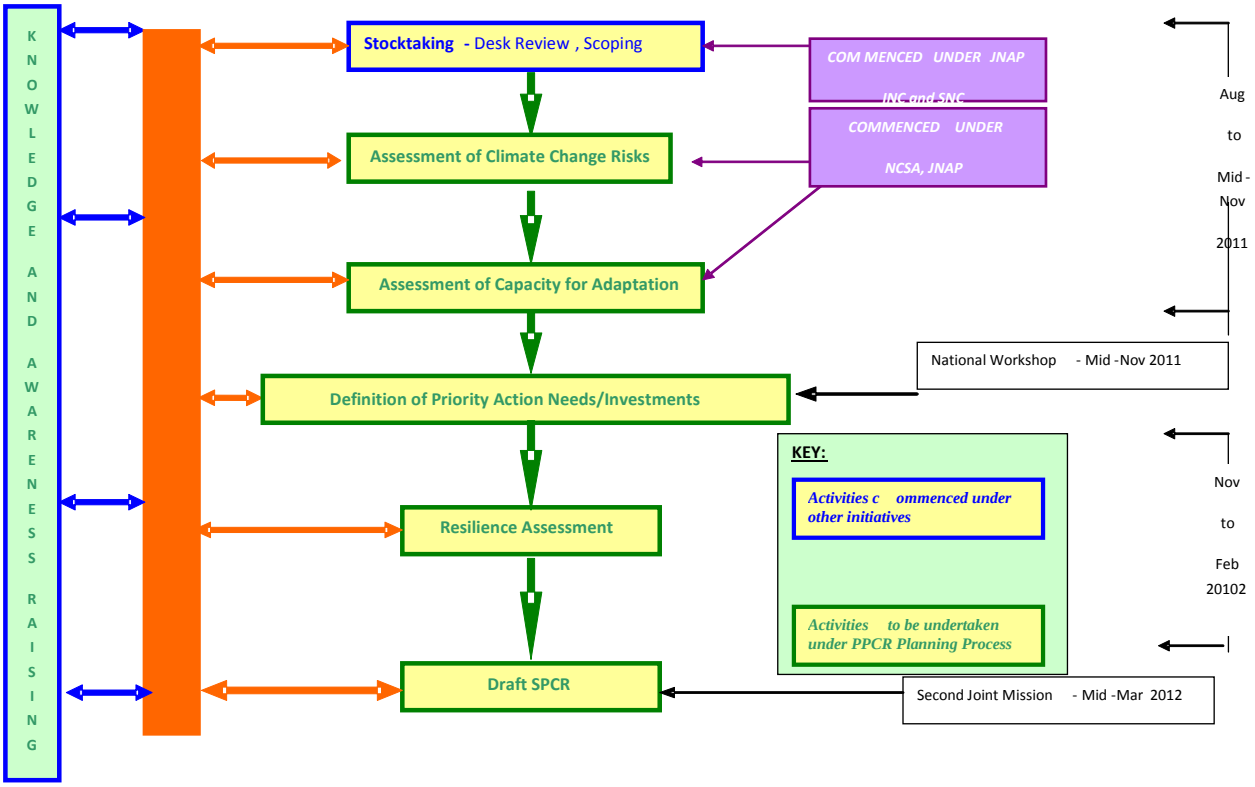

Table 1: Summary of Priority Risks for Tonga Identified by Thematic Working Groups

Event Risks	Outcome Risks	Ranking of Risks (9 = highest, 7 = lowest)
1. Increase in extreme events (drought)	Less agricultural production affecting food security, costs of recovery	9
2. Increase in intensity of tropical cyclones combined with increase in sea level and storm surge (coastal inundation)	Damage to and destruction of coastal property and infrastructure, resulting in high costs for recovery, increased costs for insurance and investment, loss of investments, and associated impact on the economy	9
3. Increase in intensity of tropical cyclones/increase in temperature	Less agriculture and fisheries production affecting food security	8
4. Changes in precipitation	Increased incidence of water- and vector-borne disease	8
5. Increase in extreme events (storms) and intensity of tropical cyclones	Damage to critical infrastructure, including water infrastructure and energy infrastructure (petroleum storage, power stations, transmission lines, solar home systems, etc.)	8
6. Changes in temperature and precipitation	Impact on water demand and water quality/quantity for household consumption	8
7. Sea level rise	Seawater intrusion, affecting groundwater quality	7

1.4.1 Rationale for PPCR Support

40. Tonga's significant vulnerabilities and limited capacities and resources require a systematic and integrated approach toward achieving the goals of building climate change resilience and disaster risk reduction, rather than a series of short-term under-resourced interventions.

41. Despite country commitment to climate change adaptation and the existence of a national strategy - the JNAP - for such an integrated approach, limited attention has been given beyond the Ministry of Environment and Climate Change (MECC) to climate change risk concerns in national and sector policy planning and budgetary processes or in the design of individual projects. There have been initial ad hoc measures for mainstreaming, for example, ensuring incorporation of disaster risk reduction (DRR) and DRM practices in local building codes, but this has yet to receive government endorsement. Further, such efforts are limited and severely resource-constrained. While MECC submits cost proposals for implementing the JNAP to the Government's Cabinet for inclusion in the annual budget proposals, climate change risk management has yet to be incorporated into planning and budgetary processes. There is limited budget to meet even current priority development needs, let alone the cost of adaptation. The problem is exacerbated by limited understanding of climate change risks and lack of technical capacity to integrate climate change risk management into planning processes. Capacity to undertake climate change risk management is extremely limited at national, sector, and local levels. There is still need for considerable capacity building to ensure effective mainstreaming at the national, sector, and community levels and within vulnerable sectors. Active involvement of the private sector, which to date has had minimal engagement in the JNAP process, is needed to accelerate

progress towards climate change mainstreaming. These efforts require significant inputs for capacity building at all levels, including for government institutions, civil society organizations, and the private sector. Given the severe budgetary constraints of the Government, and recognizing the urgency to address the potentially adverse impacts of climate change, PPCR-funded support is needed to facilitate transformation towards climate resilient growth and development. Obviously, support aimed at addressing the significant impediments or risks to JNAP implementation, as the primary driver of climate change mainstreaming, assumes high priority. Accordingly, the design and implementation of the Tonga SPCR:

- builds on the work already undertaken in Tonga in integrating CCA and DRR into national planning processes;
- builds on ongoing development partner-supported national programs, and will scale-up and leverage climate change financing and investments; and,
- will provide best practices and lessons learned for sharing with other Pacific countries.

42. The SPCR will undertake cost-effective interventions through “enabling” and “enhancing” activities. Their main effect on reducing climate change-related damages and risks will be based on public and private adaptation projects that are enabled and enhanced by the activities of the SPCR. The SPCR components will facilitate both planned adaptation, resulting from deliberate policy decision, and spontaneous adaptation, resulting from autonomous households and communities that can benefit from better access to information and funds. As such, these components will have a positive impact on the adaptation results of private initiatives, facilitating market efficiency in solving adaptation challenges, and of public initiatives, providing authorities with the tools they need to design, plan, and implement their adaptation strategies.

43. Sustainability of SPCR interventions is critical. SPCR interventions will support Tonga’s national approach to integrating CCA and DRM, which is in turn supported by allocations in the annual national budget, institutional frameworks and support staff (JNAP Secretariat), and ongoing development partner assistance. These are all key elements to ensure sustainability in the short to medium term. Long-term sustainability will be determined by the effectiveness of government, SPCR, and development partner interventions, and whether the JNAP approach provides a realistic and cost-effective solution to addressing risks from climate change and natural disasters.

44. ADB has a strong development partnership with the Government of Tonga. Current ADB programming includes the Nuku’alofa Urban Development Sector Project, Implementing Strategic Economic Management Project, and forthcoming Public Finance Management Road Map. These provide ADB with a clear understanding of the challenges involved in mainstreaming climate change considerations into government operations. The Road Map, which will strengthen capacity of the Department of Finance, provides an opportunity to introduce climate change considerations into central government planning and budgeting processes. ADB also developed the Climate Change Implementation Plan (CCIP) in 2009, which defines the strategic program for mainstreaming climate change considerations into country programming. In pursuing CCIP objectives, ADB has supported piloting of practical adaptation measures in the Pacific region, including pioneering initiatives aimed at building climate change risk management capacity at the community level. With SPCR support, ADB will be facilitating the transfer to Tonga of best practices and lessons learned to other countries in the Pacific. The Pacific regional SPCR will also complement this effort, through the support of the Council of Regional Organisations of the Pacific (CROP), by providing additional capacity support to implement the Tonga SPCR pilot activities and by replicating lessons learned and best practices from Tonga to other Pacific countries.

2. PROPOSED SPCR INVESTMENT PROGRAM AND SUMMARY OF COMPONENTS

3.1 Overview of Proposed SPCR

45. The SPCR takes as its starting point the principle that it will build on the accomplishments achieved during the PPCR Phase 1 "design and capacity-building" phase. Phase 1 of the PPCR provided the Government of Tonga, along with a range of other stakeholders, an opportunity to identify, through a formalized process, the impediments to integrating climate change adaptation into its development planning and budgetary processes, and the enabling activities that will facilitate this. Government technicians/managers and representatives of civil society and the private sector have been trained to undertake semi-quantitative risk assessments and capacity assessments as well as understand the language of, and approaches that can be used to develop, climate change adaptation and related disaster risk reduction.

46. This SPCR builds on this preparatory and design process to achieve "transformational" change by supporting implementation of Tonga's national strategy to integrate CCA and related DRM and enable Tonga to become resilient to climate change and climate-related disasters. The investments proposed in the SPCR will build on the transformational change that has commenced with the development of Tonga`s JNAP by providing the strategic human, technical, and financial inputs needed to implement JNAP activities, thereby supporting Government's poverty alleviation goals.[9] As a consequence, the proposed investments in the SPCR will support and complement the efforts aimed at achieving key goals of the JNAP.

47. The SPCR is a package of closely linked, mutually supporting, and phased interventions that together provide the framework required to support transformation to a climate resilient development path at the national, island, and community levels within vulnerable economic sectors. The proposed SPCR investments will (i) build capacity; (ii) provide information, tools, and legislative frameworks needed for informed climate change risk management; and (iii) provide access to resources (technical, human, financial) to address the climate change risk-related priorities of the Government, as well as those of vulnerable communities. This will lead to a progressive increase in the resilience of ecosystems and infrastructure that are the foundations of the country's sustainable development aspirations. The SPCR will complement the key goals of the JNAP.

48. The overall outcome of the SPCR will be enhancement of Tonga's resilience to climate change and climate-related disasters through strengthened capacity, increased knowledge and information, and enhanced access to finance and technical support for climate change adaptation and disaster risk management.

49. In seeking this transformation, the proposed investments in the SPCR will address key impediments facing Tonga's current efforts to implement the JNAP. These include

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[9] Tonga's JNAP, approved by Cabinet in July 2010, outlines six strategic goals including the following: (i) improved good governance (mainstreaming and strengthening CCA/DRM institutional policy frameworks); (ii) enhanced CCA/DRM technical capacity and awareness; (iii) improved CCA/DRM analysis/assessments; (iv) enhanced community preparedness and resilience; and (v) strong CCA/DRM partnerships across government and with non-government organizations (NGOs) and civil society organizations (CSOs).

- limited pool of qualified and trained experts to mainstream CCA/DRM at local community, sectoral, and national levels;
- inadequate information, tools, and legal frameworks; and
- Inadequate access to financial resources and challenges to accessing climate change financing.

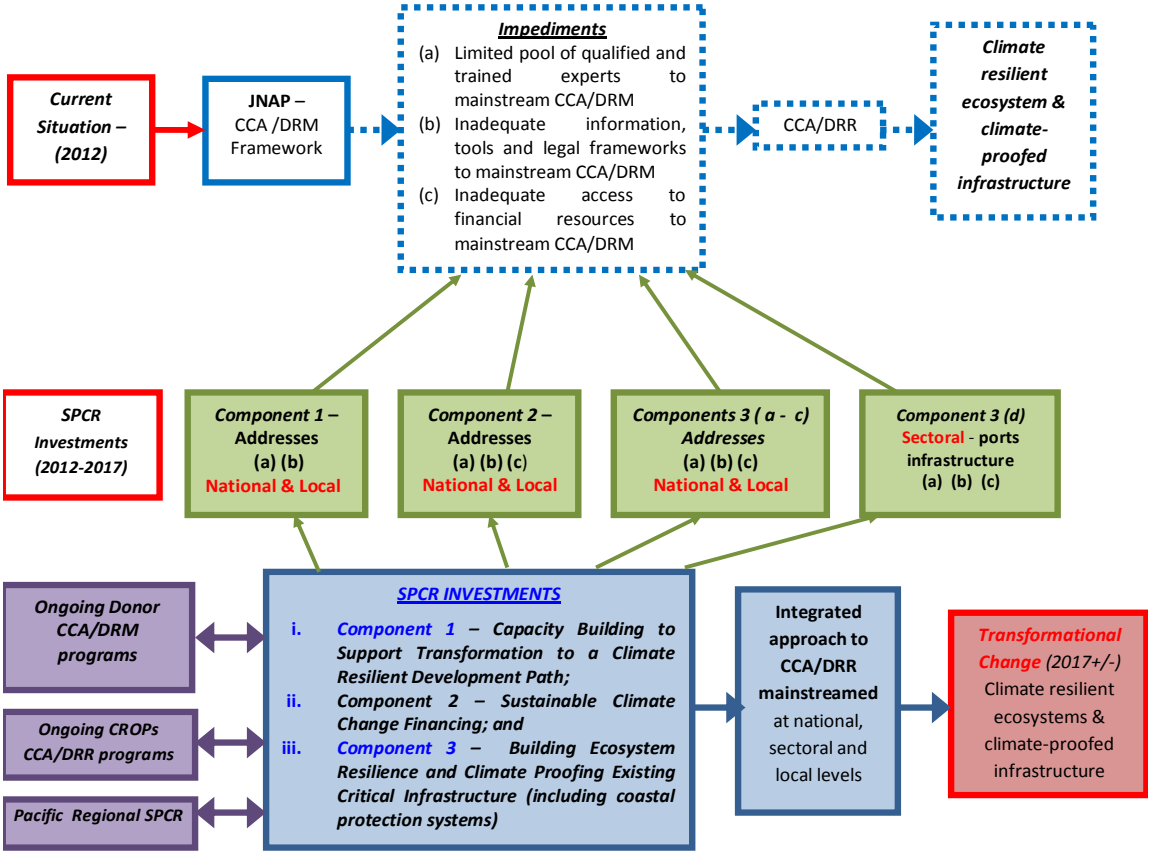
50. This support will be provided through three component activities, listed below (Table 2) with their expected outcomes:

Table 2: SPCR Component Activities and Outcomes

Component	Activities	Outcome
1	Capacity building to support transformation to a climate resilient development plan	• A local pool of qualified trained personnel who are able to mainstream climate change and related disaster risk reduction at community, sector, and national levels
2	Sustainable climate change financing	• A "fast start" climate change financing framework, which will support priority CCA/DRM interventions in vulnerable communities, primarily for climate-proofing activities, and provide a social safety net for these communities
3	Building ecosystem resilience and climate proofing critical infrastructure	• Climate change adaptation and disaster risk management integrated into Tonga's physical planning processes • Tonga's coastal fishery/agriculture/protected areas more resilient to impacts from climate change • Critical ports and associated infrastructure less vulnerable to impacts from climate change and disasters through the adoption of a revised NIIP addressing potential climate change impacts and resilience to such impacts through "climate proofed" infrastructure investments under an enabling policy and legislative framework.

51. Each component will address the key impediments noted above and listed in the schematic diagram below. The three components will be mutually reinforcing and will together achieve the purpose of the SPCR.

52. The proposed investments in the SPCR will catalyze further collaboration on resilience to climate change and disaster risk reduction between ADB, the JNAP Secretariat, and Tonga infrastructure agencies (which implement the NIIP) at the national level. These investments will in turn support sharing of information and knowledge products between Tonga's national stakeholders and other Pacific countries and regional organizations, while improving ongoing coordination and harmonization of national and regional CCA and DRM responses.



53. In terms of risks facing the proposed SPCR approach—and the SPCR investments that strategically support this approach—while Tonga has devoted considerable resources and made commendable commitment to developing and establishing an integrated approach to CCA and DRM, two main risks present challenges for SPCR implementation: any weakening of the high level of political support for this approach, and the fact that much of the technical support for this transformational work is vested in a handful of JNAP staff. The former risk will be successfully managed only if Tonga's integrated CCA/DRM approach continues to generate political, economic, and institutional benefits for government. It is proposed that SPCR investments address the latter risk by expanding and broadening the pool of CCA/DRM experts at the national, sectoral, and community levels and within civil society.

Summary of Components

54. The priority investments for support under Tonga's SPCR are described below. They are based on the priority risks and needs identified by stakeholders during the PPCR National Consultative Workshop (referred to earlier and detailed in Annex 4), inputs received from development partners and regional agencies regarding which priority needs are being supported under other projects, and consultations with the Government of Tonga and other stakeholders to identify priority areas that still remain unfunded.

2.2 Component 1: Capacity Building to Support Transformation to a Climate Resilient Development Path

Objectives

This component supports much needed capacity building required to mainstream CCA and DRM into development planning at the national, sector, and community levels.

Outcomes

The key outcome will be the establishment in Tonga of a pool of trained and qualified specialists to support CCA and DRM mainstreaming activities at national and sector levels and within vulnerable communities.

Activities

Component 1 will support the following activities, further outlined in Annex 7 (including key indicators and baseline, anticipated activities, risks, and investment costing):

- Design and implementation of a broad-based in-country train-the-trainer program and subsequent training programs for public and private sectors, NGOs, civil society, Outer Island Councils, and vulnerable communities on a broad range CCA and DRM topics.
- Scholarships for government technicians/managers to attend university-level programs (on climate change risk management, economics of climate change, coastal engineering and climate proofing critical coastal infrastructure, integration of CCA and DRM into physical planning and natural resource management, the science of climate change, and climate change policy and law). Scholarships will be targeted to the role and responsibility of the representative agency.
- Development, through broad-based consultative processes, of an appropriate enabling legal framework for climate change adaptation and disaster risk management.
- Establishment of a Program Management (PMU), separate from but working in close collaboration with MECC and the JNAP team, and staff training.
- Training and assistance for vulnerable communities and civil society to undertake community-level climate change vulnerability mapping and adaptation planning and disaster risk management.
- Establishment of appropriate community-based early warning systems in vulnerable communities based on community vulnerability mapping and real-time hydro-met and coastal monitoring and data collection undertaken under Component 3 (1).

2.3 Component 2: Sustainable Climate Change Financing

Objectives

Component 2 will establish a nationally driven, responsive, and transparent “fast start” climate change financing framework to

- support priority climate change adaptation and disaster risk management projects in vulnerable communities and sectors; and
- provide a social safety net for vulnerable communities and sectors, which will address impacts from extreme climate change events on livelihoods and food security, thereby supporting poverty alleviation.

Outcomes

The outcome will be the legal establishment and effective operation of a Climate Change Trust Fund and, through the trust fund, establishment of:

- a small grants program that will provide "fast start" financing for priority CCA and DRM projects in vulnerable communities and sectors, focusing primarily on infrastructure climate proofing using viable hard and soft engineering solutions; and
- prospectively, a climate change and disaster risk microfinance and micro-insurance program launched for farmers, fishers, and vulnerable communities and groups, in particular women.

Activities

Component 2 will support two major activities. A full description is given in Annex 8 (including key indicators and baseline, anticipated activities, risks, and investment costing), and is summarized below:

- legal establishment, through broad-based consultative processes, of Tonga's Climate Change Trust Fund; and
- provision of seed funding to launch a small grants program for "fast start" financing of priority CCA and DRM projects in vulnerable communities. The grants are to be used to implement community climate change risk management plans developed under Component 1(e)—primarily focusing on climate proofing critical community infrastructure using hard and soft engineering solutions (including community climate resilient infrastructure initiatives for access roads, jetties/wharves, and water supplies)—and early warning systems developed under Component 1(f). Additionally, the fund could provide support establishment of a climate change and disaster risk microfinance and micro-insurance program for farmers, fishers, and vulnerable communities, in particular women (50% of funding to be reserved for women and women's organizations).

2.4 Component 3: Building Ecosystem Resilience and Climate Proofing Existing Critical Infrastructure (including Coastal Protection Systems)

Objectives

Component 3 seeks to strengthen physical planning and development processes in order to improve the resilience of vulnerable coastal ecosystems to climate change impacts while climate proofing existing critical infrastructure.

Outcomes

Key outcomes include

- Climate change adaptation and disaster risk management integrated into Tonga's physical planning processes;

  Tonga's coastal fisheries, agriculture, and protected areas that are more resilient to impacts of climate change;

  Critical ports and associated infrastructure less vulnerable to impacts from climate change and disasters through the adoption of a revised national infrastructure investment plan (NIIP) addressing climate change risks and building resilience to such impacts through "climate proofed" infrastructure investments under an enabling policy and legislative framework

Activities

Component 3 will support the following activities, which are fully described in Annex 9 (including key indicators and baseline, anticipated activities, risks, and investment costing):

- establishing a national system of real-time hydro-meteorological and coastal monitoring stations and data collection/dissemination supported by capacity building in the Tonga Meteorological Service;
- producing a water resource inventory in order to develop an integrated coastal and water resource management plan;
- implementing ecosystem-based climate resilient fisheries, agriculture and/or protected areas management in pilot vulnerable communities; and
- developing a climate proofed National Infrastructure Investment Plan (NIIP) through mentoring/training of local counterparts and establishing an "enabling framework" for climate proofing critical ports and associated infrastructure (including climate proofing relevant building codes and engineering design) as well as implementing selected initial physical investments.

NIIP updating and SPCR detailed project design processes will occur in tandem and will inform each other.

2.5 Budget

55. The total budget for the SPCR is $15 million (grant). Allocations by component are summarized below.

Component 1 Budget

Budget Item	Grant Request
Design/implement train-the-trainer program and roll-out training	1,000,000
Scholarships	250,000
Develop enabling legal framework for CCA and DRM	200,000
Staffing/training of the JNAP/PPCR management unit + PPCR project management	1,350,000
Train/assist pilot vulnerable communities to undertake community-level climate change vulnerability mapping, adaptation planning, and disaster risk management	450,000
Develop/establish community-based early warning systems in pilot communities	550,000
Total	3,800.000

Component 2 Budget

Budget Item	Grant Request ($)
Legally establish and operationalize the Climate Change Trust Fund.	200,000
Provide seed funding to the Climate Change Trust Fund to launch a small grants program to implement community climate change risk management measures, primarily focusing on (i) climate proofing critical infrastructure using hard and soft options (including community climate resilient infrastructure initiatives for access roads,	5,000,000

jetties/wharves, and water supplies), and (ii) support for climate change and disaster risk microfinance and micro-insurance program - for farmers, fishers, and vulnerable communities and groups, in particular women.	
Total	5,200,000

Component 3 Budget

Budget Item	Grant Request
Establish national system of real-time hydro-meteorological and coastal monitoring stations and capacity building for the Tonga Meteorological Service (TMS) and Ministry of Lands, Survey and Natural Resources (MLSNR)	1,500,000
Water resource inventory and development of an integrated coastal and water resource management plan	1,500,000
Ecosystem-based climate resilient fisheries/agriculture/protected areas management in pilot vulnerable communities	1,000,000
Develop "climate proofed" NIIP through mentoring/training of local counterparts and establishment of "enabling framework" for climate proofing critical ports infrastructure (including climate proof relevant building codes and engineering design). Some initial implementation of physical investments should commence to inform the development of the enabling framework.	2,000,000
Total	6,000,000
Grand Total	15,000,000

2.6 Implementation Arrangements, Coordination, and Results Management

National SPCR and Regional SPCR linkages

56. The national SPCR will be the main driver of activities in Tonga, with the regional SPCR providing technical support and synthesizing and communicating lessons learned and best practices from the Tonga, Papua New Guinea, and Samoa SPCRs for the benefit of all countries in the region, especially the 11 Pacific countries that are outside the scope of national PPCR pilots.

SPCR supported work in Tonga will aim to

- demonstrate integration of CCA and DRM approaches at the community level;
- promote integrated CCA and DRM approaches in practical applications, including the climate proofing of key economic sectors and assets (ports, roads, and tourism); and
- provide best practice examples of transformational change within an integrated and coordinated framework for CCA and DRM that can be replicated and expanded by the regional SPCR through piloting and demonstration methodologies.

The regional SPCR will build on capacity building technical assistance to be provided by CROP agencies for

- community vulnerability mapping and disaster risk management and adaptation planning (CCA/DRM), tied to the development of community-level early warning systems to be integrated into coastal zone management planning;

- integrating CCA and DRM into the land-use planning process and coastal zone management process;
- integrating CCA and DRM into the operations of key infrastructure agencies and climate proofing their assets (roads, ports authorities) and the assets of key economic sectors (tourism);
- integrating CCA and DRM into fisheries management to address urgent food security issues.

57. A principal synergy between the national and regional PPCR programs is the regional SPCR's establishment of a pool of CCA and DRM experts at the regional level, termed the Regional Technical Support Mechanism (RTSM), to be deployed in support of national and regional PPCR activities, with a number of core experts financed under the national PPCR programs to provide immediate support to national PPCR programs in Papua New Guinea, Samoa, and Tonga. The RTSM will develop a network of experts from a range of organizations, including CROP agencies, who will work together to provide services to support the effective implementation of national PPCR programs in the three pilot countries on a needs basis and in a cost-effective way. The experts' network can advise on appropriate resource opportunities, strategic approaches, and technical assistance; it can provide, where necessary, support in developing project concepts and proposals, preparing reporting requirements, and in project monitoring and evaluation. This support will be particularly relevant for Papua New Guinea, Samoa, and Tonga to overcome extreme capacity constraints and to reduce transaction costs in mobilizing and implementing financial and technical resources effectively.

58. The regional SPCR will also support priority capacity building needs identified by Tonga, namely, the establishment of an effective climate change financing framework to implement urgent climate change adaptation measures at the community and national level, and for civil society. The CROP agencies have expertise and ongoing activities related to all three components of the Tonga SPCR and will be willing and able to provide advice and assistance as required by the Government of Tonga.

Management of SPCR Components

59. The Ministry of Environment and Climate Change (MECC), combined with the Ministry of Finance and National Planning (MoFNP), will be responsible for overall coordination of SPCR implementation, and for overall SPCR program monitoring and oversight. The MECC will report to the Cabinet Committee on Climate Change (CCCC) to provide regular reports on SPCR implementation and administration. The Technical Working Group (TWG) for Climate Change, comprising technical experts from government, NGOs, and statutory boards, and the PPCR working level focal points (MoFNP and MECC) will provide technical input during SPCR implementation from other ministries.

60. The SPCR will support the establishment of a SPCR program management unit (PMU), separate from but working in close collaboration with MECC and the JNAP team. Individuals for the PMU will be recruited in accordance with ADB's Guidelines on the Use of Consultants (April 2010, as amended from time to time) and tasked to provide mentoring to counterpart staff. The PMU will focus on the implementation of the SPCR, including public outreach and awareness on the SPCR program. The JNAP team has a much wider jurisdiction and scope, coordinating all CCA/DRM-related activities at the national, sectoral, and local levels. It is the intention of the Government of Tonga that the JNAP secretariat, SCPR PMU, and other relevant PMUs merge to form an umbrella MECC/MoFNP PMU for all MECC/MoFNP JNAP-related projects. Funding for these projects would eventually be through a donor basket fund channeled through the Climate Change Trust Fund.

61. Component 3(d) activities—which focus on climate proofing the assets of infrastructure agencies and building internal capacity to assess and manage climate change risks—will be implemented in collaboration and with support of the Pacific Region Infrastructure Facility (PRIF) partners, noting that PRIF is a multi-partner infrastructure coordination and financing mechanism initiated in 2008 by ADB and other development partners. Existing PRIF partner implementation modalities will be used.

Role of ADB

62. ADB has a strong development partnership with the Government of Tonga. Current ADB programming under its Nuku'alofa Urban Development Sector Project, Implementing Strategic Economic Management Project, and forthcoming Public Finance Management Road Map have provided ADB with a clear understanding of the challenges involved in mainstreaming climate change considerations into government operations. The Road Map, which will strengthen the capacity of the Department of Finance, provides an opportunity to introduce climate change considerations into central government planning and budgeting processes.

63. ADB developed the Climate Change Implementation Plan (CCIP) in 2009, which defined the strategic program for mainstreaming climate change considerations into country programming. In pursuing CCIP objectives, ADB has supported the piloting of practical adaptation measures in the Pacific region, including pioneering initiatives aimed at building climate change risk management capacity at the community level. With SPCR support, ADB is facilitating the transfer to Tonga of best practices and lessons learned from its flagship partnership with the Government of the Cook Islands on community vulnerability mapping. This initiative is based on strong demand from national authorities, NGOs, and communities. ADB's on-the-ground presence in Tonga through a development cooperation office, shared with the World Bank, underpins its strong relationship with the Government, and facilitates quick responses to issues of mutual interest as well as knowledge sharing.

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

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

Roles of Development Partners and Regional Organizations

66. Development partners and regional organizations will continue to be consulted during Tonga's SPCR detailed project preparation and implementation; this will ensure alignment with existing and planned donor programs and incorporation of lessons learned into future climate change programs being developed for Tonga and the region. Regional organizations and bodies—including CROP agencies, the Pacific Infrastructure Advisory Centre (PIAC) and the Pacific Regional Infrastructure Facility (PRIF)—will continue to be consulted through meetings of the Pacific Climate Change Roundtable and Development Partners for Climate Change and other regular liaison channels. During detailed project preparation, the timing

and implementation modalities for this SPCR and the Pacific regional SPCR will be decided in tandem.

SPCR Results and Knowledge Management

67. The program's Results Framework (RF) (Annex 10) summarizes the expected impacts of the program overall and at the component level. A detailed DMF, including outcomes and outputs, for each component will be developed during the detailed project preparation stage of the SPCR. This will be informed by the monitoring and evaluation framework in the JNAP and updated NIIP.

68. The overall impact envisioned is increased resilience to climate change and disaster risks. The overall outcome is a strengthened enabling environment for climate and disaster risk reduction. The overall outputs for Components 1 to 3 are: (i) strengthened capacity to support transformation to a climate resilient development path, (ii) sustainable climate financing, and (iii) strengthened ecosystem resilience and climate proofed critical infrastructure.

Key expected SPCR outcomes include

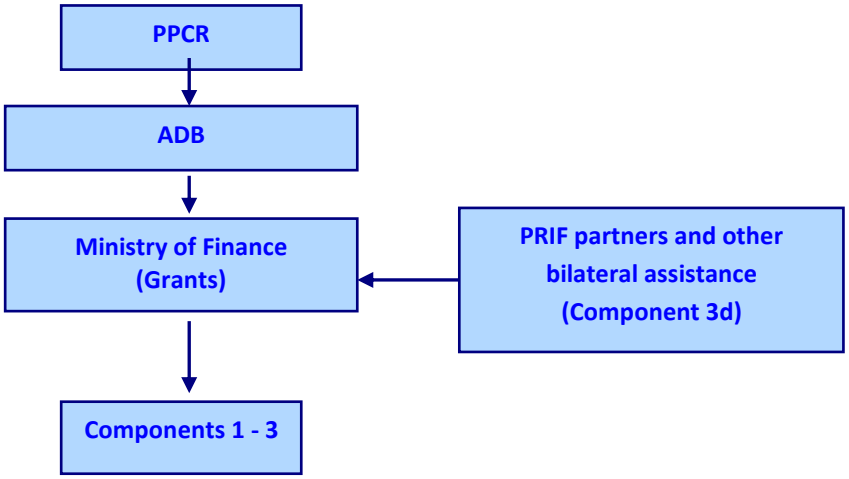
- a significant pool of CCA and DRM expertise established over the next 5 years through a program of training and capacity building at the national, sectoral, and community levels, to coordinate, direct, and guide climate change mainstreaming activities;
- Communities and NGOs trained to map (using global positioning system and geographic information system technology), evaluate, and manage climate change risks autonomously; and provided with access to technology and finances to climate proof critical community infrastructure (sea defenses, buildings, houses, access roads, water storage facilities, jetties, etc.), while reducing their vulnerability through active engagement in community early warning systems (tied to a comprehensive nation-wide hydro-meteorological service) and community-based interventions aimed at building climate resilient fisheries and agriculture to address pressing food security concerns;
- a nation-wide water resources inventory that will support the development of integrated water and coastal resources management planning at the community and island levels to address pressing threats from climate change. Together with the national system of hydro- meteorological stations, the water resources inventory will establish for the first time in Tonga the knowledge and information base required for informed decision making to guide effective climate change risk management of the water sector at the national and community levels; and
- strengthened CCA and DRM knowledge, capacity, and access to information at the national, sectoral and community levels, to ensure that risk management measures and skills developed to climate proof critical infrastructure through SPCR interventions are used in the day-to-day activities of key agencies—while managing climate change risks in their daily lives becomes a reality for vulnerable communities.

69. The development, dissemination, and application of knowledge products generated by the SPCR, as well as initial implementation of infrastructure investments, will form a critical output of the program. Each of the three components will develop knowledge specific to its work and activities. These products will be tested on the ground and peer reviewed before dissemination to national and regional stakeholders; they will be provided through national and regional gateways, such as the Climate Change Portal and the Pacific Disaster Network. These products will be mediated to ensure that overlap is minimized and that

consistent and priority messages are disseminated. MECC/MoFNP will have a role in ensuring this cross-fertilization of knowledge occurs.

SPCR Fund Flow

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



3. PROJECT PREPARATION GRANT

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

OFFICE OF THE MINISTER FOR FINANCE & NATIONAL PLANNING

MINISTRY OF FINANCE & NATIONAL PLANNING
NUKU'ALOFA
TONGA

Reference: 69/34/92

28 March 2012

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Dear Ms Bliss-Guest

Subject: Kingdom of Tonga's Proposal for the Strategic Program on Climate Resilience

The Government of the Kingdom of Tonga is pleased to submit the proposal for Strategic Program for Climate Resilience (SPCR). This program undertook broad-based national consultations, including consultative workshops held in September and November 2011 to identify priorities for SPCR support. These priorities were finalised during stakeholder consultations held during the PPCR Second Joint Mission from 5-9 March 2012.

The PPCR support will add substantial value to Tonga's efforts in leading the country to a climate resilient development path, consistent with its poverty reduction and sustainable development goals. In view of Tonga's financing needs for climate change adaptation and related disaster risk reduction, the government decided to apply for PPCR support to these efforts.

We are pleased to learn that the expert reviewer endorsed by PPCR Sub-Committee has positively evaluated the SPCR for Tonga. Please find attached the review and a note that describe how the suggestions and recommendations from the review have been considered in the final document.

The government will send a representative to present the Tonga SPCR proposal at the PPCR sub-committee meeting to be held in Washington DC on 30 April 2012. The representative will be pleased to respond to any queries of the sub-committee members.

We sincerely hope that the PPCR sub-committee will favourably consider the Government of Tonga's SPCR proposal.

Yours sincerely

MINISTER FOR FINANCE TONGA

Hon Sunia M Fili
Minister for Finance and National Planning

P.O. Box 87, Vuna Rd, Nuku'alofa Telephone: (676) 23066 Fax: (676) 26011 Email: minister@finance.gov.to

Annex 1

JNAP Secretariat Key Activities and Priorities

1. The *Joint National Action Plan for Climate Change Adaptation and Disaster Risk Management (JNAPCCADRM),* or JNAP as it is commonly known, was developed in order to facilitate a whole of government approach for managing both climate change adaptation and disaster risk management initiatives in Tonga. The JNAP is in alignment with Tonga's National Strategic Planning Framework and also responds to a range of national, regional, and international frameworks and agreements. A key aim of the JNAP is to avoid duplication of efforts and maximise the limited resources in Tonga.

2. The JNAP Taskforce that formed during its development is now a Cabinet sub-committee with the role of providing overall operational and technical leadership and guidance to implementation of the JNAP. It interacts closely with both the National Environment and Coordinating Committee (NECC) and the National Emergency Management Committee (NEMC). The estimated financial cost of implementing the JNAP over the 2010 to 2015 timeframe is $T22 million. The budget to support this implementation is to come from both internal and external revenue sources.

3. The JNAP outlines six priority goals and an action plan that focuses on existing gaps to Tonga's ability to improve the country's ability to address climate change and disaster impacts. The priority goals are:

1. Improved good governance for climate change adaptation and disaster risk management (mainstreaming, decision making, and organizational and institutional policy frameworks)
2. Enhanced technical knowledge base, information, education, and understanding of climate change adaptation and effective disaster risk management
3. Analysis and assessments of vulnerability to climate change impacts and disaster risks
4. Enhanced community preparedness and resilience to impacts of all disasters
5. Technically reliable, economically affordable, and environmentally sound energy to support the sustainable development of the Kingdom
6. Strong partnerships, cooperation, and collaboration within government agencies and with civil Society, NGOs and the private sector.

4. Some key issues were initially identified and funded but a continual effort is required by the Taskforce to identify additional sources of funding to undertake other priority initiatives. Activities that require funding under JNAP that could be addressed by the PPCR include capacity building at the district/local levels and improving water resources/fisheries/ and other food related management. The SPCR process has complemented the JNAP process and will assist in addressing some of the key goals identified in the JNAP.

5. Following is a presentation the JNAP Secretariat presented to SPCR stakeholders during the PPCR Second Joint Programming Mission in Nuku'alofa, 5-9 March 2012.

JNAP Secretariat – What We Do

6. The JNAP Secretariat has been tasked to ensure the timely coordination, execution, and completion of all activities under the six goals of JNAP.

Completed Projects or Projects that are Underway

7. The JNAP Secretariat undertakes numerous activities in order to address these six goals. Activities which have already been completed or are in the process of being implemented include the following projects. Brief descriptions of the projects are provided.

1. ACP/EU Natural Disaster Facility (coordinated through SOPAC)

8. There are 4 key goals for this project with a range of sub-activities and outputs. The following identifies the project goals and activities that are relevant to the role of the JNAP Secretariat.

Goal 1: Improved good governance for CCA and DRM
One of the key activities included in the project to achieve this goal was Activity 1.8.1. Engage technical assistance to: (i) conduct relevant training for selected representatives from key agencies, and (ii) facilitate for three days the development of an agency emergency support plan.

Goal 2: Enhanced technical knowledge base, information, education and understanding of CCA and effective DRM
One of the project activities which contributed to the role of the JNAP Secretariat was Activity 2.8.1. Engage technical assistance to (i) develop a training program on counseling, and (ii) conduct training of social workers and village leaders on counseling.

Goal 3: Analysis and assessments of vulnerability to climate impacts and disaster risks
This goal was delivered through the following activities:

- 3.13.1 Engaged technical assistance to assess dengue, diarrhea and nutritional related incidences in Tongatapu, Éua, Ha'apai, Vava'u and Niuas;
- 3.13.2. Developed a vector control unit laboratory within existing facilities of the Ministry of Health and built capacity for entomology surveillance;
- 3.13.3. Supported identified staff to undergo specialized training on vector control;
- 3.13.4. Facilitated a national workshop on vector control for key public health personnel – collection, preservation, identification and reporting; and,
- 3.13.5. Collected vectors for identification.

Goal 4: Enhanced community preparedness and resilience to impacts of all disasters
This goal was delivered through the following activities:

- 4.5.1. Conducted community workshops in Tongatapu (Hihifo), Ha'apai, Vava'u and Niuas for incorporation of food hygiene and sanitation, road construction in community disaster and evacuation plans;
- 4.6.1. Engaged technical assistance to conduct training of public health practitioners on (i) emergency microbiological water testing (H_2S), and (ii) emergency water purification;
- 4.6.2. Conducted training of food inspectors on minimum standards;
- 4.9.1. Supported the establishment of a health disaster officer;
- 4.9.2. Engaged technical assistance to develop a health emergency manual for Tonga;
- 4.9.3. Conducted training on emergency procedures for health personnel;
- 4.10.1. Initiated pre-impact arrangements with suppliers of emergency relief items through memoranda of understanding to store relevant relief items;
- 4.10.2. Identified at strategic locations throughout the kingdom existing places for storage that are currently suitable or can be made suitable with retrofitting (egg., schools, churches) and or build new storage facilities where no suitable

place exists;

- 4.10.3. Strengthened partnerships with NGOs and donor partners; and,
- 4.10.4. Sought funding for relief supplies.

2. International Climate Change Adaptation Initiative (ICCAI)

9. The ICCAI is an Australian government funded activity with a budget of A$2 million to support the JNAP Secretariat, PACC Plus as well as provide a Climate Change Financing Mechanism. The agency responsible for the initiative is the Ministry of Environment and Climate Change (MECC).

10. The JNAP Secretariat was established in August 2011 and the Climate Change Trust Fund legislation is to be formulated in 2012. The Climate Change Trust Fund is also to be established in 2012. In addition to these management and funding activities, the ICCAI is also to explore practical adaptation actions, especially related to water resources and coastal management through 2012.

3. Pacific Climate Change Science Program (PCCSP)

11. The PCCSP overall aim is to help the partner countries better understand their past, current and future climate scenarios and build capacity in climate science within these countries. The PCCSP is assisting the region address two key principles of the Pacific Islands Framework for Action on Climate Change 2006-2015: firstly, improving the understanding of climate change and secondly, the provision of education, training and awareness.

12. These also relate to JNAP Goal 2 (Enhanced Technical Knowledge base, information, education and understanding of climate change adaptation and effective disaster risk management and Goal 3 (Analysis and assessments of vulnerability to climate change impacts and disaster risks.

13. A climate change database management system was established at the Tonga Meteorological Service as part of this program.

14. A budget of A$20 million was allocated to the Pacific region and was implemented by a team of agencies: Australian Bureau of Meteorology, CSIRO, MECC, and the Tonga Meteorological Service. The PCCSP Training was completed in 2011 and the Final PPCSP Report for Tonga was published and made available to the Government of Tonga in December 2011.

4. Pacific Adaptation Strategy Assistance Program (PASAP)

15. This Program is part of the Government of Australia's International Climate Change Adaptation Initiative (ICCAI). There are two projects in Tonga funded under the PASAP.

16. The first activity funded in Tonga (A$4 million) was the implementation of the JNAP Activity 2.1. in relation to undertaking LIDAR (light detection and ranging) survey to acquire a high resolution digital elevation model of topographic and bathymetric data. The LIDAR survey was completed in 2011 and reports are to be made available to the Government of Tonga in 2012.

17. The responsible agencies involved in delivering this activity were the Pleydryn Company, UK (sea LIDAR), AAM Company (land LIDAR), MECC, and MLSNR.

18. The second activity funded by PASAP (Budget: A$562,000.00) was assessing the

vulnerability and adaptation to sea level rise in Lifuka, Ha'apai. This particular activity was developed by the Ministry of Environment and Climate Change, PASAP, and the Secretariat of the Pacific Community (SPC). This Program is currently implemented and executed by the Department of Climate Change and Energy Efficiency, Canberra, Australia. MECC is the Focal Point in Tonga for this Program and SPC is providing working with MECC to ensure effective implementation. This activity was started in June 2011 and is to be completed in December 2012.

5. Pilot Program on Climate Resilience (PPCR)

19. There are three major components of the SPCR based on the outcome of the PPCR National Consultative Workshops that were conducted in November 2011:

Component 1: Capacity Building to support the transformation to a climate resilient development path;
Component 2: Sustainable Climate Change Financing
Component 3: Building Ecosystem Resilience and Climate Proofing of Critical Infrastructure

20. The responsible agencies involved in this project are MECC and MFFNP. Budget allocated to undertake this work is $250,000 and Phase 1 of PPCR is expected to be completed in first quarter of 2012.

Pending and Approved Projects

21. In addition to projects that are already underway in Tonga to support the JNAP Secretariat and it mandate, there are a number of other projects that are pending or have been approved and are yet to commence.

1) Enhanced Resilience of Six communities on the Eastern site of Tongatapu to Climate Change Impacts and Disaster Risks
Donor: AusAID under the Government of Australia's ICCAI
Timeframe: 2 months (February 2012 – May 2012).
Budget: T$130,000
Responsible Agency: MECC

2) Tefisi Community Based Climate Change Adaptation Project

The project activities align with the JNAP Goals 1 (Improved good governance for CCADRM), 3 (Analysis and assessment of vulnerability to climate change impacts and disaster risks) & 4 (Enhanced community preparedness and resilience to impacts of all disasters).
Donor: (JICA)
Timeframe: 12 months (to be implemented in 2012)
Location: Tefisi, Vava'u
Budget: $1 million
Responsible Agency: MECC

3) Tonga's 'Third National Communication' on Climate Change Project
Donor: GEF/UNDP
Timeframe: 3yrs (to be implemented in 2012)
Location: Tonga as a whole
Budget: $480,000
Responsible Agency: MECC

4) Evaluate the existing replanting schemes and implement lessons learned (JNAP Activity 3.3 – Forestry Related Activities)
Donor: EDF 10 as coordinated by SOPAC
Timeframe: 3 years (to be implemented in 2012)
Budget: T$2.3 million

Projects needing Funding

22. In addition to the range of activities that are already underway or about to commence, their remains numerous activities within the JNAP program that continue to need funding support. These include the following:

1.1 Review land/water (coastal area/lagoon waters) policy for sub- divisions to incorporate risks management criteria
1.5 Establish district emergency office and staff in Éua, Ha'apai, Vava'u and Niuas
1.6 Establish district office for the Ministry of Environment and Climate Change in Vava'u, Éua, and Niuas
1.7 Establish district climate change and emergency committees and plans (Vava'u, Ha'apai, Niua, Éua)
2.2 Improve and update existing fish and coral data base to assess impacts of climate change
2.3 Document traditional knowledge on early warning, food preservation and land management
2.7 Determine climate change impacts on fisheries in relation to fish poisoning and coral reef ecosystems
3.1 Develop site specific guidelines for coastal and in-land reclamation
3.4 Develop crops that are tolerant to the impacts of CC
3.7 Minimize livestock impacts on vegetation and crops in view of CC projections
3.8 Enhance the management and monitoring capacity of government Marine Protected Areas (MPA)
3.11 Assess water resource capacity in urban centers, villages and outer islands
3.12 Develop water resources capacity models on CC scenarios
4.3 Develop capacity in the Ministry of Education to conduct regular drills for schools
4.4 Develop waste management strategies for post disaster situations
4.7 Strengthen aquaculture fisheries to support food security and adaptability of coastal resources and habitats to CC impacts and disaster risk
4.12 Upgrade of the Fua'amotu Weather Forecasting Centre and Coast Radio Office Infrastructure

Project Alignment

23. The following projects have a strong alignment with the JNAP program of priorities:

- CCCCA
- SPC/GIZ
- EU-GCCA-USP
- SLM
- MESCAL
- PACC
- SGP
- GEF 5
- CDM – UNEP/Risoe

Tonga Climate Change Trust Fund

24. In order to establish a Climate Change Trust Fund for Tonga there are several organizations and agencies that need to be consulted:

- UNDP (New York, Bangkok, Fiji, Tonga)
- AusAID (Tonga, Canberra)
- Ministry of Finance (Minister, Aid Division, Procurement, Treasury)
- Legal Entities (Solicitor General, private firms)
- Asia-Pacific Community of Practice (CoP) on Climate Finance

25. Many of these consultations have commenced but need to be continue in order to learn the lessons from the establishment of other Trust Funds and develop an architecture that is best suited to climate change adaptation activities in Tonga.

Monitoring and Evaluation

26. Monitoring and evaluation is an important aspect of implementing the JNAP program to ensure that it is meeting its objectives and to track actual progress. The following activities are means by which the JNAP program is being monitored and evaluated:

- Quarterly reports (donors) – narrative & financial reports
- Day to day monitoring (MECC Director)
- Mid-term/annual review (donors & MECC, & stakeholders)
- Audit
- In-house monthly meetings (MECC projects)

Communication Strategy

27. In order to achieve the maximum benefits of work that is being undertaken by the JNAP Secretariat, a Communication Strategy has been developed to share lessons with a range of stakeholders, including communities, government agencies, donors, and the private sector. Activities undertaken as part of this Communication Strategy include

- Awareness raising
- Website
- Newsletters
- Brochures
- Posters
- Drama
- TV & radio programs
- Meetings
    - stakeholders – committees, communities
    - donor roundtable

Challenges and the Way Forward

28. There are numerous challenges face by the JNAP Secretariat in delivering its program and coordinating all the different activities that are underway or planned. The following highlights key challenges that will need to be managed:

- Donor coordination and harmonization
- Stakeholder coordination and harmonization
- Consistency in participation
- Paris Declaration on aid effectiveness

- Procurement policies (implementation plan)

29. Two of the most critical issues which need to be addressed are:

(i) to strengthen coordination and harmonization of stakeholders: donor/donor, donor/stakeholders, JNAP Secretariat/Government., NGOs, private sector, communities; and
(ii) to Improve procurement regulations and procedure between different donors (donor/donor) and between donors and the Tonga government systems (donor/government).

Annex 2

Institutional Framework for Mainstreaming Climate Change Adaptation and Disaster Risk Management in Tonga

30. There are currently several institutions involved in climate change adaptation (CCA) and disaster risk management (DRM) in Tonga. Some have only recently been established as Tonga has recognized the need to emphasize CCA and DRM in its National Strategic Development Plan (NSDP) and Tonga Strategic Development Framework (TSDF 2011–2014) to meet its long term development objectives. The framework for mainstreaming CCA across the Government has been evolving as Tonga's understanding of the importance of managing CCA and DRM has developed.

31. The main institutional responsibility for climate resilience presently is with the environment portfolio. The Ministry of Environment and Climate Change (MECC) (former Department of Environment) is the National Executive Agency for climate change activities as approved by the Tongan Cabinet in 2004. In 2007, a broader high-level Cabinet Committee on Climate Change was formed. This included the Ministers for Environment (Chair), Transport, Public Works, Justice, and the Attorney General. At the working level, the MECC has carriage for climate change matters. In terms of whole of government involvement in climate change matters, there is a technical working group (TWG) that provides some input from other ministries, such as the Tonga Meteorological Service; Ministry of Lands, Survey and Natural Resources; National Emergency and Management Office; Ministry of Agriculture and Food, Forestry and Fisheries; Ministry of Health; Tonga Water Board; and Climate Change Coordinator as the secretariat.

32. MECC only became a separate ministry in late 2009. Cabinet also approved the establishment of the National Environment Coordinating Committee (NECC), which functions as the advisory body for all environmental projects including climate change. It also serves as the mechanism to coordinate climate change related issues at both the policy and technical levels. The committee is chaired by the Minister of Environment and Climate Change. Members are departmental heads from government ministries, NGOs and statutory authorities. The TWG consists of the greenhouse gas inventory and the vulnerability and adaptation groups. These institutions are responsible for the proper implementation of climate change activities at the technical level. Members of the TWG are technical experts from government agencies, NGOs and statutory authorities.

33. DRM is the responsibility of the National Emergency Management Committee (NEMC) in the National Emergency and Management Office (NEMO), which is in the Department of Works and Disaster Management. The *Emergency Management Act* 2007 called for the development of a National Emergency Management Plan (NEMP, 2009) and the establishment of emergency management committee systems at the national, district, and village levels.

34. The Government of Tonga's commitments to addressing DRM are reflected in the recently revised legislation and the development of the *National Emergency Management Plan*. Such commitments are reflected in national initiatives to improve risk management processes in Tonga through institutional strengthening and human resource development. This commitment is embodied in the Cyclone Emergency and Risk Management Project (CERMP, 2002) and other subsequent initiatives. Under the CERMP, 270 low-cost cyclone resistant houses were constructed for the victims of Cyclone Waka , the *Emergency Management Act* was promulgated in September 2007, and the *National Emergency Management Plan* was reviewed among other things. A *National Disaster Fund* was set up in June 2008 (T$5 million) to facilitate the recovery process after impact and the staffing of the National Emergency Management Office was strengthened by three senior new posts in

its 2007/08 financial year.

35. When the commitment was made by the Government of Tonga to develop the Joint National Action Plan for Climate Change Adaptation and Disaster Risk Management (JNAP), it required the inputs from the different agencies described above. Tonga's JNAP, approved by Cabinet in July 2010, outlines several strategic goals: (i) improved good governance (mainstreaming and strengthening CCA/DRM institutional policy frameworks), (ii) enhanced CCA/DRM technical capacity and awareness, (iii) improved CCA/DRM analysis/assessments, (iv) enhanced community preparedness and resilience, and (v) strong CCA/DRM partnerships across government and with NGOs and civil society organizations (CSOs). The JNAP is in alignment with the National Strategic Planning Framework (NSPF). The JNAP is also consistent with regional CCA/DRM strategies, including the Pacific Plan, Pacific Islands Framework for Action on Climate Change 2006–2015 (PIFACC) and Pacific Disaster Risk Reduction and Disaster Management Framework for Action (2005–2015). With regard to the development of the DRM elements of the JNAP, Cabinet tasked the NEMC to participate in the process. A DRM Task Force was also established (CD No.564 of 22 July 2009) to provide the technical inputs in the DRM process. MECC was responsible for providing input on climate change adaptation issues. In addition, a JNAP Task Force was established in 2010 as the logical merger of the two technical teams (Climate Change TWG and DRM Task Force) for the purpose of developing the JNAP on climate change adaptation and disaster risk management.

36. Based on the above, it is clear that management of CCA and DRM in Tonga is complex and involves a range of institutions. It is also clear that this institutional framework is still in its infancy in terms of operational effectiveness and needs to be supported with SPCR assistance. The SPCR will focus on strengthening the JNAP Secretariat as the key coordination center. As part of SPCR development, a number of technical working groups (TWGs) were utilized and/or established and included central, planning and sectoral agencies. Involvement of these agencies in the integration of CCA into development planning and budgeting is critical to long-term approaches to managing climate change. These include Ministry of Finance and National Planning, Ministry of Health, Planning and Urban Management Agency, Ministry of Works, Ministry of Transport, and the Ministry of Agriculture, Forestry and Fisheries.

37. In addition to mainstreaming and coordinating CCA across government, it is important that the Government supports initiatives that promote nongovernment and private sector involvement in CCA and develops programs that support involvement of communities in CCA. An effective institutional structure for CCA and DRM involves all stakeholders within a strong government framework.

38. During detailed project preparation, further consideration will need to be given to engagement with the private sector to define its role in achieving climate resilience for its activities, and to explore the private sector's ability to contribute to national efforts to achieve climate resilience. The private sector, represented by the Tonga Chamber of Commerce and Industry, showed keen interest in participating as an important stakeholder during the SPCR consultations. Further consideration will also need to be given in the project preparation phase to the implementation structure and risks (including risk mitigation strategies) for the proposed investments using PPCR grants.

Annex 3

Overview of the Main Development Partner Initiatives on Climate Change Adaptation and related Disaster Risk Management

39. Extensive consultation with development partners was undertaken throughout the SPCR planning process. These included discussions with ADB, AusAID, JICA, UNDP, and World Bank Group, as well as updates with the Suva-based Development Partners Climate Change.

40. The discussions confirmed the focus on donor harmonization with regard to climate change adaptation work in Tonga. The aim was to ensure that SPCR investments addressed gaps in existing donor programs in accordance with the priority needs identified by Tonga. The discussions helped to provide the framework for SPCR to work within existing institutional structures and constraints. This recognized the importance of whole-of-Tonga Government implementation and built on current and pipeline development projects and programs identified during the SPCR planning process.

41. Tables 1–3 summarize these consultations. Table 1 provides a stocktaking of development partner activities on climate change. Table 2 summarizes feedback from development partners and regional organizations on Tonga's priority needs and investments. Table 3 is a List of Development Partners consulted.

Table 1

PPCR (Tonga) Stocktaking of Development Partner Activities on Climate Change

Project/Program Title	Donor(s)/Lead Agency	Description/Objectives	Duration	Budget
1. Pilot Program for Climate Resilience (PPCR)	ADB/WB Ministry of Environment and Climate Change/Ministry of Finance	The PPCR aims to pilot and demonstrate ways to achieve integration of climate risk and resilience into core national development planning in the Pacific. The regional pilot comprises two tracks: (a) country-specific components in three Pacific Developing Member Countries (PDMCs), Papua New Guinea, Tonga and Samoa; and (b) region-wide activities focused on monitoring, institutional strengthening, capacity-building and knowledge-sharing. The PPCR is a cross-sectoral and programmatic, rather than project by project, initiative which is country-led and supposed to complement, not duplicates, NAPAs or other relevant country studies, pilots and strategies, as well as currently available climate change adaptation financing. Under PPCR, Tonga will be eligible for grants and concessional loans for initiatives that build climate resilience in development activities. The PPCR is part of the suite of resources available under the Climate Investment Funds. The PPCR is to proceed in two potentially overlapping phases.	2011-2016	$25,000 $10-15 million
2. Pacific Adaptation to Climate Change (PACC)	GEF/UNDP/SPREP/ Ministry of Environment and Climate Change (MECC)	PACC aims to improve the effectiveness of response to climate change in the Pacific. The project has selected Hihifo district from Fo'ui to Ha'atafu village in Tongatapu. Climate change and sea level rise had significantly impacted on the livelihoods of the communities which further vulnerable by drought and saltwater intrusion affecting their groundwater. The two main outputs for Tonga PACC project are: • Producing guidelines for water resource use management to counter increased ENSO frequency, and • Demonstrating climate change risk management practices for water in Hihifo	2009 – 2013	$700,000
3. Second National Communication (SNC)/ Third National Communication(TNC)	GEF/UNDP/ MECC	The core output of the SNC project is Tonga's Second National Communication on Climate Change Report. This project further enhances the national capacities and raises general knowledge and awareness on climate change, sea level rise, natural hazards and their effects. It also contributes to putting climate change issues higher on the national agenda through strengthened cooperation and increased involvement of all relevant stakeholders in the process. In addition, it also strengthens national capacities for participation in different mechanisms related to adaptation and greenhouse gas (GHG) mitigation, as well as fulfilling	2006-2011/ 2012-2014	$405,000/ $500,000

		other commitments to the UNFCCC		
4. Sustainable Land Management (SLM)	GEF/UNDP/ MECC	The Tonga Sustainable Land Management (SLM) Project intends to stem the current rate of land degradation by developing individual, institutional and systemic capacity to manage land wisely, and to mainstream sustainable land management tools and practices into the development and budgetary processes of the government. GEF funding requested through this proposal will be used to lift barriers to sustainable land management and thus contribute to enhancing ecosystem health, stability, functions and services. It will also enable the government of Tonga to strengthen its policies, regulatory and economic incentive frameworks to facilitate wider adoption of sustainable land management practices across sectors. The ultimate goal of this project is to enhance ecosystem stability, functions and services while promoting sustainable livelihoods through sustainable land management. Particular focus will be paid towards supporting and strengthening national and local level activities identified during the process of developing Tonga's NAP under the UNCCD and other instruments such as the Millennium Development Goals (MDG). To ensure sustainability, part of the strategy to achieve the project objectives will be the development of an investment plan wherein specific activities will be identified for donor funding. A Coordinated Resource Mobilization Plan (CRMP) will also be developed to help secure funding support for the implementation of the investment plan.	2007-2011	$1 million (tbc)
5. Mangrove Ecosystem for Climate Change Adaptation and Livelihoods (MESCAL)	IUCN/MECC	Under the Pacific Mangrove Initiative (PMI), the MESCAL project was developed to address key challenges to mangrove management and conservation. The overall goal of this project is to help Pacific Islanders effectively manage their mangrove and associated coastal ecosystems to build resilience to the potential consequences of climate change and variability on coastal areas and support/enhance livelihoods. The MESCAL project focuses on five Pacific Island countries (Fiji, Samoa, Solomon Islands, Tonga and Vanuatu) to achieve its objectives. It is envisaged that the MESCAL project will serve as a platform for future Pacific-wide integrated coastal ecosystem management support under the Pacific Mangrove Initiative umbrella. Tonga MESCAL activities will include the reviewing of baseline survey & data from previous programs to update and avoid duplication of activities, school and community awareness programs, monitoring of small community mangrove projects and identify suitable sites for rehabilitation & replanting. There will also be a lot of emphasis put into the reviewing and reinforcement of existing laws surrounding mangroves.	2009-2013	$350,000 (tbc)

6. Pacific Climate Change Science Program (PCCSP)	AusAID/Bureau of Meteorology/CSIRO/Tonga Meteorology	The PCCSP aims to help Australia's neighbors in the Pacific and East Timor to better understand how the climate and oceans have changed and how they may change in the future. The 15 partner countries are the Cook Islands, East Timor, Fiji, Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu. Investment in better climate change science for the Pacific region and East Timor will improve the basis for adaptation planning and allow for more targeted development assistance. The program is working with partner countries to i) track and analyze recent climate trends; ii) investigate regional climate drivers; iii) investigate past and future changes in ocean processes, ocean acidification, regional sea level rise and extreme sea level events; and iv) iv) prepare regional and national climate projections for 2030, 2055, and 2090. Partner country engagement, information sharing and capacity building are integral to the program and are being undertaken across all areas of research. The program is being led by the Bureau of Meteorology and CSIRO through their research partnership in the Centre for Australian Weather and Climate Research.	2008-2011	A$20 million (tbc)

7. Pacific Adaptation Strategy Assistance Program (PASAP)	AusAID/MECC	The Pacific Adaptation Strategy Assistance Program (PASAP) is working closely with CROP agencies and partner countries to build national, community and regional capacity to understand the likely impacts of climate change and support national adaptation planning and policy responses. Within the overall Initiative, the $12 million program aims to enhance country capacity to assess vulnerability to climate change and develop evidence-based adaptation strategies in partner countries in the Pacific (incl. Tonga) and East Timor. Activities include a number of country-specific projects to enhance country capacity to assess their vulnerability to climate change and develop evidence-based adaptation strategies and an overview of adaptation in the region, which will describe regional trends and variability in climate change impacts, vulnerability and adaptive capacity; and identify common needs, lessons learned, relevant good practice and significant knowledge/research gaps. The program is being developed and implemented in close consultation with partner countries and regional organizations		A$12 million (tbc)
8. Coping with Climate Change in the Pacific Island Region (CCCPIR)	GIZ/SPC/ MECC	CCCPIR aims to strengthen the capacities of Pacific islands to cope with the impacts of climate change, especially on sectors such as agriculture, forestry, fisheries, tourism, energy and education. The Program is implementing the following components: • Enhance SPC/SPREP capacity to integrate CC into service delivery • Integrate CC into various national strategies, plans, and policies • Implement specific adaptation and mitigation measures (pilot projects) • Promote adaptation to CC and strategies for emission reductions in the tourism sector • Sustainable energy management • Integrate climate change into existing curricula and training programs	2009-2015	EURO 4.2 million

9. Pacific Islands Climate Prediction Project (PICCPP) – Phase 2	AusAID/Bureau of Meteorology/Tonga Meteorology Office	The aim of this project is to strengthen climate prediction in Pacific Island countries, both in National Meteorological Services and by industries/agencies which use climate information including farmers, tourism, water resource managers and health authorities. At the end of the project implementation, the NMS of each participating country are to have software tailored for use in its location, and a thorough understanding of how seasonal climate prediction services can be applied to support climate-sensitive decision making in industry and government. Key representatives of climate-sensitive activities (e.g. agriculture, water management, disaster mitigation) will have received training in the effective use of climate predictions in a risk management context. It is hoped that in turn, the growth in productivity and efficiency that will follow in climate-sensitive industries will naturally flow through to better food security, improved public health, better managed water resources and more robust national economies.	2003-2009	
10. South Pacific Sea Level & Climate Monitoring Project (SPSLCMP) Phase IV – Monitoring, Reporting and Review	AusAID/Ministry of Lands, Survey and Natural Resources (MLNSR) - Geology Unit	The primary goal of the SPSLCMP is to generate an accurate record of variance in long-term sea level for the South Pacific and to establish methods to make these data readily available and usable by Pacific Island countries. Since 1991, the Project has established a network of 12 high-resolution sea level monitoring SEAFRAME (Sea Level Fine Resolution Acoustic Measuring Equipment) stations throughout the Pacific. A system for transmitting the data via satellites and telephone links is in place, and computer databases have been established at the National Tidal Centre (NTC) (formerly the National Tidal Facility Australia (NTFA)), for processing, analyzing, archiving and making the data available to the international community. SPSLCMP: Phase IV builds on the achievements of Phases I, II and III. The goal of Phase IV is to continue to provide for partner countries an accurate long-term record of sea level variability and change in the South Pacific that enables them: • to respond to and manage related impacts; • to manage their near-shore and coastal resources sustainably; and • to develop policies and strategies for responding to long-term trends.	1991-2011	

11. The Pacific Community Focused Integrated Disaster Risk Reduction Project	AusAID/Pacific Council of Churches /Tonga National Emergency Management Office (NEMO)	The Pacific Community Focused Integrated Disaster Risk Reduction (DRR) Project – implemented in Fiji, Solomon Islands, Tonga and Vanuatu between 2008 and 2011 by the National Council of Churches in Australia, with funding from AusAID is designed to integrate community-focused disaster risk reduction programs with existing disaster risk reductions institutions and organized by faith-based networks.	2008-ongoing	
12. Disaster Risk Reduction Project	SOPAC	The DRR Projects Portal is building on, and adding to, existing initiatives such as the Pacific Disaster Net, which has been developed and maintained in SOPAC under a partnership with the United Nations Development Programme Pacific Centre, the United Nations Office for the Coordination of Humanitarian Affairs and the International Federation of Red Cross and Red Crescent Societies; and the SOPAC Disaster Risk Programmer's Projects and Capacities Portal for the Pacific Disaster Risk Management Partnership Network, which hosts project information relating to the Pacific. Having the mandate to coordinate Disaster Risk Management in the Pacific Region, and coordinating the Pacific Disaster Risk Management Partnership Network, SOPAC's Disaster Risk Programme is an essential partner of Disaster Risk Management stakeholders in the region	2010-ongoing	
13. The Small Grant Project	GEF/Civil Society Forum of Tonga	This umbrella project is designed to assist 15 Pacific island countries in the implementation of a GEF Small Grants Program (SGP) and NZAID regional Pacific Environment Fund (PEF). Through an umbrella approach, the project is intended to provide expedited assistance to countries and reduces transaction costs of individual SGP country programmers in the region. Its benefits will include enabling country parties, including both civil society organizations, as well as participating governments, to improve access to sources of funding for local environmental initiatives and for the protection of the global environment. In Tonga, GEF Small Grant Program has funded a number of community-based projects and initiatives under the GEF focal areas of biodiversity conservation, climate change adaptation and mitigation, and sustainable land management.	2008 – ongoing	$300,000 per year

14. Pacific Islands Greenhouse Gas Abatement through Renewable Energy Project (PIGGAREP)	GEF/SPREP/MLSNR	The PIGGAREP is a product of a Global Environment Facility (GEF) and United Nations Development Programme (UNDP) funded preparatory exercise, the Pacific Islands Renewable Energy Project (PIREP). The PIREP was completed in 2006 and the implementation of the PIGGAREP commenced in 2007. The global environment and development goal of PIGGAREP is the reduction of the growth rate of GHG emissions from fossil fuel use in the Pacific island countries through the removal of the barriers to the widespread and cost effective use of feasible RE technologies. The specific objective of the project is the promotion of the productive use of RE to reduce GHG emission by removing the major barriers to the widespread and cost-effective use of commercially viable RE technologies (RETs).	2008-2011	
15. Tonga Strategy for Climate Change	Caritas International /Caritas Tonga	The objective of the Program Priority is to mainstream climate change into other program activities with development of Protocol Systems with particular emphasis on generating awareness and information dissemination. Activities include Capacity Building to coordinate and assist Parish and Communities in updating information on climate change, including Pacific stories on impacts on Pacific people in the light of the social teachings of the church. This activity also covers training workshops, TV spots, posters etc. The program also assists and supports Parish Priests and Caritas Parish Committee Leaders with leadership roles on Climate to establish a Communications Protocol at the community level in the event of an emergency. Networking is another activity of the program linking Caritas Tonga with relevant Government Departments and other NGOs also working to combat climate change. The program also supports activities like coastal tree planting by youth groups and picking up rubbish.	2008-2011	
16. Children Centered to Climate Change Adaptation (4CA)	AusAID/FSPI/AusPlanning International/Tonga Community Development Trust	The project aims to bring about safe and resilient communities in which children and young people contribute to managing and reducing the risks to natural disasters. Key Objectives are: • To increase the awareness and capacity of children, youth and communities of climate change and related disasters, so that they can facilitate child-centered climate change adaptation 4CA processes. • To develop and implement locally appropriate climate smart solutions that incorporate and demonstrate the 4CA model To advocate for the inclusion of good practices and learning from the 4CA program approach in local, district and/or national government processes.	2012-2014	A$160,000

17. Climate Change Adaptation: Empowering communities in Lifuka and Foa, Ha'apai	GEF/Tonga Community Development Trust	The project aims to empower local communities to understand and adapt better to the impacts of climate change, especially sea level rise and coastal erosion in Lifuka and Foa islands in Ha'apai. The main project components include: • Increase community awareness of climate change and its impacts • Strengthening village governance structure to make informed decisions • Demonstrating community-based adaptation activities • Coastal tree planting scheme	2009-2011	$50,000
18. Pacific Program to build community resilience to reduce vulnerability: Coping Communities	NZAid/FSPI/Tonga Community Development Trust	The project was aimed to reduce the social, economic and environmental impacts of disasters on Pacific island communities. The project objectives were: • To document through participatory research and disseminate widely the traditional and modern vulnerability reduction methods, social conditions and skills that effectively contribute to community resilience. • To empowering communities to self-organize and prepare for and manage disasters and to build risk reduction measures into daily development activities • To strengthened linkages with key stakeholders at both national and regional levels to promote sustainability of community activities and to spread advocacy for community based vulnerability reduction	2008-2010	NZ$140,000
19. Building Community Resilience to cope with the impacts of flood and cyclone	Force of Nature Aid Foundation/FSPI/Tonga Community Development Trust	The project was aimed to increase resilience of the targeted communities in Tonga to better respond to the impacts of disaster by enabling them to revive, apply and share traditional methods and where necessary merging these practices with modern scientific and technical knowledge. The project was piloted in Neiafu, Vava'u and Hihifo in Ha'apai. The main project components include: • Documentation of traditional coping strategies • Vulnerability Capacity Assessment Reports both and Neiafu and Hihifo • Raise public awareness through schools/community drama and other activities	2009 -2010	$30,000
20. Pacific Disaster Risk Management Programme to Tonga	AusAID/MECC/NEMO	Design phase for a five country program to be piloted in the Pacific in DRM.	2012-2016?	A$4 million?
21. International Climate Change Adaptation Initiative (ICCAI)	AusAID and the Australian Department of Climate Change and Energy Efficiency (DCCEE)	The delivered jointly by focuses on: improved scientific information and understanding; strategic planning and vulnerability assessments; implementing, financing and coordinating adaptation measures; and multilateral support for climate change adaptation. As part of ICCAI Australia has provided A$40 million to the PPCR. Tonga has been an active participant in the ICCAI Pacific Climate Change Science Program, which aims to develop better understanding of how climate change will impact the region.	ongoing	A$150,000,000

		Tonga has access to Australian funding and support through a number of regional programs including: the Pacific Adaptation Strategy Assistance Program to support regional organizations (SPREP and SPC); the Community-based Adaptation Activities program; the Pacific Future Climate Leaders Program; the South Pacific Sea Level and Climate Monitoring Project; and bilateral assistance for priority, practical adaptation programs.		
22.Regional Programs	AusAID	• the Community-based Adaptation Activities program; • the Pacific Future Climate Leaders Program; • and bilateral assistance for priority, practical adaptation programs.	Ongoing	
23. UNDP-GEF; UNEP-GEF FUNDED PROJECTS		UNDP-GEF has funded the following climate change adaptation and climate change related projects in Tonga: *Completed activities - UNDP* • Initial National Communication Project ($325,000) • Capacity building activities, including Technology Needs Assessment ($100,000) • National Capacity Self Assessment Project ($200,000) • National Biodiversity Strategic Action Plan Project ($325,000) • Small Grant Projects ($69,835,00 for 2010) • Programme of Action on Protected Areas *Completed activities - UNEP* • Ozone Depleting Substance Project ($30,000) • Persistent Organic Pollutants Projects ($386,000) *Ongoing activities - UNDP* • PIGGAREP (to be completed by 2013: $360,000); • Integrated Water Resource Management Project (to be completed in 2012: $7 million) • Third National Communication on climate Change ($500,000).		
24. Renewable Energy	EU-Energy Development Fund 10	• Renewable Energy		Euro 5 million

25. Renewable Energy	JICA	• Renewable Energy - outer Islands TBU (2) Vv (11) (designing, supply hard ware. Co-finance PIGGAREP GEF/UNDP for institutional set up and technical training and consultancy, community consultation.)		$5.9 million
26. Pacific Climate Change Program	ADB	• climate risk studies leading to the preparation of climate risk profiles to serve as bases for climate change adaptation initiatives for various development sectors • mainstreaming climate change adaptation and mitigation in the Country Partnership Strategy to ensure that climate change implications are incorporated in the economic development policies and planning processes • incorporation of climate change adaptation in infrastructure processes, such as the forthcoming Urban Integrated Development Project (Phase II). The ADB Pacific Region Work Program for 2010-2012 includes proposed loan-financed projects that focus directly on adaptation or have climate adaptation features incorporated in their design. The Program also includes technical assistance projects aimed at helping develop capacity for adaptation or ensuring that climate adaptation is incorporated in the design of proposed investment projects.		
27. Transport / energy	World Bank	• Transport Sector Consolidated Project: $5.4 million, 2012; PRIF/Australia $9.2 million, 2013 • Renewable Energy Road Map $8 million • Energy DPL $10 million		
28. Renewable energy	Government Of France	• wind resource assessment–finding suitable places for wind monitoring)	2006 -2011	$100,000
29. Renewable energy	IUCN –Italy, Austria	• Renewable Energy Projects: installation of solar panels in Ha'apai outer-islands (Mango & Moungaone)	2008-10	$350,000

Table 2
Summary Table: Donor and Regional Agency Feedback on Priority Needs and Investments
PPCR Tonga – National Priorities

The following table is a direct output from the PPCR National Consultative Workshop convened during 23–25 November 2011.

***Event Risks* and Outcome Risks (as defined by National Stakeholders)**	**Ranking of Risks (9=highest, 7=lowest)**	**Proposed Intervention (as identified by National Stakeholders)**	**Any International Partner or CROP Agency Working on this Issue or Proposed in Future?**
1. *Increase in extreme events* (drought) - less agricultural production affecting food security, costs of recovery	**9**	Capacity building to improve crop diversification, land use (e.g. slope land conservation systems such as Eua), and farming techniques (hydroponics, green houses, organics, agro-forestry) to introduce climate and pest resilient crops, facilitate access to markets, improve food preservation, storage and processing. Encourage In-situ conservation (e.g. germplasm collection/traditional famine crops and stock breeding for livestock). **Private sector** to develop gene banks of drought resistant seeds and market these seeds and technologies. Private sector to promote sustainable irrigation system - introduce water conserving irrigation systems and market them to the agriculture sector.	**SPC/GIZ Coping with Climate Change in the Pacific Island Region program** is implementing sustainable agriculture development and sustainable land management technologies as CC adaptation measures in 'Eua and Tongatapu (Nakolo). **GIZ** Existing Funds – Euro 4.2 million for 3 Pacific island countries (Fiji, Tonga and Vanuatu). Tonga's current pilot activities in Nakolo village Tongatapu are focusing on crop resilience. The second pilot site is 'Eua Watershed. The next available funds of Euro 17. 2 million are to cover 9 Pacific island countries. Tonga's priority sites are 'Utulei and Tefisi' both in Vava'u addressing the priority issue of soil erosion. Ha'apai again is coastal erosion. **USAID** is supporting **SPC** for three years to evaluate and implement innovative technologies and management approaches to increasing the climate change resilience of terrestrial food production systems for communities in selected Pacific island countries including Tonga.

			The Increasing Agricultural Commodity Trade project implemented by **SPC:** This project (Euro 9 million) covers the 15 Pacific ACP states. It was signed in June 2011 but activities will commence in January 2012. Its objective is to strengthen countries' export capacity in primary industries (agriculture, forestry and aquaculture / mariculture) and allied downstream processing. The program has a specific focus on developing environmentally friendly production systems (organic agriculture, agro-forestry systems, low-carbon footprint, eco-certification) and assist exporters adapt to the impacts of CC (utilization of SPC's gene bank of climate resilient germplasm, better matching of crops to sites, climate resilient agro-forestry and organic production systems). Please coordinate activities with SPC (LRD). **JICA** has had several programs in DRM/ Rural Development but these appear to be phasing out in Q1 2012. **Pacific Adaptation to Climate Change (PACC)** being implemented by **UNDP/SPREP** in 2009-2013 is addressing the issue from a water sector perspective. Underground water salinity is an issue in some parts of the Hihifo district, the PACC pilot site. Less agricultural production could be an issue if saline water is used for agricultural production particularly during droughts. **SPREP** through the FINPAC project (Finland – Pacific Project on Reducing Vulnerability of Pacific island countries

			livelihoods to the effects of climate change) is upgrading and strengthening meteorological services to provide climate change and met. service information to key development sectors including agriculture. **SPREP** can also share with Tonga experiences from the planned work on ecosystem based adaptation (coastal management including work on mangroves and protected areas.
***Event Risks* and Outcome Risks (as defined by National Stakeholders)**	**Ranking of Risks (9=highest, 7=lowest)**	**Proposed Intervention (as identified by National Stakeholders)**	**Any International Partner or CROP Agency Working on this Issue or Proposed in Future?**
2. *Increase in intensity of tropical cyclones combined with increase in sea level and storm surge* (coastal inundation) – damage and destruction of coastal property & infrastructure resulting in high costs for recovery, increased costs for insurance & investment, loss of investments and associated impact on the economy	**9**	For new infrastructure - climate-proof designs and the building approval process (including building codes and train key agencies) and integrate climate risks into EIA process. Revise Tourism Act to require climate proofing of tourism facilities. For existing infrastructure - undertake vulnerability assessment to identify infrastructure at risks from climate change. Identify international best practice applicable to Tonga to protect infrastructure. Develop cost / benefit analysis techniques to determine best options for climate proofing of infrastructure. Establish micro-insurance scheme and Regional Risk Insurance facility modeled on Caribbean Catastrophic Risk Insurance Facility (CRIF). Establish sustainable financing mechanisms (Climate Change Trust Fund) to finance costs of climate proofing property and infrastructure. Implement coastal protection measures based on	**Australian Government** to undertake LIDAR surveys in Ha'apai and Tongatapu. These surveys have already been undertaken and the images will be available shortly (end of 2011, early 2012). This data will enable coastal modeling to be developed. PASAP (**Australian Government**) is also undertaking a coastal feasibility study in Ha'apai and it is expected to be completed in December 2012. **AusAID** has also committed A$1.7 million to undertake studies on water resources as well as a coastal feasibility study for the area from Sopul to Haatafu (west side of Tongatapu). This coastal study will involve the following activities: • Coastal feasibility • Coastal Design • EIA The aim of this work is to develop an

		outcomes from AusAID coastal vulnerability assessment projects. **Private Sector** - Build private sector climate change and disaster risk management capacity across sectors. Train private sector engineers, architects, consultants, developers to climate proof development and buildings. **JNAP suggestion:** Since JNAP is currently undertaking a lot of assessments: 1. **PPCR** may focus on implementing the outcomes of PASAP (AusAID) coastal vulnerability assessment in Ha'apai, and in eastern and western Tongatapu. 2. **JNAP** have funds to undertake climate proofing and building codes assessment and maintenance of CCDRM issues so perhaps PPCR can help in implementing the outcomes of these assessments?	integrated strategy for coastal management in the identified sector of coastline. A further A$106,000 from AusAID is available for the same assessment to be carried out at the Eastern side of Tongatapu, starting from Nukuleka to Kolonga. **PACC** being implemented by **UNDP/SPREP** in 2009-2013 is also working on coastal inundation in the Hihifo district, with its AusAID funding support. **EU** also has another project in the pipeline to be financed under the 10th EDF ACP-EU Natural Disaster Facility focused on building safety and resilience to natural disasters in the Pacific. This project will cover the 15 Pacific ACP countries with an approximate budget of Euro 20 million. The project is currently still in the process of formulation. It is scheduled to start in 2012. Contact: Malcolm Ponton. Under the Pacific Mangrove Initiative (PMI), the **IUCN/MECC** implemented MESCAL project was developed to address key challenges to mangrove management and conservation. The overall goal of this project is to help Pacific Islanders effectively manage their mangrove and associated coastal ecosystems to build resilience to the potential consequences of climate change and variability on coastal areas and support/enhance livelihoods. The **MESCAL** project focuses on five

			Pacific Island countries (Fiji, Samoa, Solomon Islands, Tonga and Vanuatu) to achieve its objectives. It is envisaged that the MESCAL project will serve as a platform for future Pacific-wide integrated coastal ecosystem management support under the Pacific Mangrove Initiative umbrella. Tonga MESCAL activities will include the reviewing of baseline survey & data from previous programs to update and avoid duplication of activities, school and community awareness programs, monitoring of small community mangrove projects and identify suitable sites for rehabilitation & replanting. There will also be a lot of emphasis put into the reviewing and reinforcement of existing laws surrounding mangroves. **UNDP Adaptation Fund proposal:** Shoreline management and freshwater management in the Ha'apai Island Group within the overall context of addressing JNAP priorities. Under the shoreline management component, the project will: 1) secure critical assets in Lifuka Island through a hard engineering shoreline protection scheme and 2) demonstrate currently underutilized soft engineering techniques in 4 districts in Ha'apai (Pangai, 'Uiha, Ha'ano and Foa) including placement of artificial coral reefs, small-scale beach nourishment, small-scale groins, coastal vegetation to minimize the impacts of salt spray, wetland protection/enhancement through mangrove plantation, etc. Under the freshwater management component, the project envisages i) installing rainwater harvesting system

			to all remaining households in the same target areas who currently do not have a system (approximately 200 households) and enhancing capacity at community buildings; ii) installing a groundwater recharge facility, at least in Lifuka, so that the overflow from water tank during the wet season can be effectively delivered to groundwater to lower the groundwater lens; and iii) installing infiltration galleries, at least in Lifuka, to improve the groundwater quality. The project places a considerable emphasis on fostering an enabling environment to integrate the project results into national and sub-national planning and execution mechanisms. First, a shoreline management plan will be established to be part of the existing Regional Development Strategies in Ha'apai and outside the project direct target islands. Second, a centrally-managed database on shoreline and groundwater protection will assist the government and local communities in capturing data generated from a number of donor-assisted initiatives, including the AF project. Third, a small grant mechanism will be established with the AF resources and will be managed by the JNAP Secretariat to assist communities implement community-based adaptation measures beyond the project target sites. Adaptation Fund project assisted by UNDP. These interventions will be supported through an institutional strengthening component where shoreline/freshwater management plans will be integrated into the existing Regional (Island)

			Development Plans and the project will assist the establishment of a centrally managed database to store and monitor information related to coastal erosion and water availability/quality. Both the shoreline management and freshwater management interventions seek synergies with the ongoing work of the PASAP Program. The results from the LiDAR assessment are crucial in fine tuning and verifying the most strategic locations of defense measures envisaged in the hard engineering intervention. Also the PASAP Program is installing several tidal gauges and groundwater monitoring wells in Ha'apai. The database that the project envisages developing will improve the storage and effective use of information collected from such apparatus for integrated coastal and freshwater management in Tonga. **SPC/GIZ Coping with Climate Change in the Pacific Island Region program** will support cost-benefit analysis of the forestry sector. **EDF10, SOPAC** – $T2.7 million to fund JNAP activity 3.3 – relating to Forestry. **JICA** – $1 million CCA Project in Tefisi (soil/coastal erosion) **Third National Communication Project** –$480,000 from 2012 to 2015 to conduct Vulnerability adaptation Assessments.

Event Risks* and Outcome Risks** ***(as defined by National Stakeholders)	**Ranking of Risks** ***(9=highest, 7=lowest)***	**Proposed Intervention** ***(as identified by National Stakeholders)***	**Any International Partner or CROP Agency Working on this Issue or Proposed in Future?**
3. *Increase in intensity of tropical cyclones/increase in temperature* - less agriculture and fisheries production affecting food security	**8**	Undertake ecosystem based climate resilient fisheries management in pilot vulnerable communities, including up-scaling Fisheries Community Special Managed Areas in Tonga. **Private Sector** - Facilitate capacity building to undertaken aquaculture/hydroponics development.	SCICOFISH- Scientific Support for the Management of Coastal & Oceanic Fisheries in the Pacific, implemented by **SPC:** This project (Euro 9 million) covers 14 Pacific ACP countries and is implemented by SPC (contract signed in April 2010). The project purpose is to provide a reliable and improved scientific basis for management and decision-making in oceanic and coastal fisheries. Under component 1 (scientific support for oceanic fisheries management) one of the activities is the ecosystem modeling of management measures: the SEAPODYM model (large-scale Spatial Ecosystem and Population Dynamics Model) will be further developed to estimate the response of Pacific tuna stocks to exploitation, management intervention and environmental variability, including climate change. **SPREP** through FINPAC The **SPC/GIZ Coping with Climate Change in the Pacific Island Region program** pilot site, 'Eua island, is implementing land use planning, promoting an ecosystem-based approach, undertaken with local communities. Land use / forest cover change analysis from 10 years ago is being mapped (with SOPAC).
4. *Changes in Precipitation* – Increased incidents of water and vector borne disease	**8**	Undertake a pilot in a priority vulnerable community to determine best mechanisms to address water and vector–borne disease.	**SPREP** could assist Tonga in learning from the Samoa NAPA project relating to climate change and health.

5. *Increase in extreme events (storms) and intensity of tropical cyclones* - Damage to critical infrastructure, including water infrastructure and energy infrastructure (Petroleum Storage, Power Station, Transmission Lines, Solar Home System etc)	**8**	Undertake capacity building program to climate proof priority infrastructure agencies and assets including: • Policy development (from the National Level down to sector level); • Vulnerability assessment of infrastructure assets; • Research and development of climate proof design standards; • Training and human resources development in climate change risk management ; • Sustainable financing for climate proofing infrastructure; • Initiate climate- proofing of infrastructure assets using appropriate technologies (hard and soft engineering).	**SPREP and FINPAC** **SPC/GIZ Coping with Climate Change in the Pacific Island Region program** will support the development of the national land use policy that will include consideration of climate change issues.
Event Risks* and Outcome Risks *(as defined by National Stakeholders)	**Ranking of Risks *(9=highest, 7=lowest)***	**Proposed Intervention *(as identified by National Stakeholders)***	**Any International Partner or CROP Agency Working on this Issue or Proposed in Future?**
6. *Changes in Temperature and Precipitation* – Impact on water demand and water quality/quantity for household consumption	**8**	Undertake a pilot to promote integrated water resource management in a priority vulnerable community – including water resource inventory (surface and underground), assessment of water demand and water balance, water infrastructure assessment to determine rate of leakage and supply, water conservation opportunities, rain-water harvesting.	Disaster Risk-Reduction multi-country project financed under the 9th EDF implemented by **SOPAC (SPC).** This project (Euro 9.7 million) covers 8 PACPs including Tonga. It started in January 2008 and is scheduled to end in June 2013. Activities in Tonga focus on building resilience to drought through: the up-grade of the Mataki'eua wellfield, the provision of rainwater tanks for outer islands and the improvement of water supply in villages on Tongatapu. Pacific Adaptation to Climate Change (PACC) being implemented by **UNDP/SPREP** in 2009-2013 aims to improve the effectiveness of response to climate change in the Pacific. The

			project has selected Hihifo district from Fo'ui to Ha'atafu village in Tongatapu. Climate change and sea level rise had significantly impacted on the livelihoods of the communities which further vulnerable by drought and saltwater intrusion affecting their groundwater. The two main outputs for Tonga PACC project are: • Producing guidelines for water resource use management to counter increased ENSO frequency, and Demonstrating climate change risk management practices for water in Hihifo.
7. *Sea level rise* – seawater intrusion affecting underground water quality	**7**		PACC is directly addressing the issue through its work in the Hihifo district.

Capacity Building Issues *(as identified by National Stakeholders)*	**Priority Capacity Building Issue**	**Proposed Interventions** *(as defined by National Stakeholders)*	**Any International Partner or CROP Agency Working on this Issue or Proposed in Future?**
8. STAGE 1 Capacity Building a. Sensitization and building awareness of climate change impacts and risks at national and local levels and within vulnerable sectors and population groups. b. Building climate monitoring and analytical capacity c. Building adaptation planning capacity at national and local levels and within vulnerable sectors and vulnerable population groups d. Undertake a vulnerability and adaptation assessment	**Priority** – Build adaptive capacity in vulnerable communities and in infrastructure sector and finance sector	**Vulnerable communities** - Train and assist vulnerable communities in undertaking climate change vulnerability mapping and adaptation planning (*see ADB SGA pilot project in Cook Islands for methodology* - RETA 6420) and integrate community vulnerability maps and adaptation plans into Island and national coastal zone management planning process and national coastal zone management policies and plans. Develop community based early warning systems based on community vulnerability mapping. Provide sustainable financing that can be accessed by vulnerable communities to implement community adaptation plans and early warning systems. Train and build capacity within community climate change committees. Establish, train and build capacity of Island Climate Change Officers to develop island level coastal zone management plans and early warning systems built upon community vulnerability mapping and adaptation plans that can be integrated into Island and National coastal zone management plans. **Infrastructure sector** - See Risk 2 above **Insurance/finance sectors** – Establish micro-insurance and microfinance schemes to provide social safety net for vulnerable communities including farmers and fishers. Train and build capacity in insurance and finance sectors to evaluate and manage climate change risks as part of microfinance and micro-insurance program. Establish Regional Risk Insurance facility modeled on Caribbean Catastrophic Risk Insurance Facility (CRIF). **Ministry of Finance** – Build capacity within Ministry	The GCCA (Global Climate Change Alliance) project on Capacity Building & Community Engagement implemented by **USP:** This project (Euro 8 million) covers the 15 Pacific ACP countries. It was signed in December 2010. It includes 3 main components: 1) Capacity building through formal academic training (university courses) and informal community training, 2) Identification and implementation of climate change adaptation actions at community level. These will be identified in each country following a review of best practice and V& A assessments, 3) Applied research focused on the development of tools to support vulnerability assessments and the development of adaptation plans. The type of adaptation activities to be implemented in each country are not pre-defined. They may be in one of these 4 areas: coastal zone management, coastal ecosystem protection, water supply and conservation, or flood prevention/food security. The GCCA (Global Climate Change Alliance) project on improving climate change resilience in Pacific Small Island States implemented by **SPC:** This project (Euro 11.4 million)

		of Finance to mainstream climate change risk management into national accounts and budgetary processes. Establish arms-length Climate Change Trust Fund (not part of Government national revenue or accounts) to provide sustainable source of financing for priority adaptation measures and to relieve pressure on national accounts.	covers 9 Pacific Small Island States including Tonga. It was signed in July 2011. The project will work at regional level with regional organizations (mainly **SPC and SPREP**) to better coordinate and streamline the delivery of climate change adaptation assistance to Pacific countries. It will also work at national level with each country to a) support their efforts in mainstreaming climate change into national and sector plans and response strategies, and b) identify, design and support the implementation of pilot adaptation actions on the ground. As with the **USP** project, these activities are not pre-defined. They will be selected in each country (on the basis of priority, need, feasibility, replicability, etc) and could be in any field relevant to climate change adaptation (agriculture, health, water, coastal ecosystems, coastal management, storm protection, transport, infrastructure, etc). The **AusAID** Pacific Climate Change Science Program aims to help Australia's neighbors in the Pacific and East Timor to better understand how the climate and oceans have changed and how they may change in the future. The 15 partner countries are the Cook Islands, East Timor, Fiji,

			Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. Investment in better climate change science for the Pacific region and East Timor will improve the basis for adaptation planning and allow for more targeted development assistance. The program is working with partner countries to v) track and analyze recent climate trends, vi) investigate regional climate drivers, vii) investigate past and future changes in ocean processes, ocean acidification, regional sea level rise and extreme sea level events and, viii) iv) prepare regional and national climate projections for 2030, 2055 and 2090. Partner country engagement, information sharing and capacity building are integral to the program and are being undertaken across all areas of research. The program is being led by the Bureau of Meteorology and CSIRO through their research partnership in the Centre for Australian Weather and Climate Research. The **AusAID** Pacific Adaptation Strategy Assistance Program (PASAP) is working closely with CROP agencies and partner

			countries to build national, community and regional capacity to understand the likely impacts of climate change and support national adaptation planning and policy responses. Within the overall Initiative, the $12 million Program aims to enhance country capacity to assess vulnerability to climate change and develop evidence-based adaptation strategies in partner countries in the Pacific (incl. Tonga) and East Timor. The **GIZ/SPC/MECC** implemented Coping with Climate Change in the Pacific Island Region project aims to strengthen the capacities of Pacific islands to cope with the impacts of climate change, especially on sectors such as agriculture, forestry, fisheries, tourism, energy and education. The Program is implementing the following components: • Enhance SPC/SPREP capacity to integrate CC into service delivery • Integrate CC into various national strategies, plans and policies • Implement specific adaptation and mitigation measures (pilot projects) • Promote adaptation to CC and strategies for emission reductions in the tourism sector • Sustainable energy management Integrate climate change into

			existing curricula and training programmers
9. STAGE 2 Capacity Building a. Integration of risk assessment and management in the design of infrastructure projects b. Integration of risk assessment and management in the urban planning process c. Climate proofing engineering design criteria and building codes d. Integration of climate change risk assessment and adaptation management in financial and insurance sector e. Integration of climate change risk and adaptation into formal and informal education programs f. Develop and elaborate appropriate and integrated plans for water resources and agriculture g. Integration of climate change risk assessment and adaptation management into sectoral policies and programs, and national development strategies h. Establish capacity building measures to support adaptation planning measures at local and community level i. Establish capacity building measures to support adaptation risk assessment and management measures within vulnerable sectors, including financial sector j. Establish capacity building measures to support risk management and adaptation	**Priority** – Integration of risk assessment and management in infrastructure, coastal zone planning process and insurance/finance sectors		There are a number of small **NGO** managed projects listed on the Tonga stocktaking report that are still active.

planning measures within vulnerable population groups			

Capacity Building Issues *(as identified by National Stakeholders)*	**Priority Capacity Building Issue**	**Proposed Interventions** *(as defined by National Stakeholders)*	**Any International Partner or CROP Agency Working on this Issue or Proposed in Future**
10. STAGE 3 Capacity Building a. Mainstreaming of climate change adaptation that results in the shift of responsibility for climate change adaptation from single ministries or agencies to all sectors of government, civil society and the private sector b. Climate change risk assessments being undertaken for all new infrastructure projects c. Assimilation of adaptation activities within development budgets d. Climate change risk assessment and management a formal part of urban planning processes and vulnerability atlases developed and used to inform urban growth e. Climate change relevant engineering design criteria and building codes used for infrastructure design and construction f. Lending and insurance programs have adequate risk management measures in place g. Climate change risk and adaptation a formal part of the education curricula in formal education and profession education programs h. Vulnerability atlases used as part of early warning systems for disaster management i. Health service delivery made resilient to stressors caused by climate change impacts and	**Priority** – Integration of risk assessment and management in infrastructure, coastal zone planning process and insurance/finance sectors	a. to i. - See Capacity Building program outlined in Stage 2 Capacity Building above. j. - Develop PPCR M & E program	**PACC** being implemented by **UNDP/SPREP** in 2009-2013 has developed climate change, water and food security policies in collaboration with countries and Partners. In Tonga a National Water policy was developed.

population made more resilient to climate change health impacts. j. Undertake monitoring and evaluation, and amend ongoing adaptation measures, policies and programs as necessary			

Table 3: List of Development Partners Consulted

Name	Title	Organization	Phone	Email
Manila - Consultations in Manila with the Asian Development Bank, August 2011				
Anne Witheford	Project officer	ADB, HQ	632 6367	awitheford@adb.org
Steve Blaik	Senior Urban Development Specialist	ADB, HQ	632 6738	sblaik@adb.org
Daisuke Mizusawa	Infrastructure Specialist	ADB, HQ	632 6762	dmizusawa@adb.org
Jiangfeng Zhang	Senior NRM & Agriculture Economist	ADB, HQ	632 5162	jzhang@adb.org
Daniele Ponzi	Lead Environment Specialist	ADB, HQ	632 6746	dponzi@adb.org
Loreta Rufo	Environment Officer	ADB, HQ	632 1986	lrufo@adb.org
Cinzia Losenno		ADB, HQ		closenno@adb.org
Charles Rodgers		ADB, HQ		crodgers@adb.org
Jay Roop	Senior Environment Specialist	ADB, HQ	632 5631	jroop@adb.org
Hasan Masood	Lead Project Specialist	ADB, HQ	632 6818	hmasood@adb.org
Lu'isa Tu'l'afitu Malolo	Coordinator SNC Project / Team Leader	JNAP/Ministry of Environment and Climate Change	27263	ltvtuiafitu@yahoo.com
Saia Faletau	Country Representative	ADB / WB		sfaletau@adb.org
Demetrios Papathanasiou	Senior Infrastructure Economist	World Bank, Sydney	+612 9223 7773	dpapathanasiou@worldbank.org
Makoto Tsujimoto	Resident Representative	JICA	23072	Tsujimoto.makoto@jica.go.jp
Shigeki Ishigaki	Project Adviser	JICA	23072	Ishigaki.shigeki@jica.go.jp
Lilieta Takau	Senior Program Manager	AusAID	23244	Lilieta.takau@ausaid.gov.au
Milika Tuita	Program Analyst / Country Officer	UNDP	22520	Milika.tuita@undp.org
Marc Overmars	Climate Change	ADB/SPSO (Suva, Fiji)		movermars.consultant@adb.org
Taniela Faletau	Environmental Safeguards	ADB/SPSO (Suva, Fiji)		sanedan@gmail.com
Alfred Vaka	Program Officer	JICA	7738194	Alfredvaka.TO@jica.gov.jp
Nalesoni Leka	Environmental Officer	GIZ Project/MECC	24514	nalesoni@gmail.com
Soana 'Otuafi	Project Officer	PSASP Project/MECC	25050	soanaotuafi@yahoo.om

Name	Position	Organization	Phone	e-mail
Sione T Fulivai	JNAP Finance Officer	JNAP Secretariat	27262	Talo_is@hotmail.com
Karen Lummis	Pacific Climate Change	AusAID, Canberra		Karen.Lumins@ausadi.gov.au
Ryan Medrana	First Secretary	AusAID, Suva		ryan.medrana@ausaid.gov.to
Greta Cranston	First Secretary	AusAID, Tonga		
Lilieta Takau	Program Manager	AusAID, Tonga		
Netatua Prescott	Director of Climate Change	SPREP, Apia		netatua@sprep.org
Gillian Cambers	Project Manager GCCA:PSIS	SPC, Suva		gillianC@spc.int
Mosese Sikivou	Deputy Director, Disaster Reduction	SPC, SOPAC Division, Suva		mosese@sopac.org
Noa Tokavou	Adviser, Disaster Management	SPC, SOPAC Division, Suva		noa@sopac.org
Milika Tuita	Program Analyst	UNDP, Tonga		milika.tuita@undp.org
Shigeki Ishigaki	(Project Formulation Adviser	JICA, Tonga		ishigaki.shigeki@jica.go.jp
Alfred Vaka	JICA	Program Officer	7738194	Alfredvaka.TO@jica.gov.jp
Maria Melei,	Tonga Country Team Leader	ADB, Manila		mmelei@adb.org
Martin Jensen	Investment Specialist	ADB, Manila		mjensen@adb.org
John Austin	Manager	PIAC, Sydney		Jaustin.consultant@adb.org
Nina Mines	Operation Officer	PIAC, Sydney		Nmines.consultant@adb@org

Annex 4

Participatory Processes and Consultation with Stakeholders

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

A. STAKEHOLDER CONSULTATIONS METHODOLOGY AND RESULTS

Background

43. Several methods were used to consult with stakeholders in Tonga: meetings and workshops, semi-structured interviews with industry representatives (private sector, environment and other nongovernment organizations (NGOs), media, insurance, Ministry of Environment and Climate Change (MECC) staff), focus groups in Vava'u, and a household survey of vulnerable communities in Vava'u and Tongatapu.

Role of Civil Society

44. Civil society is fundamental to the social and developmental fabric of Tonga. While these civil society organizations do not replace the delivery of government services, they do provide important social support and developmental projects to vulnerable households and communities. NGOs and civil society organizations are mainstreamed into Tongan society. Tonga has a small number of NGOs yet these are stable and have been in existence for many years, enduring through economic and social changes in the country. All are based in Nuku'alofa, with some having one representative in Vava'u and/or Ha'apai and 'Eua. The presence of a representative in areas outside of Tongatapu gives NGOs a presence and a direct connection with the community, which is reportedly missing from some government agencies, such as the MECC, which tend to have a more sporadic presence. Because Tonga—and Nuku'alofa in particular—is small, staff of NGOs know one another well and often work together in high levels of collaboration, or attend the same workshop or training event. It would appear that there is also some informal demarcation of interests, resulting in specialization by some NGOs, or to have a support or implementing role depending on the project.

45. Churches are a mainstream part of Tongan culture, with an estimated 97% of people affiliated with a Christian religion. They have a strong network into villages all over the country. The National Council of Churches has been involved in disaster preparedness. A limitation of churches however, is that they are not seen to (nor do they claim to) support everyone in a community, focusing as they do mainly on their congregation.

46. A challenge for all NGOs is that they are very small, rely heavily on volunteers and are often poorly resourced due to lack of long term stable funding. It is rare for NGOs to receive core funding and most are dependent on external project grant funding from donor initiatives or international benefactors for their development activities. As such, donors usually set the operating requirements in terms of priority activities, reporting, and budget for these development projects. Donor funding can be insecure in the short term, and make NGOs vulnerable to changes in government priority of donor countries, for example when New Zealand changed its aid funding modality to Tonga. Despite this uncertainty, over the long term, support by donors such as Australia and New Zealand, particularly in training and capacity building of NGOs, has produced skilled staff in community development, and environment. The flip side is that when skilled staff leave for better paid jobs (including Government jobs in climate change) this can leave quite a gap in the organization. All NGOs

have to be flexible and share staff responsibilities, and can only scale-up when they have secure funding to do so.

47. Examples of relevant NGOs in environment, climate change and community development are described below:

- *The Civil Society Forum of Tonga* (established in 2001) is the umbrella NGO that operates as a collective agency for NGOs within Tonga and manages inter-agency relationships across the regional network. One of its key objectives is improving communication and information sharing, network establishment, and building the communication abilities of member NGOs.

- *Alou'a Ma'a Tonga* was established in Tonga in 1995. The basic aim of the association is to work with grassroots women to improve the quality of their lives. Work has included: land filling of low-lying swampy areas, gardening and composting, waste awareness, support for land preparation and building materials, improving water supplies, kitchen construction, and income-generating projects. It is currently involved with an ADB urban upgrading project which includes community mobilization to improve low-lying flood-prone areas for 30 households in Popua by bringing in crushed stones and soil to set up gardens for vegetables, flowers, plants for medicine and food, breadfruit trees, bananas, and pandanus.

- *Langafonua 'a e Fefine* (meaning nation building by women), now the National Council of Women, was originally established as an NGO by the late Queen Salote in 1953. It is Tonga's oldest national women's organization and was mainly concerned with raising community living standards and self-sufficiency by encouraging women's productive and leadership skills, and income-generating potential. The focus remains on mat weaving, *tapa* making, and other traditional craft skills, together with home gardening and home improvements. Reconstituted a few years ago as the National Council of Women, it officially functions as a coordinating NGO body or umbrella organization. It currently receives no direct funding and relies on proceeds from handicraft sales and rental income for operations. Langafonua has carried out some disaster preparedness awareness for women in Tongatapu only. This is in the form of the "72 hours bucket"—when a natural disaster occurs, women have access to a bucket and different items (water, batteries, food, flashlight, transistor radio, clothes for children) that will get them through the first 72 hours. Women are trained to know what to get ready for an emergency when the warning comes. Langafonua also has a program to encourage younger women to maintain their houses, and in 2012 the recommendations for household improvements may include rainwater tank maintenance. It operates a very small loan program for women to get capital for handicraft production.

- *Tonga Red Cross Society* has a disaster management program run by one paid staff and many volunteers. This program includes training of emergency response teams (up to 20 people) in remote communities to prepare them for what to do in an emergency, including Red Cross principles of equity, conducting assessments during disaster, distribution of relief supplies, and stocktaking of supplies. Red Cross works in partnership with government including the National Emergency Management Office (NEMO) and other organizations during disaster relief. Through the International Red Cross, climate change has now been recently brought into the work of Tonga Red Cross as part of disaster risk. Activities have included helping coastal areas (e.g., Niua islanders planted mangroves on the sea shore where the tsunami hit), and planning with vulnerable communities (e.g., Patangata at Popua islanders helped to think about the consequences of coastal

inundation). The Red Cross's approach involves empowering existing community groups to address climate risks in their own way. Funding for the disaster program is from Australian Red Cross with some contributions from New Zealand Red Cross for special activities. Tonga Red Cross also works together with MORDI Tonga (see below) to train volunteers in disaster preparedness.

- *Tonga Community Development Trust* was established in the 1990s and currently has 8 staff (five in Tongatapu and one extension officer in each of Vava'u, Ha'apai and 'Eua. Its strategic areas include environment, disaster; governance, democratic rights; water, health and sanitation; and women in development. Tonga Trust has experience in climate change projects and disaster management through the GEF Demonstrating Community Based Adaptation Activities, NZAID Disaster Management Project, Foundation of the People's for the South Pacific (FPSI) programs to build community resilience, and Force of Nature Aid Foundation project to revive traditional practices and mechanisms to cope with floods and cyclones. The trust will soon be working on a primary and secondary schools 4Cs project (Children's Central Climate Change Adaptation) to improve understanding of climate change.

- *Tonga National Youth Congress* (TNYC) is one of the few NGOs with some core funding for basic operating costs and salaries (from AusAID). TNYC has 12 permanent staff in Nuku'alofa, plus three in Vava'u (office manager plus two others in agriculture and environment); two in Ha'apai (one office manager, one agriculture/environment); one in 'Eua, one in Tongatapu, one in Niua Toputapu and Niua Fo'ou. It has an active environment program that has been operating since 1991 and currently includes Youth Environment Conservation and Stewardship (GEF), which works with some schools in Tongatapu to establish garden plots; working with youth on management of community fishing grounds in Special Management Areas; 350 Program to reduce carbon emissions; mangrove replanting in vulnerable areas; and working with Ministry of Agriculture, Food, Forests and Fisheries on climate resilient crops. TNYC has also worked with the Council of Churches to train 101 communities to do disaster risk management planning. TNYC relies on voluntary youth members to organize youth groups and support activities in outer islands.

- *Mainstreaming of Rural Development Initiative, Tonga Trust (MORDI Tonga)* is a community development NGO that helps rural isolated communities of Tonga fight poverty through sustainable community action. MORDI Tonga became an NGO in 2010 but had its roots as a regional program of the International Fund for Agricultural Development (IFAD), working with communities in remote outer islands over three years to develop and implement a community led improvement plan. The community development plans focus particularly on the needs of women and youth, and frequently involve an infrastructure component such as new jetties and water supply, while sustainable tourism has also been successfully integrated into community plans. MORDI Tonga also worked together with the Council of Churches on preparing disaster management plans and training of disaster teams in 29 communities. It is funded by IFAD and may be supported by NZAID to scale-up its work in an additional 31 communities. MORDI Tonga has 4 paid staff in Tongatapu and Vava'u, and 29 volunteer community facilitators, of whom 75% are active.

NGOs and Climate Change

48. As indicated above, NGOs have some experience in climate change, with NGOs such as Tonga Trust having direct implementation experience in climate change activities, including vulnerability assessments and resilience building.

49. The key findings from NGO discussions are as follows:

Specific inquiry	**Comment**
Knowledge about climate change risks affecting the civil society sector	
How many NGOs/CBOs know about climate change risk affecting the civil society sector?	Climate change is a familiar concept to NGOs, although there are gaps in knowledge around adaptation. Most climate change risks are familiar to NGOs, including drought, sea level rising, and cyclones as these are experienced first-hand. However, the predicted risks for Tonga and how these might impact on communities in severity and frequency are not deeply understood.
What is the availability of data and appropriate documentation mechanisms that can be used for climate change risk management?	Technical data is available to NGOs on the predicted risks of climate change to Tonga. Tools to assess local risks and vulnerability are not available.
What is the status of research (knowledge generation) and outreach mechanisms (including research and development) for climate change risk management?	NGOs do not have the resource capacity to do research unless it is funded by donors. NGOs and the media in Tonga have good capacities to reach vulnerable communities, however the knowledge and information about climate risks and prevention are weak. Dissemination is dependent on project funding or availability of materials from MECC. In general, civil society coordination is very good and is made easier by the small population size and clustering of civil society organizations in Nuku'alofa.
Mechanisms to address climate change risks affecting the sector	
Does policy exist for climate change risk management?	Several local NGOs have given thought to climate change impacts in their work particularly around water supply, coastal replanting, agricultural diversification, traditional food preservation, and disaster preparedness, although this is mostly donor driven and is not reflected in organizational policy. NGOs with international links, such as Red Cross, are influenced by policies of their partner organizations.
Is there an institution/mechanism to integrate climate change risk management into day-to-day	Climate change risk management is not institutionalized into the day-to-day activities of NGOs. There are other challenges and priorities affecting the

operations of the organizations?	sector—lack of funding and human resources being more pressing issues.
Do system/tools/guidance exist to undertake climate change risk management?	Tools have generally not been developed and standardized although Tonga Trust has some experience in vulnerability assessments but only for disaster management.
Resources/ability to implement climate change risk management measures	
How do you rate the availability of human resources in the area of climate change risk management within this organization?	Some staff from NGOs have general exposure to climate change, e.g., through workshops or in some cases specific climate training, however human resources are weak in climate change risk management. For example, MORDI Tonga is accomplished at community development projects yet when supporting one community to replace and raise its jetty it did not consider the climate change risks and whether the jetty level would be appropriate for the future. Staff had not thought to do this.
How do you rate the availability of financial resources for climate change risk management within this organization?	NGOs are highly dependent on external/donor funding. Unless climate change risk management is included in donor specifications and adequately resourced it will not be routinely covered in other activities, especially until human resource capabilities improve. NGOs operate on very tight budgets.
How do you rate the availability of technical resources for climate change risk management within this organization?	Technical capacity needs strengthening and tools need to be developed.
Impediments to implementation of climate change risk management measures	
What is the level of coordination among stakeholders at national and sectoral/district levels for managing climate change risks?	There is a high degree of coordination between NGOs, including partnering on project delivery. Coordination between MECC/NEMO and civil society could be improved through more meaningful consultation and information exchange mechanisms. NGOs are able to coordinate at local government level, especially outer islands where they have a presence. However, they are seriously constrained by the number of staff. MORDI Tonga intends to engage Town Officers in their next phase of rural development projects in outer islands—to both improve their knowledge and make them more accountable to the community. The capability of Town Officers varies considerably.

What is the level of inter-agency coordination among stakeholders at national/sectoral/district levels?	NGOs and civil society have been included in the consultations as part of the Joint National Action Plan (JNAP) on Climate Change Adaptation and Disaster Risk Management, and the Technical Working Groups for the PPCR. There is no other formal mechanism for information sharing and coordination on climate change. The Civil Society Forum is an overarching body for NGOs but it is understood that climate change has not been a focus.
Other	NGOs, and civil society organizations have serious budget and human resources constraints.

Private Sector

50. Tonga has a small private sector, often constrained by lack of educated employees (the most skilled leave for overseas jobs), high fixed operating costs because of the size and remoteness of Tonga, and the small number of potential customers, which reduces opportunities for firms to take advantage of economies of scale in production and distribution. Most private sector firms in Tonga cannot afford to spend money on market information, nor invest in new skills and technologies.

51. The Chamber of Commerce and Industry is the peak representative body for the private sector, which has been funded since 2009 by AusAID to have a small permanent administrative staff of four. There are 130 members although this does not represent all businesses and excludes Chinese and outer islands businesses. An office is proposed to be opened in Vava'u with one staff to be appointed in 2012. The Chamber Council is made up of 16 officials elected from member businesses to work on a voluntary basis to represent the interests of the private sector. Understandably council members are very busy attending to their own businesses and this affects their time for chamber matters.

52. The chamber has one staff member, a research officer, who has recently been designated to be responsible for climate change along with many other duties. It is unlikely she will have much time to dedicate to this area, despite a personal interest. Some council members may have knowledge about climate change because of their business involvement, or they have attended a workshop or have a general interest, however the chamber does not have anyone specialized in this area. Information exchange between council members and chamber staff is poor.

53. According to the chamber, there is a strong need for businesses to have information on climate change risks and resilience but it does not have the resources (human or budget) to develop anything at present. A need was expressed for the assistance of a consultant to provide technical expertise to develop and disseminate information specific to the Tongan business context, and specifically on resilience and adaptation. Information would need to combine with national awareness to target business people living in Tonga. The chamber usually only reaches its own membership through email or with monthly meetings but there are some members that do not participate; they just pay their membership. A need to work more closely with MECC was also expressed, as it was felt that at the moment MECC works at very high levels of consultation. Every two years a business survey is implemented by the chamber to find out about general business issues for members and non-members. While there have been some environmental questions previously, the PPCR team was able to contribute a question on climate risks for the next survey (early 2012).

54. The Tonga Business Education Centre (TBEC) is an AusAID supported training centre to improve business services and management through targeted short courses and

follow-up mentoring. In the priorities and demands for training from business, climate change is a long way down the list. Lack of resources in TBEC means climate change cannot be increased in priority as there are other courses more in demand from businesses, such as financial literacy, business management, customer service, and basic job skills. However, if businesses demanded training about climate change then TBEC would help to implement this. TBEC also sees an opportunity to include climate risk training in management training courses as it fits into risk management. It is willing to be a leader in this area but would need support to develop content and improve understanding about the risks. The opportunity to deliver some clear, concise factual analysis of climate change in Tonga to build people's understanding of the implications was thought to be particularly important.

55. Property insurance in Tonga is almost entirely driven by bank lending requirements that demand that borrowers have adequate insurance cover. This includes business property, residences and vehicles. Family Assurance, which is underwritten by Lloyds of London, only accepts large buildings over T$70,000 in value and only markets to people with homes above this amount. People with houses of lesser value are either not insured or insured though other companies in Tonga. The basic premium for Family Assurance is $850 and this is difficult to afford. The Government of Tonga has no insurance coverage of any asset, and may simply replace damaged assets.

56. Lenders for property require a survey to be carried out to assess building condition. Family Assurance's only assessor was trained by the Ministry of Works and it is the only company in Tonga that does building surveys prior to insuring; other companies contract this out to specialists. This survey includes looking at the condition of building materials such as the condition and stability of roof sheeting, checking for cyclone ties and earthquake ties, if the property is raised on posts that it has the proper ties, foundation checks, and making sure no big trees are close by. Recommendations are made to owners on the need to replace ties (T$2) if necessary and removal of trees, etc. It is pointed out in the report to property owner that if they do not act, this will affect their claim. If a property is in a flood-prone area (as identified by satellite imagery), their premium is higher. For example, coastal areas have a higher premium than the lagoon areas in Tongatapu.

57. Insurance companies, such as Family Assurance, have only recently begun to think about climate risks and insurance. As risk-adverse foreign companies from Australia, New Zealand, and United Kingdom underwrite insurance companies in Tonga, cover for climate risks will be increasingly reduced as these companies seek to minimize their exposure to claims.

58. With the advent of the November to March cyclone season, many businesses make a point of renewing their policies.

Media and Communications

Media outlets

59. As with NGOs, media outlets are short of resources, have few staff and rely on staff being multi-skilled in order to deliver media products to deadlines. Due to the small number of the media outlets in Tonga, it is relatively easy to get a newsworthy event or item covered in the media.

60. Newspaper outlets include The Tonga Chronicle (government owned); and Taimi o Tonga (privately owned and published from New Zealand). Newspapers are published one or two times per week, for example Taimi o Tonga is published on Tuesdays and Fridays only. Matangi Tonga has a magazine and runs an internet news service, with much of the content accessible through subscription only. Taimi o Tonga also runs a website for news.

61. Radio is an important medium in Tonga, particularly the government-owned Tonga Broadcasting Corporation's AM Radio Tonga 1 radio service, which is available in the outer islands. There are private FM stations based in Nuku'alofa including Tonga Broadcasting Corporation's Kool 90FM, the privately owned Tonga Radio "Magic" 89.1FM, and Radio Nuku'alofa. Letio Faka-Kalisitiane 93FM is a private, Christian radio station. Taimi o Tonga is about to start a radio station that will focus on awareness programs.

62. Television includes TV Tonga, which is part of the Tonga Broadcasting Corporation; and Digi-TV run by Digicel, which includes one community-based free channel. Those who are able to afford satellite TV can access foreign channels, such as the BBC, and Australian Television. Taimi o Tonga produces awareness programs that are shown on both TV Tonga and Digi-TV but produces these for the community good, not on a for-profit basis.

63. Tonga Broadcasting Corporation is an outlet for many government community awareness programs through both television and radio.

64. As of June 2011, some 8,800 Tongans were online.

Media and Climate Change

65. Although reporters described the relationship with MECC as "healthy", they felt that climate change was an important issue and that there had not been much publicity on the issue to date. They felt there was information worth writing about or broadcasting, but that information was not passed to them, and if it were it would be published. Coverage of climate change tended to be focused around one-off events such as workshops or Environment Day at the request of MECC. The media has not accompanied MECC to any field visits for climate change. Previously some media were part of a biodiversity network which received regular information and published this but this was not happening with climate change, despite this being a bigger issue and being more relevant to people's daily lives and affecting the nation's youth. The media felt that a more sustained coverage would be more effective at changing attitudes and behavior. They saw their role as helping to inform people about climate change.

66. An issue with MECC is that there is no media liaison person, and that staff are project based so it is difficult for media to get information. Often inquiries to MECC are passed from person to person, and there is no *one* person to talk to. Media found this confusing and complicated. An example of a good model of media liaison on the issue of domestic violence is described in Box 1.

BOX 1: Good Media Relations – with the Police

(as told by Taimi o Tonga)

"A good example of a successful partnership on media awareness is the violence against women campaign with the Police Department. The Police held a workshop to discuss their relationship with the media. The Police used feedback from the media on how to improve the relationship. Now we include awareness on violence against women in a weekly TV program produced by us. We also write articles from the Police nearly every week. The Police now have a media liaison person to work with media and build relationships and follow up with media releases. This has improved how information is shared. Now it is very good. Sometimes if we cannot make it to a particular event run by Police, the media liaison person comes to our office and brings a folder of information and explains the event and issues. This makes it easier for us. We are pressured to run his stuff because he comes in every production day!"

Gender Issues in Climate Change

General Situation

67. Tonga ranks 90th in terms of Human Development in 2011—ahead of every other Pacific islands country, including Samoa (99th) and Fiji (100th). While Tonga is not ranked in the 2011 Gender Inequality Index, the major MDG indicators show that men and women are basically equal in education attainment and health indicators. However, cultural attitudes remain a major constraint to women's equality as reflected in women's rights to land resources and their sexual and reproductive freedoms. Women are expected to be the primary care giver at home, and the organizer of food and catering at public events, such as church functions. Women who work have a double labor and time burden from obligations in the workplace and at home.

68. While women have similar high levels of literacy and education attainment as men, they have not achieved the same levels of decision making as men. This is quite striking by the domination of men in parliament and in positions of Town and District Officers. In 2007/2008 there were two women in the one-party Parliament, but as of 2008 there were no elected women representatives, only a King-appointed female minister holding the Justice portfolio. Currently there is only one woman in parliament, the Minister for Education. Only men can be nobles, as women cannot inherit the title. While women have traditionally held high social status, women as leaders are not part of Tongan tradition, and a commonly held view is that women should not engage in politics. It is a challenge for any woman to break from this constraint, including lack of support from other women.

69. Unlike other Pacific Islands, Tongan women's status is not derived simply from marriage and motherhood. Through their role as sisters and paternal aunts, women enjoy status, access to goods and services, and self-worth independent of their husbands. Traditionally younger brothers and maternal uncles had cultural obligations to provide food and other materials to their elder sister or niece. This status is acquired at birth, and is operational both before and after a woman enters marriage. Today, however, women's status as wives takes increasing precedence over their cultural status as sisters. The adoption of Christian values has created a more patriarchal society and reduced the status of women, relegating them to a more domestic role. Respect for women in the household has diminished, and in most cases the man is the decision maker for important family matters. The overall effect of this for women has been negative.

70. While most Tongans, including women, do not regard gender issues as a problem in the country, Tongan women are inhibited by lack of laws that protect their rights, such as protection from domestic violence and rape in marriage, and inheritance of land. Lack of land laws also prevents women from obtaining loans as they cannot use land as collateral for loans, unlike men. Women have to get a male relative to endorse a loan application.

71. In 2009, Tonga failed to ratify the Convention on the Elimination of all forms of Discrimination Against Women (CEDAW), although it is signatory to other international gender equality conventions. It was felt that ratifying CEDAW would undermine the cultural and social heritage of Tonga, and would also have required amendment to the land ownership system, allowing women to have land rights.

72. A cabinet decision established the Gender and Development Division housed within the Ministry of Education, Women's Affairs and Culture, now called Women's Affairs Division. The Women's Affairs Division has four staff. Its objective is the development of women in Tonga, by promoting universal and free participation, and partnership of women and men in all spheres of life. The Women's Affairs Division is not able to function sufficiently due to the lack of human and financial resources. There is a National Policy on Gender and

Development, established in 2001 and revised in 2005; however, implementation has been weak. Gender is not specifically mentioned in the National Strategic Planning Framework. There is a low level of political will and accountability for gender equality and equity. The budget process does not include gender considerations and not all statistics are gender disaggregated. Given the current political and legal system and strong current cultural practices and attitudes, this lack of gender accountability is unlikely to change soon.

Rural Conditions

73. The primary sector only accounts for 20% of GDP yet rural people still largely rely on subsistence agriculture and fishing for their existence, with just a small amount of cash crop agriculture being produced.

74. Despite a perception that men are/were responsible for hard physical labor in agriculture, while women take/took on lighter labor, such as home gardening for vegetables and craft making, the reality is that women take active roles in the core parts of subsistence agriculture. For example, in staple root crop production (e.g., taro, yam) women go to the bush and work with the men, performing heavy agricultural work like planting, weeding, and harvesting. If they have surplus produce after securing their household needs, either a man or woman goes to the local market to sell it. Some women prefer going to the market by themselves because of fears that men would spend the money earned on alcohol. Few women engage in paid agricultural work and opportunities for women in commercial agriculture are scarce.

75. In principle, women manage and control the cultivation of vegetables, fruit trees, and a wide range of medicinal, cultural and ornamental/fragrant (often multipurpose) trees/plants in the immediate vicinity of the household. In addition, they are responsible for the cultural and income-generating handicraft species like the paper mulberry and pandanus, which usually grow in the male bush garden area. Often sales from handicrafts made from these plants form a majority of a household's, and even a community's, income. Women also feed the pigs and raise the chickens. Men are responsible for trees and crop species (with the exception of handicraft plants), including staple root crops and multipurpose trees like coconut, mango, and breadfruit.

76. In 2008, a division of Food, Women and Youth in Community Development was created in the Ministry of Agriculture, Food, Forests and Fisheries (MoAFFF). The purpose of the division is to support the development of women and communities as a whole, including some limited support for projects concentrating on food and livestock production at home to reduce food purchases.

77. In the outer islands, some NGOs have been working to support village women's organizations and providing information on growing vegetables and how to cook crops, as well as health related information.

78. Deep sea fishing in boats is considered a man's job, while women do coastal gleaning, including catching small fish and collecting sea slugs, jelly fish, and shell fish. Even the language used to describe fishing suggests a gender hierarchy; the word *toutai* (meaning fishing) is used only to refer to men's activities and the word *fangota* (meaning collecting or gathering) is used to describe women's fishing activities. Most of women's produce is consumed at home as an important source of family protein, with surplus sold at the local market.

Women make traditional handicrafts from tapa (mulberry) and pandanus

Women selling produce at the market, Nuku'alofa

Woman collecting sea cucumber, Tongatapu

Woman bleaching pandanus for handicrafts, Tongatapu

Situation of Women/Gender in Disaster Management and Environment

79. According to a recent analysis by JICA, gender issues are not specifically incorporated into either disaster management policy or environment policy. Gender is to some degree considered in disaster management through NEMO. Although men and women are treated the same during a disaster, their different needs are recognized, for example to restore livelihoods men would be provided with fishing nets, while weaving huts for craft making would be built for women.

80. The Government of Tonga's Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management 2010–2015 does not undertake any gender analysis on the impact of climate change and natural disasters, nor make any distinction in needs between men and women, despite consulting with women's groups and NGOs.

81. From experience of the tsunami that hit Niua Toputapu in 2009, there was no evidence that women were more vulnerable than men, although the number of women that died was slightly higher than men.[1]

Women and Climate Change

82. Focus group discussions in Kolo'a, Vava'u, in November 2011, highlight some important differences in gender perspectives of climate risks. For example, increased numbers and strength of tropical cyclones was seen to have an external impact for men—affecting agricultural production and food security, and requiring rebuilding effort; while women were more concerned about food, family, living conditions and livelihood, such as damage to raw materials used for handicrafts, damage to home fruit trees affecting food available for the family, communication break downs in telephones, road access, difficulty in getting water from damaged water tanks, gutters and salt water contamination, loss of income and cost of recovery, and more chance of water-borne disease outbreaks.

83. The risk for women is that many of the informal agricultural and income-generating activities they engage in are not recorded or noted and may be overlooked in climate change resilience building as they may be seen as unimportant or trivial. However, such activities of women as inshore fishing, agriculture, and handicrafts do contribute significantly to household income and nutrition, and these activities are also the most climate sensitive.

Household Survey Results

84. One hundred and twenty households were interviewed in Tonga—60 from Tongatapu area and 60 from Vava'u. This represents a broad cross-section of households in different geographies from 28 villages in 8 districts: Hahake, Kolomotu'a, Hihifo, and Ma'ufanga in Tongatapu; and Eastern, Western, Island, and Neiafu districts in Vava'u.

85. Respondents to the survey were 59% male and 38% female, with 3% unknown.

86. Most households (79%) have a male head. The average size of household is 6.6 persons, although household size was bigger in Tongatapu (7.6) than Vava'u (5.5), which is likely to be reflective of migration patterns. Large households of 10 or more people are not uncommon, with the largest having 22 people; 14% of the population is under 5 years of age, with 6% over 65 years of age. Slightly more males than females are under 5 and over 65 years of age. Females outnumber males in the 5–15 year range.

Education Level of Head of Household

Education	Number	Percent of Household Heads
No education/illiterate	6	5.0
Primary or Upper Primary	24	20.0
High school	45	37.5
Secondary School	23	19.2
Tertiary	21	17.5
No Response	1	0.8
Total	120	

[1] Four females died and five were seriously injured compared to three males that died and two seriously injured.

87. Thirteen percent of households had a member who was chronically ill or physically disabled. In two households, there were two people in this category.

88. The main sources of income show a high reliance on agriculture, primary production and home production. Remittances and family assistance is also a vital source of back-up income.

Most Important Sources of Income (percent)

Income	1st ranked	2nd ranked	3rd ranked
1. Salary or wages – government	13	3	1
2. Salary or wages – private company	13	5	1
3. Self employed/own business	8	8	7
4. Agriculture and fish sales	39	17	4
5. Home produce/market sales	13	27	7
6. Remittances and gifts	8	15	28
7. Casual jobs	4	8	6
8. Welfare and pensions	1	1	-
9. Royalties e.g. land, mining, timber	-	1	-
10. Subsistence activity	1	4	13
11. Other income	1	8	13

89. Home ownership is high, with 91% of occupants owning their own home, and only 2% renting, while 7% have other arrangements, which include looking after a family home rent free. Most houses have been built by their owners (65%), with 28% built by a professional builder. The average age of the house is 24 years with the average duration of the household living in the house at 20 years. Housing stock comprises durable materials, such as wooden (67%) or cement (27%) walls; metal (90%) and cement (3%) roofs; and cement (58%) or wood (37%) floors. The median value of the houses surveyed was T$9,700 (but ranged from a few hundred T$ to T$200,000). Houses in Tongatapu had a higher median value than those in Vava'u. 41% considered their walls and roofs to be in good condition while 20% claimed their walls were poor condition and 14% of roofs were in poor condition. More than half the households (53%) had cyclone ties with 5% not knowing whether they had these or not. More households in Tongatapu (58%) had cyclone ties than Vava'u (41%).

90. One third (34%) of households had experienced flooding. Most houses (87%) are raised, one meter on average, above the ground, typically on a concrete slab (44%) but also on timber poles (22%) and concrete posts (20%).

91. Around 19% of households have insurance, slightly more proportionally in Vava'u than Tongatapu.

92. Half the households surveyed had other associated buildings than their main house, mostly comprising cooking houses/kitchens and boys' huts.

93. Three quarters (74%) of households have their own food garden (13 households did not respond to the question). Where households were located—Vava'u or Tongatapu—made no difference to whether there was a food garden or not. Some households also sell produce. About 50% of households sell staple crops, such as taro, cassava, and yam.

Home Garden Foods Grown for Own Consumption

Crop	Number	Percent of Households
Cassava	88	85
Giant Taro	85	83
Taro	76	74
Bananas	76	74
Yam	69	67
Coconut	55	53
Breadfruit	49	48
Sweet potato	35	34
Pineapple	27	26
Vegetables	23	22
Total	583	

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

Home Garden Foods Grown for Sale

Crop	Number	Percent of Households
Taro	21	51
Cassava	20	49
Yam	20	49
Giant Taro	18	44
Pineapple	13	32
Sweet potato	10	24
Bananas	10	24
Vegetables	7	17
Coconut	6	15
Breadfruit	3	7
Total	128	

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

94. Commercial crop production was mostly kava (25% of households), followed by vanilla (13%), and watermelon (5%). Other minor crops included coffee and peanuts.

95. Nearly every household (92%) had pigs, typically averaging 10 animals per household, but some households have up to 50 pigs. Chickens are also common, with 57% of households having chickens, typically 15 chickens per household. Also, 18% of households had goats or sheep and 32% had cows. Goats and sheep are not kept by anyone. Only one household indicated they had crop insurance. While garden food is an important element in the household diet, fish and seafood and store-bought food are also relied on heavily.

Top Three Sources of Food (percent)

Crop	1st ranked	2nd ranked	3rd ranked
Fresh fish/seafood	39	31	22
Pork, chicken, goat	9	23	20
Garden food	58	14	8

Wild bush food		4	14
Store-bought food (rice, tinned fish)	12	28	45

96. Food shortages were experienced by 30% of all households, and these were often multiple times or annual events (usually between the period of August to December, but with some occurrences in March-May each year). Foods in short supply were root crops and garden foods (taro, cassava, kape), and also meat was sometimes unavailable. Causes included slow harvesting, droughts and cyclones destroying crops (in particular Cyclone Waka in 1982 was mentioned several times), but also other reasons, particularly for meat shortages, not receiving a salary and being without money, and for those in Vava'u, no ship coming for a long period of time. Food shortages lasted up to a month if the cause was no ship, 1-3 months due to cyclone conditions and drought, and 3-6 months for very serious events like Cyclone Waka or severe droughts.

97. The main coping strategy to deal with these events was the provision of food (or money) by friends and relatives (including from overseas) or asking neighbors for certain foods, and church handouts. It was also common to buy food from the market or store (rice, flour etc.); and grow fast-growing crops that can be harvested quickly, such as corn, potatoes, and sweet potato. A few households also go fishing to supplement their diet.

98. Asked if households preserve or store food for future use, about 40% of households said they did. This included storing cassava and meat mostly. Some fish was also stored, along with dry goods such as rice, flour, crackers, and tinned food. The most common method of storing/preserving food was to freeze or refrigerate it, especially meat. There were some cases of drying fish, and burying food like cassava in a wet cloth for later use.

Example of house having a water tank without guttering

The main sources of water are vulnerable to climate variations. For example, 85% of households use rainwater all year round. Piped water is also a common all-year source of water, 32% indicating that some households have both piped water and rainwater; 96% of rainwater tanks are concrete or cement construction, and the rest made from plastic. Of those households that have a rainwater tank, the median size is 10,000 liters; 82% have a roof rainwater catchment system but just over half the houses (57%) have guttering around only half the house and only 10% have a full guttering system. Three quarters (75%) of households said their rainwater collection system was working properly.

99. Water shortages were experienced by 56% of households. Coping strategies during times of water shortage are shown below:

Water Shortage Coping Strategy	Number of Times Mentioned
Reduce the domestic use of rainwater for drinking only; use water wisely; when tap water is not working, use rainwater wisely for domestic purposes, mostly for drinking; save tap water/rain water in containers for drinking; save rainwater for drinking, cleaning and bathing use sea water	17
Get from neighbor's tank that still has water good for drinking	17
Get drinking water from the water tank of church (LDS, Catholic)	16
Buy bottled water for drinking from town	14
Wash and bath using well water	4
Get water from relatives	4
Drink from coconut	2
Get water from the village tank, village halls, village well	2
No actions; struggle for a place to get water	2

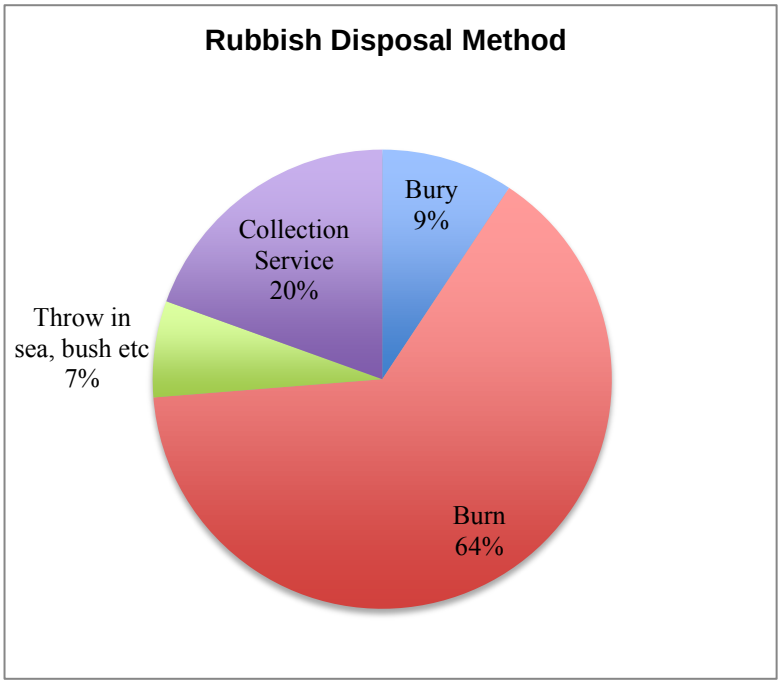
100. Some 70% of households are connected to mains electricity, 13% have solar power, and 3% use a generator. Lighting is also provided by kerosene lamps and battery lamps. Wood is the primary source of fuel for cooking for 80% of households, and 20% use gas, despite most households being connected to electricity. This may reflect both a preference for traditional cooking using wood and an unreliable electricity supply.

101. A septic tank flush toilet is the most common type of toilet used (see table below).

Type of Toilet Used by Household

Toilet Type	Number	Percent of Households
Water flush to septic tank	50	41.7
Dry pit latrine	48	40.0
Water (pour) flush to pit	22	18.3
Bucket collection (night soil)	-	-
Water flush to sewerage system	-	-
Composting toilet	-	-
No toilet – sea, bush, river, etc	-	-
Other	-	-
No response	-	-
Total	120	

102. Rubbish in Vava'u is disposed mostly by burning; there is no collection service.



Flooding, cyclonic rain and storm surges were experienced by 44% of households. There were significant events noted in 1982 (cyclone), 2006 and 2008, February 2009, February 2010, and January 2011 (cyclonic rain). The causes were cyclonic rain periods, cyclones, and some storm surges. The most serious damage occurred because of severe cyclone Waka in 1982, which caused property damage in Tongatapu and flooding for 4-6 hours. Flooding occurred inside and outside houses, and resulted in household contents, furniture, and personal effects being damaged, as well as some damage to roofs. The cost of building damage was T$1,000-10,000 per affected building, and about half the households experienced some damage. Other flooding events did not always produce damage but rain lasted from between a few hours to a week. Some households had their floor damaged or their sand or cement platform eroded. Those few households experiencing water damage to household contents estimated this at T$800-T$6,000. Grass and plants around the property died because of the rain.

103. Suggested actions to prevent flooding were:

- Grow trees to cover the main house from flood water, such as growing them in row like a wall; replant mangroves
- Use truckloads of rocks to fill the property; fill with gravel and soil, or limestone; collect dry coconut leaves and spread around the ground
- Use a water pipe to drain water down to the sea; dig holes for water drain
- Build a house that is 3 meters above the ground; raise the house floor; rebuild on a high posts, e.g., on 2 meter high poles
- Rebuild fence, gravel fill the coastal side; build a fence to avoid water being invading to the house
- Build sea walls
- Strengthen roof, so it can resist cyclone; buy cyclone ties for the roof
- Put personal belongings on the roof; take belongings to another place; use the roof to stock personal effects
- Evacuate during flooding; run away
- Move to high ground; move to a better location
- Not do anything, because of very poor finance; husband has died and children still in school

104. Fewer than 5% of households indicated they might move to avoid flooding. The reasons why others would not move were: no money to buy materials and finance a move, no land or other place to move to.

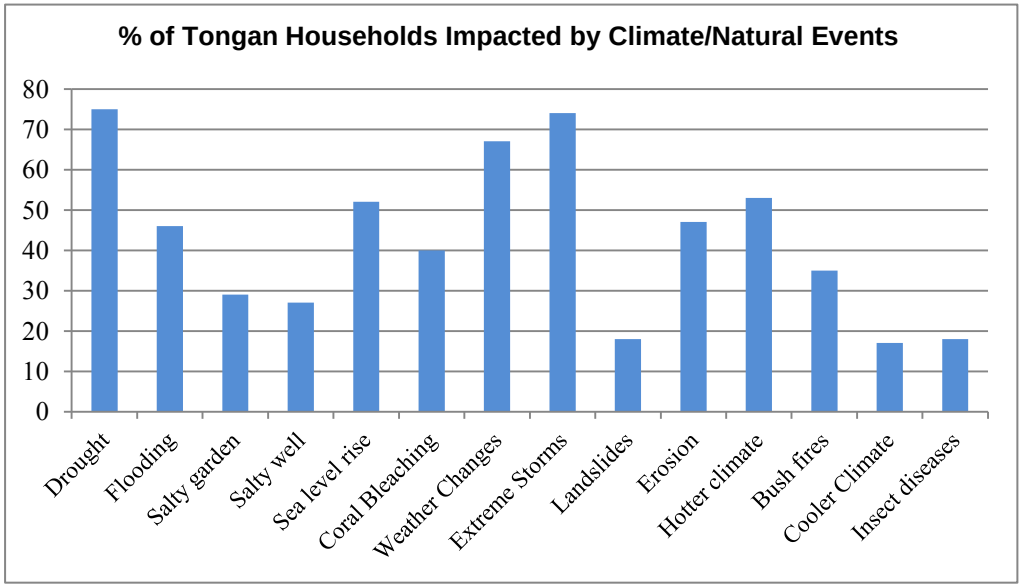
105. The concept of climate change is familiar to people in Vava'u and Tongatapu, with 88% of respondents having heard of it prior to the interview. When asked to describe climate change, the following responses were given, which show respondents' experience in changing weather patterns and impacts on crops:

- Usual seasons are changing, generally colder this year as shown by the plantations/crops yield
- Droughts and rainfall can affect plantations
- Climate change influences the commercial crops, e.g., watermelons
- Changes in weather patterns can cause disappearance of fish species and planting seasons for farmers to vary
- Humans careless and misuse resources; human development—cars, factories, pollution;
- Human activities cause changes to climate; increase weather related hazards
- New developments e.g., roof materials, road tar, increases temperature.
- Change in weather patterns, global warming, caused by human activities
- Warmer temperature, more droughts and cyclones— increasing problems
- Weather patterns are changing—cooler and warmer temperatures
- Change in weather patterns, more rain in warmer seasons, sea level rise
- Heavy rain, weather is getting worse e.g. higher temperatures
- Hotter, more rain, change in weather pattern
- Hotter and less rain
- Too much rain, more cyclone warnings, weather changes pattern, hotter, sea level rise
- Increase in sea level. Sea now coming to areas where it did not before. And, trees at the beaches start to erode as well as other materials, such as soil and sand.
- High sea level meaning heavy rain— damages the trees, etc.
- It happens in different times and seasons that people do not expect, e.g., drought and suddenly heavy rain, etc; season change not in the right time—cold air still going in warm season; warm air coming during winter season.
- Frequent bad weather recently; not up to level of hurricane but damaging to root crops and fruit crops.
- Continuous changing of weather, e.g., raining for 2 or 3 days and then sunny days for 3 to 4 days then, more bad weather coming; heavy rain almost every month.
- New pattern experienced these past 5 years as more rainfall (heavy) every month; or after every 2 months, with also very hot days for weeks or almost a month before more heavy rain and bad weather arrive.
- Climate changes in different time causing confusion, because it happens nowadays when it is in the hot season—heavy rain and cold at the same time.
- Climate change considering sea level—high level meaning that there

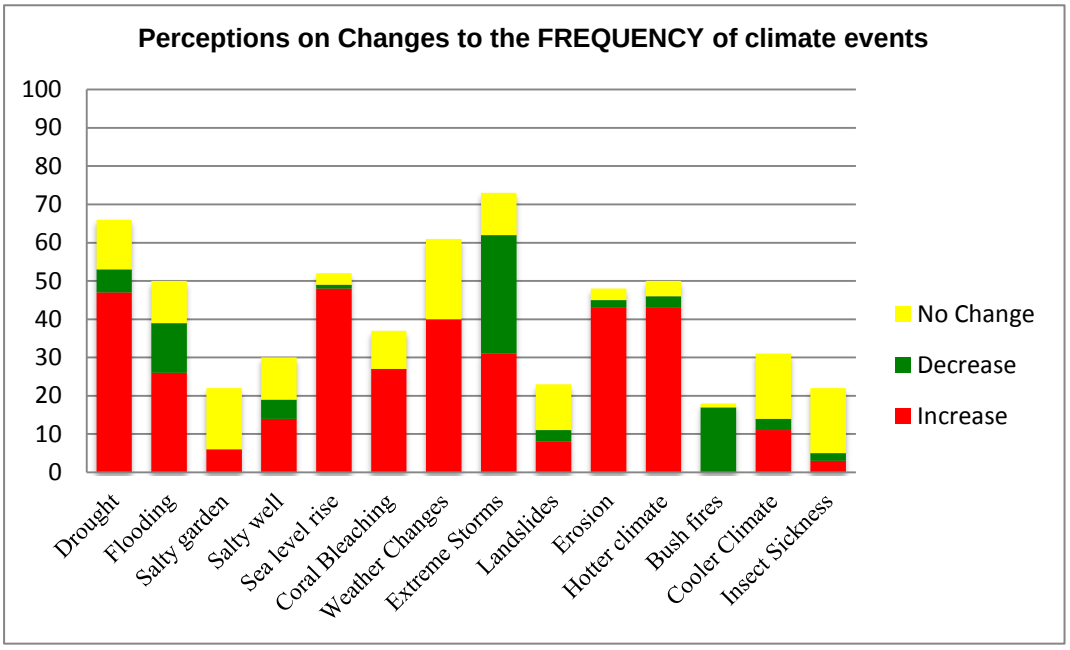
would be a heavy rain, etc., while its hot at daytime and cold at night, etc;

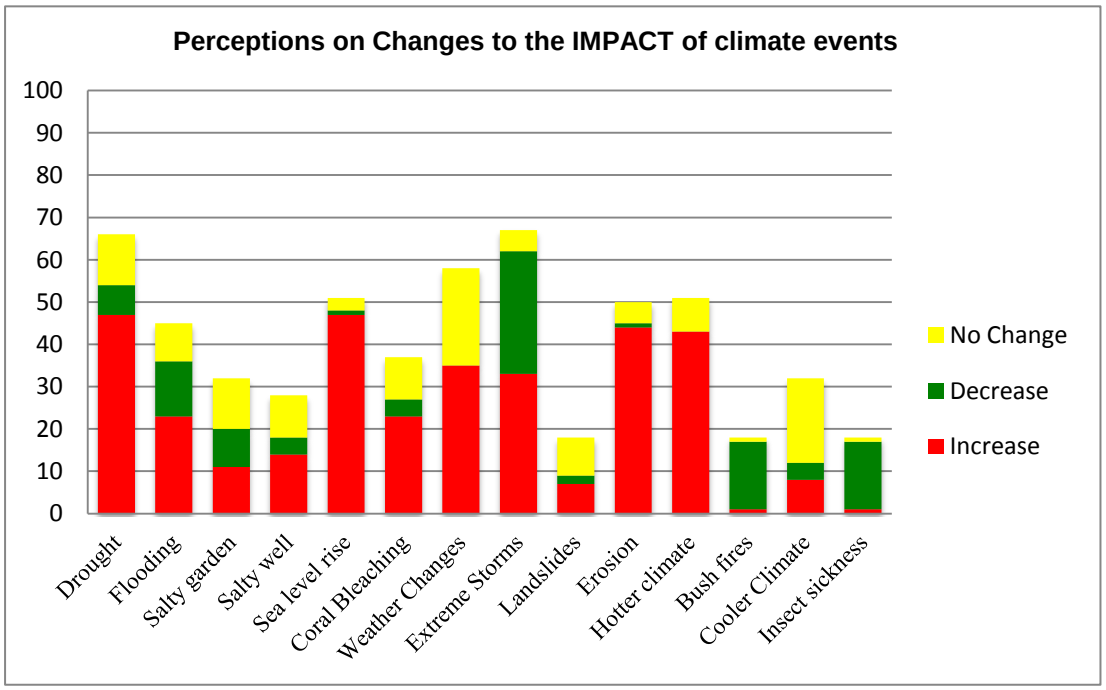
- The normal air season (climate) changes. E.g. High sea level, meaning that there would be a heavy rain; different changes that cause confusion about the climate when it is not a normal year, etc.
- Sometimes the air changes from hot to cold, and drought to heavy rain. It happens nowadays very differently from what people know about the season; high sea level; the air become hotter than before, and while it is hotter at day time it is cold at night; dry season (warm) arrives when cold persists; cold air goes together with warm air.
- It is the changing of air from day today, e.g. rain, cool and hot air, And it depends on the interaction of nature and the climate
- Sudden change in climate—suddenly hot and sometimes suddenly cold, It changes very fast nowadays
- Flood problems cause sickness to the family
- Don't know anything about it
- Do not understand it

106. Residents in Vava'u and Tongatapu have experienced a range of climate change impacts, notably droughts (75%), and extreme storms (74%) (refer to chart below).



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





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

- Climate change
- Burning rubbish, cutting trees and not replanting
- New developments, increasing pollution

- Nature—deforestation and burning of rubbish
- Human activities, e.g., burning rubbish
- Pollution from industries
- Burning of toxic rubbish and cutting coastal plants for firewood
- Coral bleaching due to fishers using the fishing nets and interaction of climate and nature
- Introduction of overseas or foreign materials, such as chemicals
- Too much release of gas to the atmosphere
- Too much use of contemporary technical tools, which attract and pull down different energy from space, causing climate to be hotter than the past.
- Caused by the interaction of nature and climate
- Don't know

109. The association between burning rubbish and climate change is the result of an awareness program about how burning rubbish is harmful to the environment and health. Churches appear to be an important source of help for households if a catastrophe occurs, such as cyclone, flooding or serious drought. The government, including national level, Town Officers, District Officers and local politicians, also has an important role in assistance as a second option, possibly after the initial crisis.

Top Sources of Help during a Catastrophe (percent)

Source of Help	1st ranked	2nd ranked	3rd ranked
Church	32	20	13
National Government	30	13	12
Head of household	27	13	11
Town Officer	18	18	4
No one	7		1
Provincial/district government	6	11	5
Local MP/politician	5	13	13
Representative organization	5	7	6
Family	5	2	1
Village committee	2	5	7
Noble	2		2
Neighbor	2		1
NGO, e.g. Red Cross, Mordi Tonga		3	3
Other			3

110. The importance of the church in people's lives is reflected in the high number of households with a social connection to a church organization. Women's groups and youth groups also have high membership levels.

Membership of Social Organizations

Type of Organization	Number	Percent of Households
Church	101	91
Women's groups	69	58
Youth groups	34	28
Local NGOs	9	8
Other	8	7
Agriculture/farmers' association	7	31
Fishing association	6	5
Landowners' association	1	1
International NGOs	0	0

111. Respondents were asked what measures would help their family to prepare for and manage the risks of climate change (e.g., 50 cm sea level rises, droughts, floods, landslides, changes in weather patterns). The large number of responses indicate a widespread knowledge of the actions that people can take to protect themselves, and show some awareness about disaster preparedness. Examples of needs and suggestions are:

- Store and prepare first aid, food, clothing, batteries, water bottles etc,
- Stock food and first aid, and emergency supplies, Insurance
- Use water and food resources wisely; use water wisely; store water in co
- Tie roof more tightly and strong
- Raise house; landfill to make high ground; prepare for sea level rise
- Earn more money to find a new place in the high ground; move to higher
- Ask families overseas for rebuilding a new and stronger house.
- Try to ask the Town Officer for another property so we could move
- Earn and save more money to buy a new place on higher ground far fro
- Strengthen the house, renew/strengthen roof and gutter, install gutters, in
- Need some water tank to store enough water during drought season
- Need to improve water tank, get a plastic Rotomould plastic tank
- Water storage for the cows and crops
- Replant coastal trees; tree planting; plant mangroves; stop cutting trees
- Crop diversification, drought resistant crops, increase amount and variety
- Plant vegetables during drought seasons
- Grow crops that cyclone affects, such as taro, yam
- Grow more crops to sell to get more money and more food in case there
- Grow more crops that would resist damage from a cyclone and kind of cr damage caused by drought
- Insurance of family, property, crops and animals
- Would join an insurance group for repairing something damaged; be damage occurs.
- Make tin fences to avoid water flooding, fence
- Build a sea wall on coastline
- Save money for future use and evacuation plans
- Earn more money to be better prepared for natural hazards
- Stop burning rubbish, decompose organic waste
- Teach people how to plant trees in coastal area; stop cutting trees
- A big, strong and safe village hall that is well equipped for the commu hurricane; hope there will be a big strong town hall where we can be safe

- Increase natural disaster awareness
- Teach people and village how to protect the environment—stop burning p
- educate them on how to identify hazards and make plans to cope with its
- Need to be well prepared for natural disasters
- Better prepared for natural disasters and reduce activities that cause clim
- Listen to environmental awareness programs and be prepared
- Learn more about climate change and how to stop risks to the environme
- Villagers work together to protect their environment
- Work together to protect the environment; government to assist
- Don't know any help for climate change

Vulnerable Areas, Community Coping Strategies, and Help Needed

112. Climate impacts in Tonga identified by the community and civil society include drought, cyclones, increased rain, and sea level rising and coastal flooding. Due to the high coastal exposure of Tonga there are many vulnerable locations including outer islands and coastal communities in Tongatapu, e.g., Hihifo.

113. The most vulnerable groups are poor and remote, and frequently women. After a disaster, such as a cyclone, people are in shock, and do not know what to do. The most seriously affected are poor and vulnerable families especially those without a man to do physical work of rebuilding—women and small children, elderly. Losing property through natural disaster or climate change is difficult as most people do not have the money to rebuild and are not able to access insurance cover. In outer islands where there are few opportunities for cash income-generating, rebuilding or investing in any risk reduction actions, such as building a rainwater tank, is particularly problematic for households. Often the response is to wait for assistance from government, NGOs, and overseas relatives.
Other vulnerabilities occur because of institutional weakness during climate change and natural disasters, for example, an inactive Town Officer or poor coordination between community groups, such as women and youth, can affect response and recovery.

Coping Strategies

114. Examples of current coping strategies in Tonga to deal with climate change and natural disasters are:

- During natural disasters the community members help each other. For example, during the 2009 tsunami, members of the community went to houses of elderly and carried them to safety. After cyclones they help each other to rebuild.
- Mangrove replanting is occurring in vulnerable coastal communities where erosion is severe.
- People affected by natural disasters turn to extended family for help by asking for money or assistance, especially from relatives in New Zealand or Australia.
- People plant quick growing crops after a disaster, such as kumara and sweet potatoes, as these can be harvested quickly.
- The Ministry of Agriculture is promoting organic farming and identifying crops that are drought resilient and have a stronger adaptation to the climate. The Ministry has helped with supplying planting materials to NGO projects, e.g., banana that grows in more salty soils, variety of coconut for coconut oil production but which is more resilient, and other fruit trees.

- Have a safe place for planting material and seedlings so there is a quick recovery after a cyclone. TNYC is building this aspect into a project to develop school bush allotments.
- Outer island communities have some remaining traditional practices of coping with natural disasters, such as cyclones. For people in Tongatapu, modern technology, such as refrigeration for storing food, has meant the loss of these practices. After a cyclone, people usually dig a hole in the ground and put all the food, such as breadfruit, there and bury it. When there is no more food they open it and distribute it to families. There are also traditional ways of storing meat and fish by drying, e.g., fish and octopus, but technology like refrigeration has replaced this practice. Tonga Trust has been working on a project to revive some of these traditional practices.
- Elderly people know how traditional methods of food preservation including fermenting, drying, salting, and also putting food in a sealed container and burying it for more than one year. However, passing this traditional knowledge to youth and young farmers is a challenge.
- Mormons throughout Tonga practice food storage—called “The Welfare”. This involves putting aside rice, flour, and sugar type products in foil-protected storage for six months to one year, after which it is used and restocked.
- There are also traditional signs of imminent disaster that have been lost to younger generations. For example, impending cyclones can be identified according to strange cloud formations or movement of trees, or tsunamis from pigs running inland and unusual behavior of other animals, or different fish appearing in the seas than normally, or air changes. Some of these signs are being documented by NGOs.
- Income-generating programs supported by NGOs exist in the outer islands, such as sustainable tourism and handicraft development, to protect vulnerable communities from shocks of natural disasters.

Needs and Solutions

115. Reducing the vulnerability of people to climate change requires action at the community level. This includes training and facilitating communities to understand their own situation and future vulnerabilities, as well as exploring new and old ways of reducing vulnerability.

116. Steps for this to happen are:

- Resourcing and training of NGOs so they can assist communities to understand climate change risks and resilience building.
- Developing awareness materials and information to convey Tonga’s climate risks and simple behaviors for the community and businesses that can build resilience.
- Integrating risk assessment and response into existing NGO support projects, e.g. community development and disaster management.
- Training Town Officers and community groups (women, youth, church) to understand and integrate adaptive behaviors into their daily lives. For example, this might include training younger women and men in traditional and modern food preservation techniques.
- Strengthening town committees so they can take responsibility for water supply management, including development and repair of water supply tanks.
- Promoting climate change into community council structures and governance. This might involve selecting and training a council member to be the climate change representative.

- Funding community selected protection measures, such as building foreshores and coastal tree planting.
- Providing microfinance for insurance, rebuilding, and livelihood development.
- Improving MECC communication and knowledge sharing on climate change risk management to operate as a partnership with civil society and to include a wider range of stakeholders, e.g. development NGOs, businesses, media.
- Supporting a climate change media liaison position in MECC to provide information and coordination with civil society.
- Integrating climate change into NEMO's work and improving coordination between NEMO and MECC.
- Improving NGO and donor coordination to avoid duplication of planning at community level.

117. **Focus Group Meeting, Koloa, Vava'u, 2 November 2011**

1. *Talanoa'i 'e he kulupu 'a e anga hono uesia 'e he ngaahi ha'aha'a 'oe feliliuaki 'oe 'ea 'a e anga ho'o mou nofo moe mo'ui 'i homou kolo?* Discuss as a group how climate change affects your life and work in your village?

Kakai Fefine (Female)	**Kakai Tangata (Male)**
Malohi mo lahi ange 'a e Saikolone (more and stronger tropical cyclones) • *Lahi ange mamau ki he ngaahi koloa 'oku fakatefito mei ai e lalanga 'a e kakai fefine, e.g. lou'akau moe hiapo* (more damage to the raw materials used by women for weaving e.g. panadanus and mulberry trees) • *Lahi ange maumau ki he 'akau fua 'oku fakatefito mei ai e feime'atokoni hange koe mei, siaine, hopa, pea pehe ki he kai 'a e fanau moe famili hange koe mango, tava, vi, etc* (more damage to home grown fruit trees that often provide food for the family, such as banana, breadfruits, etc) • *Motuhia e fefononga'aki – tapuni e hala he holo 'a e 'akau, 'ahanga he hake 'a e peau, mate 'uhila moe telefoni* (breakdown in communication as road are being blocked by fallen trees, electricity and phone line broke down) • *Lahi ange maumau 'a e ngaahi tanaki'anga vai hange ko hono hu'i hifo 'ehe havili 'a e fakatali pea 'uli moe vai* (more damage to water tanks, gutter blown away and water being contaminated by salt sea spray) • *Mole e faingamalie ki he ma'u'anga pa'anga pea lahi e fakamole ki he langalanga fo'ou e mo'ui* (loss of income and increasing cost for recovery)	***Malohi mo toe lahi ange saikolone (more and stronger tropical cyclones)*** • *Lahi ange maumau e fua 'oe fonua pea uesia 'a e fo'i me'atokoni* (affect agricultural production and food security) • *Lahi ange e ngaue ki hono langa hake e maumau 'a e ngoue'anga* (more effort in rebuilding and recovery from all the damages)

• *Lahi ange 'a e faingamalie ke too ha ngaahi to'u mahaki hange koe fakalele 'a e fanau tupu mei he 'uli 'a e vai, tengi, etc etc* (more chances for an outbreak of waterborne diseases such as dengue fever, diarrhea, etc)	
Mafana mo Momoko ange 'a e 'ea(temperature changes – hotter in summer and cooler in winter) • *Uesia 'a e lou'akau he taimi lahi ange 'a e mafana pea pakaka mo pakupaku e lou'akau ka 'oku lelei ia he taimi momoko* (pandanus are hard and not good for weaving during summer but better in winter) • *Ko taimi 'oku momoko ange 'oku uesia e ngaahi ngaue faka'apai hange koe foo pea tautoloi kae 'oua kuo mafana 'o a'u ki ha taimi 'oku toe lahi ange 'a e ngaue hono tautoloi. Lahi ange 'a e ta'ota'o he taimi momoko*. (home duties such as washing delayed and more time spend in bed getting warm when it is much cooler)	***Mafana mo momoko ange 'a e 'ea (temperature changes – hotter in summer and cooler in winter)*** • Fua kovi 'a e 'akau fua (fruit trees are less productive) • *Mahaki'ia 'a e ngoue mei he inisekite* (less production from root crops due to increase pests) • *Taimi 'oku vela ange ai 'a e 'ea pea fakahoko e ngaue ki 'uta he taimi pongipongi moe efiafi he mokomoko 'a e 'ea* (when the temperature is much hotter, men go to the bush twice a day – early in the morning and afternoon)
	La'ala'a (drought) • *Honge vai* (water shortage) • *Uesia e ngoue'anga pea honge me'atokoni* (affect agricultural production and lead to food shortage)

2. *Koe ha e founga 'oku malava ke mou matu'uaki ai 'a e uesia mei he feliliuaki 'a e 'ea? Koe ha ha toe tokoni makehe te mou fiema'u ki hono matu'uaki 'a e feliliuaki 'a e 'ea?* (How do you cope with the impacts of climate change? What sort of assistance you need in order to cope better with the impacts of climate change)

Kakai Fefine (Female)	**Kakai Tangata (Male)**
Toe tokanga mo mateuteu ange kei taimi ki he saikolone (be more prepared during cyclone seasons) • Tokonaki me'atokoni kei taimi (store food in advance/use welfare system) • *Fiema'u e tokoni ke fakalahi e ngaahi tangike vai mo fakalelei'i e ngaahi sima vai* (need assistance for more water tanks and repair old ones)	***Mateuteu 'a e ngoue'anga ki mu'a ha matangi (prepare plantation in advance for strong wind or cyclones)*** • *Kini e manioke pea kini moe lau 'oe fusi pe siaine* (trim down manioke branched and banana leaves, etc) • *Fiema'u tokoni pulopula vesitapolo ki he langalanga hake* (need financial assistance on seedling for recovery)
Ke malu ange 'a e me'atokoni 'i eh taimi saikolone (food security should be a priority during cyclone season) • *Too e ngaahi ngoue 'e si'i hono uesia*	***Malu'i 'a e tanaki'anga vai (protect water collection system)*** • *Fakapapau'i 'oku kini e 'akau lalahi ofi ki he sima vai* (ensure

'ehe matangi e.g. talo, 'ufilei, etc. (plant crops that will be less affected by strong wind e.g. talo, yam, etc,) • *Fiema'u tokoni fakapa'anga ki he langalanga hake* (need assistance for recovery, such as seedlings for vegetables, pandanus, mulberry,etc)	trees near the tanks are trimmed beforehand) • *Hu'i e fakatali na'a puhi 'e he havili* (take off gutters to prevent from blown by wind) • *Haka e vai pea toki faka'aonga'i ki he inu* (boil water before drinking) • *Fiema'u tokoni ke monomono e sima maumau, fakafo'ou e fakatali pea mo ha tangike fo'ou ke fetongi e ngaahi tangike kuo ta'e'aonga* (need assistance to repair damaged tanks, and install new ones)
Mateuteu 'a e fale nofo'anga (cyclone damage dwelling houses) • *Tukituki kei taimi* (put up shutters in advance) • *Taa 'ulu 'akau ofi ki fale* (trim down trees around the house) • *Fiema'u tokoni fakapa'anga ki hano monomono e maumau pe langa fale kapau na'e holo* (need financial assistance to rebuild houses if damaged)	
Ma'olunga ange tahi (sea level rise) • *Too e 'akau ke 'akau mataatahi lahi* (plant more coastal trees) • Tokoni fakapa'anga ke ngaohi a fosoa ke malu'i e mataatahi (need financial assistance to build foreshore to protect the coast areas from erosion)	

Tangata (Male)	**Fefine (Female)**
3. *Koe ha e tu'unga ho'o mou mahino'i 'a e kaveinga 'oe feliliuaki 'oe 'ea mo 'ene uesia e anga ho'o mou nofo/mo'ui?* (What is the level of your understanding of climate change and how it affects you?	
'*Oku 'iai pe ngaahi me'a 'e ni'ihi 'oku mahino* (we have some understanding)	'*Oku 'iai pe ngaahi me'a 'e ni'ihi 'oku mahino* (we have some understanding)
4. *Koe ha e ngaahi kaveinga 'oku ke fiema'u ke fakaloloto ai ho'o 'ilo?* (What are some of the things you need to know about climate change and its impacts?)	
'*Oku mau fiema'u ke toe fakaloloto'i ange 'emau 'ilo ki eh feliliuaki 'a e 'ea, tautefito ki he foung temau mateuteu ange ke matatali 'aki 'a hono ngaahi ha'aha'a*. (We would like to learn more about climate change and how we can be better prepared to cope with its impacts)	*Sai p eke toe lahi ange 'e mau 'ilo ki he feliliuaki 'a 'ea pea tautefito ki he anga e tupulaki e levolo 'a e tahi moe ngaahi me'a fua ki he mafana moe malohi 'oe matangi, etc?* (It will be good to know more about climate change, why sea level is rising and its effects and also some of the measurements used such as millibars, categories of cyclones, etc)

5. *Koe ha e founga lelei taha ke fakafou mai ai ha ngaahi polokalama ako ke fakaloloto ‘aki ho’o mou ‘ilo ki he feliliuaki ‘a e ‘ea?* (What is the best way to disseminate information to raise your awareness about climate change?)	
Fakahoko mai ha ngaahi polokalama ako ‘i he TV moe Letio (conduct television and radio awareness program)	*Fakahoko ha ngaahi polokalama ako ki he ngaahi kolo ke fakafou mai ‘e he Tonga Community Development Trust pea pehe ki he kau taki lotu moe ngaahi siasi.* (Conduct community workshops by Tonga Community Development Trust and also church leaders and churches.)

118. **Observation of Climate Change Impacts in Koloa village**

i. *Ma’olunga ange ‘a e levolo ‘o e tahi* (sea level rise and its impacts on infrastructure, such as road)

- *‘auhia ‘a e fonua moe mataatahi* (coastal erosion)
- *Hake ‘a e tahi ki he fonua moe hala pule’anga* (waves goes inland at high tides across the beach road)
- *Uesia ‘a e ngaahi ‘api ne tu’u matatahi* (coastal residence are affected badly)

ii. ‘*Uha lahi* (heavy rain)

- *‘auhi ‘a e kelekele ki tahi, ‘uli ‘a e tahi pea mate me’a mo’ui* (soil erosion is very evident as sign of heavy rain washing soil into the sea and may affect coastal marine life)

iii. *Ma’u’anga Vai* (water resources)

- *‘ikai ha vai mei lalofonua he ‘oku kona pea maumau e misini* (no groundwater because of salt intrusion and water pump broke down)
- *ahi e ngaahi sima ‘oku kei malu ‘aupito ka ‘oku tu’u ‘ata’ata ‘o ‘ikai ofi ki ha fale ke tanaki mei ai ha vai* (a lot of cement tanks in very good condition are being left idle in homes without houses. This is due to cyclone damage to the houses and some due to out-migration. A few cement tanks have houses but without guttering).
- *Lahi e fakataka e fang puaka pea ‘oku nau tokonia ‘a e ‘auhia ‘a e kelekele ki tahi he taimi ‘uha lahi* (too many roaming pigs contributing to soil erosion in heavy rains)

Beach road under water during high tide

Erosion from roaming pigs and heavy rain

Tonga Workshop sector groups

Tonga Workshop

Community representative from Vava'u describes climate impacts

Small group work

Small group work

Persons Consulted through Interviews or email, October- November 2011

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Vulnerable Household Survey Respondents, November 2011. Vava'u and Tongatapu

Respondent	Sex	Location	District	Village
Fetapa Falemaka	Female	Tongatapu	Hahake	Lapaha
Fahina Ma'afu	Female	Tongatapu	Hahake	Lapaha
Tongamatamoana	Male	Tongatapu	Hahake	Lapaha
Ahio	Male	Tongatapu	Hahake	Lapaha
Fepaki Sili	Male	Tongatapu	Hahake	Lapaha
Mateo Hefa	Male	Tongatapu	Hahake	Lapaha
Anasi Fotu Pulu	Male	Tongatapu	Hahake	Lapaha
Paulo Vakapuna	Male	Tongatapu	Hahake	Lapaha
Anilona Onesi	Female	Tongatapu	Hahake	Lapaha
Finau Vaka	Female	Tongatapu	Hahake	Lapaha
Fane Tonga	Female	Tongatapu	Hahake	Lapaha
Ofakiahau Pese	Female	Tongatapu	Hahake	Hoi
Seleti Samoa	Male	Tongatapu	Hahake	Hoi
Melelupe Uhi	Female	Tongatapu	Hahake	Tatakamotonga
Hone Felemi	Male	Tongatapu	Hahake	Tatakamotonga
Lavinia Taufa	Female	Tongatapu	Hahake	Tatakamotonga

Visilia Tu'akalau	Female	Tongatapu	Hahake	Tatakamotonga
Saane Matakaiongo	Female	Tongatapu	Hahake	Tatakamotonga
Seini Nusi	Female	Tongatapu	Hahake	Tatakamotonga
Lo'amanu Taimani	Male	Tongatapu	Hahake	Tatakamotonga
Melino Fungasia Siua	Male	Tongatapu	Hahake	Tatakamotonga
Taani Mafile'o	Male	Tongatapu	Kolomotu'a	Sopu (Isileli)
Fifita Kuila Havea	Male	Tongatapu	Kolomotu'a	Hofoa
Liliola Makoni	Female	Tongatapu	Kolomotu'a	Hala'ovave
Amanaki Feke ('API)	Male	Tongatapu	Kolomotu'a	Hala'ovave
Tavoi Lui	Female	Tongatapu	Kolomotu'a	Hala'ovave
Sione Katalina	Male	Tongatapu	Kolomotu'a	Halaano (Sopu)
Meleulu Kolo	Female	Tongatapu	Kolomotu'a	Sopu
Hao Mo'unga	Female	Tongatapu	Kolomotu'a	Halaano
Tesimoni Iloa	Male	Tongatapu	Kolomotu'a	Isileli
Matini Kotini	Male	Tongatapu	Ma'ufanga	Patangata
Talita Kafoa	Female	Tongatapu	Ma'ufanga	Patangata
Ofa Lelenoa	Male	Tongatapu	Ma'ufanga	Popoua
Hala Hakalo	Male	Tongatapu	Ma'ufanga	Popoua
Mo'unga Otuhoma	Male	Tongatapu	Ma'ufanga	Popoua
Simione Kolo	Male	Tongatapu	Ma'ufanga	Popoua
Semisi Lomu	Male	Tongatapu	Ma'ufanga	Popoua
Uhila Finau	Male	Tongatapu	Ma'ufanga	Popoua
Sione Pekani	Male	Tongatapu	Ma'ufanga	Popoua
Maka Fainuanuku	Male	Tongatapu	Ma'ufanga	Patangata
Tupou Pahulu	Female	Tongatapu	Hihifo	Kanokupolu
Ma'ake Kofe	Male	Tongatapu	Hihifo	Kanokupolu
Vaolupe Na'a	Female	Tongatapu	Hihifo	Kanokupolu
Veikoso Hausia	Male	Tongatapu	Hihifo	Kanokupolu
Tevita Holo'ia	Male	Tongatapu	Hihifo	Kanokupolu
Maumi Fa'oa	Female	Tongatapu	Hihifo	Kanokupolu
Asinate 'Uta'atu	Female	Tongatapu	Hihifo	Kanokupolu
Mahina Sofele	Female	Tongatapu	Hihifo	Kanokupolu
Anitila Mahe	Female	Tongatapu	Hihifo	Kanokupolu
Susana Hala'enei	Female	Tongatapu	Hihifo	Kanokupolu
Sione S Tautuiaki	Male	Tongatapu	Hihifo	Ahau
Kisepi Siale	Male	Tongatapu	Hihifo	Ahau
Tovi	Male	Tongatapu	Hihifo	Ahau
Latu Tavake Funaki	Male	Tongatapu	Hihifo	Ahau
Nauvai Talamai	Male	Tongatapu	Hihifo	Ahau
Taku Alatini	Male	Tongatapu	Hihifo	Ahau
Apaiata Manumanu	Male	Tongatapu	Hihifo	Ahau
Sitiveni Vaipulu	Male	Tongatapu	Hihifo	Ahau
Totesio Latuila	Female	Tongatapu	Hihifo	Ahau
Toloa Tautuaki		Tongatapu	Hihifo	Ahau
Sunia Fifita	Male	Vava’u	Island	Matamaka
Sione Pahulu	Male	Vava’u	Island	Matamaka
Kaivai Tu'ivailala	Male	Vava’u	Island	Matamaka
Lolo Fifita	Male	Vava’u	Island	Matamaka
Lopini Tu'ivailala	Male	Vava’u	Island	Matamaka
Tominika Kaianuanu	Female	Vava’u	Island	Matamaka
Naitingikeili Tu'ivailala	Female	Vava’u	Island	Matamaka
Sione Tau'ataina Uele	Male	Vava’u	Island	Matamaka
	Male	Vava’u	Island	Matamaka
Peni Fifita	Male	Vava’u	Island	Matamaka
Sitaleki Po'uli	Male	Vava’u	Island	Hunga
Soane Vailea	Male	Vava’u	Island	Hunga
Sione Faupula	Male	Vava’u	Island	Hunga
Malakai Ika	Male	Vava’u	Island	Hunga
Loto'ahea Finau	Male	Vava’u	Island	Otea
Taniela Fine	Male	Vava’u	Island	Otea

Tei Pupu	Male	Vava'u	Island	Otea
Asipeli Hausia	Male	Vava'u	Island	Otea
Vea Vailea	Female	Vava'u	Island	Otea
Fatafehi Kolo'ofa'i	Female	Vava'u	Island	Otea
Palei Maamaloa	Male	Vava'u	Island	Hunga
Napa'a Halatanu	Male	Vava'u	Island	Hunga
Tevita Palu	Male	Vava'u	Island	Hunga
Lavinia Hakalo	Female	Vava'u	Island	Hunga
Samisoni Lolohea	Male	Vava'u	Island	Hunga
Katavake Lotu	Male	Vava'u	Island	Hunga
Ana Havea		Vava'u	Island	Otea
Tomi Vailea	Male	Vava'u	Island	Otea
Sione Maliu Mafi	Male	Vava'u	Island	Otea
Isileli Ma'ukoloa	Male	Vava'u	Island	Otea
Tovalu Foliaki	Female	Vava'u	Neiafu	Tefisi
Lota Finau	Female	Vava'u	Neiafu	Utulangivaka
Sione Fetokai	Male	Vava'u	Neiafu	Kameli
Pahulu Vaka	Male	Vava'u	Neiafu	Saineai
Fifita Fusi	Female	Vava'u	Neiafu	Masilamea
Kilisita Fa	Female	Vava'u	Neiafu	Vaipua
Mele Hopo	Male	Vava'u	Neiafu	Fa'okula
Ana Tukumoe	Female	Vava'u	Neiafu	Aloi Talau
Moa Fakatulolo	Female	Vava'u	Neiafu	Talau
Sikuluseti Finau	Female	Vava'u	Neiafu	Fungamisi
Leitu Lavemaau	Female	Vava'u	Neiafu	Falaleu
Vili Molitika	Male	Vava'u	Eastern	Koloa
Petelo Taunauta	Male	Vava'u	Eastern	Koloa
Susana Fifita	Female	Vava'u	Eastern	Koloa
Muna Moala	Female	Vava'u	Eastern	Holeva
Lausi'i		Vava'u	Eastern	Koloa
Seini Alamoni		Vava'u	Eastern	Koloa
Pesa Lili Fetuimoeata	Male	Vava'u	Eastern	Holeva
Silia Tutone	Female	Vava'u	Eastern	Koloa
Savelio Guttenbeil	Male	Vava'u	Eastern	Holeva
Palu Vaipulu	Female	Vava'u	Eastern	Koloa
Ngalu Vanisi	Male	Vava'u	Western	Tefisi
Kautai Tukuafu	Male	Vava'u	Western	Tefisi
Seti Tupou	Male	Vava'u	Western	Tefisi
Talita Veatupu	Female	Vava'u	Western	Tefisi
Kaufusi Vaiomo'unga	Female	Vava'u	Western	Tefisi
Ika Tufa	Female	Vava'u	Western	Tefisi
Piuela Tupa	Male	Vava'u	Western	Tefisi
Kelela Toli	Female	Vava'u	Western	Tefisi
Vai Mahina	Male	Vava'u	Western	Tefisi

Gender Focus Groups Participants
October 2011. Koloa Village, Vava'u

Respondent	Sex	Age
Akenisi Fotu	Female	53
Tupou Fia	Female	45
Meleseini Fifita	Female	47
Asena Fifita	Female	31
Uini Fifita	Female	43
Sia Taulani	Female	32
Seini 'Alamoni	Female	41

Fa'e Kata	Female	26
Paea Taukiuvea	Female	20
'Elati Veleika	Female	51
'Ana Halaufia	Female	69
Tilila Taunauta	Female	39
Amelia Kauvaka	Female	51
Pauline Fotu	Female	22
Motuliki Fifita	Male	48
Sateki Taukiuvea	Male	44
Faka'amu Fia	Male	50
Malekamu Atuekaho	Male	39
Latu Veleika	Male	51
Molitika Manu	Male	49
Vili Fifita	Male	50
Ma'asi Tulikihakau	Male	26
Molitoni Halaufia	Male	38
Motuliki Tukuafu	Male	
Sailokeini Kauvaka	Male	44
Lokitone Alamoni	Male	54
Viliami Taulani	Male	29
Vili Tukuafu	Male	71

Koloa Women's Focus Group reporting

Women's Focus Group Meeting

Men's Focus Group Meeting

B. ADDITIONAL CONSULTATIONS WITH KEY STAKEHOLDER GROUPS DURING DEVELOPMENT OF THE SPCR

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

120. **Private sector:** Engagement included private banks, micro-insurance institutions, and representative groups. These representatives highlighted an urgent need for climate change risk capacity building in key economic sectors, including ports, finance and insurance, tourism industry, and infrastructure development industry. Several meetings were convened with the Tonga Chamber of Commerce and Industry (TCCI) which expressed interest in exploring climate change risk management training activities for its members (approximately 150 private sector organizations), through the PPCR. The TCCI is also able to work with the overall umbrella group of private sector representative organizations in Tonga, such as those representing the agricultural sector, tourism sector, fishery sector and manufacturing sector in support of specific SPCR interventions. The TCCI expressed interest for including a dedicated climate change risk training program within the new centre's events calendar. There is scope for ensuring the continued dialogue process at a high level between representatives of private sector organizations and senior officials in government, to promote climate change risk management in the private sector and promote the work of the PPCR.

121. The Institution of Professional Engineers Tonga (IPET) stressed the importance of working to ensure that climate change risk management is understood by its members and good practice is promoted within the government agencies responsible for infrastructure planning and delivery. IPET confirmed that during SPCR implementation it will work to establish climate change risk training and capacity building activities. At present, there is a low level of understanding of climate change risks in Tonga and particularly with regard to the practical implications of incorporating climate change considerations into infrastructure engineering.

122. Private sector financial institutions, including ANZ Bank and South Pacific Business Microfinance Limited, were consulted during the SPCR planning process to evaluate the possibility of establishing microfinance and micro-insurance programs to assist vulnerable communities, farmers and fishers affected by climate change impacts which threaten livelihoods.

123. **Civil Society:** Roundtable meetings were convened with civil society organizations (CSOs) attended by representatives from key local CSOs. The importance of SPCR support to capacity building within civil society organizations has been identified as the principal SPCR mechanism to build climate resilient communities through the establishment of early warning systems, community vulnerability mapping, risk management and adaptation planning, and through engaging CSOs to deliver climate change microfinance schemes in vulnerable communities, and in implementing community adaptation projects with support from "fast start" financing to be launched under Tonga's SPCR.

124. **Development Partners:** In addition to AusAID, UNDP, and DFID participation in the First and Second Joint Missions, extensive consultation with Development Partners was undertaken throughout SPCR planning process, including updates to the Suva-based Development Partners Climate Change Group which includes the People's Republic of China. These included discussions with the World Bank Group, ADB, UNDP, AusAID and JICA and others. Discussions focused on ensuring donor harmonization on climate change adaptation work in Tonga to ensure that SPCR investments addressed gaps in existing

donor programs in accordance with priority needs identified by Tonga, and for the SPCR to work within existing institutional structures and constraints, recognizing the importance of whole-of-government implementation, and building on current and pipeline development projects and programmers identified during the SPCR planning process.

C. LIST OF PERSONS CONSULTED

Table 1: Consultations with ADB, August 2011

Name	Title	Organization	Phone	Email
Manila - Consultations in Manila with the Asian Development Bank, August 2011				
Anne Witheford	Project officer	ADB, HQ	632 6367	awitheford@adb.org
Steve Blaik	Senior Urban Development Specialist	ADB, HQ	632 6738	sblaik@adb.org
Daisuke Mizusawa	Infrastructure Specialist	ADB, HQ	632 6762	dmizusawa@adb.org
Jiangfeng Zhang	Senior NRM & Agriculture Economist	ADB, HQ	632 5162	jzhang@adb.org
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Jay Roop	Senior Environment Specialist	ADB, HQ	632 5631	jroop@adb.org
Hasan Masood	Lead Project Specialist	ADB, HQ	632 6818	hmasood@adb.org

Table 2: Consultations in Tonga, September /November 2011

Name	Title	Organization	Phone	Email
Tonga				
Tiofilusi Tiueti	Secretary	Ministry of Finance & National Planning	23066	
Kilisitina Tuaimei'api	Aid Management Unit / A/Deputy Secretary for Finance	Ministry of Finance & National Planning	28120	ktuaimeiapi@finance.gov.to
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Lupe Matoto	Deputy Director	Ministry of Environment and Climate Change	25050	
Lu'isa Tu'l'afitu Malolo	Coordinator SNC Project / Team Leader	JNAP/Ministry of Environment and Climate Change	27263	ltvtuiafitu@yahoo.com
Saia Faletau	Country Representative	ADB / WB		sfaletau@adb.org
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Kathryn Keki	Asst. Secretary	Tonga Chamber of Commerce & Industries	(M) 7720248	Kathryn.keki@dateline.to
George Nakao	Asst. Treasurer / Executive Member	Tonga Chamber of Commerce & Industries	23 232 / 7777470	nakaoco@kalianet.to / igynakao@gmail.com
Suliana Afu	Representative	As above	24500	Suliana.afu@dateline.to
Makoto Tsujimoto	Resident Representative	JICA	23072	Tsujimoto.makoto@jica.g

Name	Title	Organization	Phone	Email
				o.jp
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Quddus Fielea	Senior Planning Engineer	Tonga Water Board (TWB)	7749613	qfielea@gmail.com
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Nailati Kupi	Urban Planner	Planning and Urban Management Unit (PUMA)	8875684	nkupu@puma.gov.to
Alamoti Tautakitaki	Board Director	MORDI Tonga Trust	7556288	
Simata-e-la'a Palu	PA to the Minister	Ministry of Tourism (MoT)	7789711	simatavp@thekingdomoftonga.com
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Alaipuke 'Esau	Board Member	Vava'u Environmental Protection Agency (VEPA)	84223075	alaipuke@gmail.com
Usaia Fifita	Town Officer	Tofoa Village/Prime Minister Office	7716752	
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Monalisa Tukuafu	Project Manager	Aloua Ma'a Tonga	7718597	monalisa.tukuafu@gmail.com
Matelita Houa	Environmental Officer	Tonga National Youth Congress	7764692	Matelita.houa@gmail.com

Name	Title	Organization	Phone	Email
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Soana 'Otuafi	Project Officer	PSASP Project/MECC	25050	soanaotuafi@yahoo.om
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Ofa Masila	Women's Officer	MEWAC		
Kakau Foliaki	Energy Officer	Energy Unit/MECC	25050	
Kelela Tonga	Senior Transport Officer	Ministry of Transport		
Iketonga Tauati	Senior Fisheries Officer	Ministry of Fisheries		
Taniela Hoponoa	Deputy Director	Ministry of Agriculture		
Viliami Manu	Deputy Director	Ministry of Agriculture		
Ofa Kaisamy	JNAP Secretariat	MECC	25050	
Cecile Quesada Moaeteau	Program Officer	Tonga Chamber of Commerce	25168	Cecile@tongachamber.org
'Onetoto 'Anisi	MDG Coordinator	MDG/MoNFP	22455	oanisi@finance.gov.to
Ma'ata Mafi	Economist	MoFNP	28120	mmafi@finance.gov.to
Lu'isa Latu	Treasurer	Popua Village Womens Group	7716596	
Maama Molitika	Youth	Tofoa Village	28961	
Matelita Houa	Environmental Officer	Tonga National Youth Congress	7764692	Matelita.houa@gmail.com
Sonatane Tukuafu	Youth	Tofoa Village	28691	
Senituli Kolo	Village Committee	Tofoa village		
Graham Sem	Consultant	PPCR / ADB	+64 93606571	gsem@xtra.co.nz

Table 3: Second Joint Mission, Tonga, March 2012

Name	Position	Organization	Phone	e-mail
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	Secretary	Management		
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‘Ofa Fa’anunu		Ministry of Transport	28024	ofaf@met.gov.to
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‘Elisapeti Veikoso	Urban Planner	PUMA (MLSNR)	23611	eveikoso@puma.gov.to
Tukua Tonga		Planning and Urban Management Agency (PUMA)	21784	ttonga@puma.gov.to tukuatonga@gmail.com
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Quddus Fielea		Tonga Water Board	23299	qfielea@gmail.com
Sinilau Tomo’ua		Waste Authority	27827	qfielea@gmail.com
Tatiana Tupou		Tonga Energy Roadmap (TERM)	24794	tatianakmarich@gmail.com
Seini V Movete	Deputy Managing Director	Tonga Development Bank	23333	klainef@yahoo.com
Edward Buenaverntura		ITS Company Ltd	28807 24875	valerie@itstonga.to
Amy Lofgren	General Manager	SPBD Microfinance	8773094	qmy@spbdtonga.com
Karen Lummis	Pacific Climate Change	AusAID, Canberra		Karen.Lumins@ausadi.gov.au
Ryan Medrana	First Secretary	AusAID, Suva		ryan.medrana@ausaid.gov.to
Greta Cranston	First Secretary	AusAID, Tonga		

Lilieta Takau	Program Manager	AusAID, Tonga		
Netatua Prescott	Director of Climate Change	SPREP, Apia		netatua@sprep.org
Gillian Cambers	Project Manager GCCA:PSIS	SPC, Suva		gillianC@spc.int
Mosese Sikivou	Deputy Director, Disaster Reduction	SPC, SOPAC Division, Suva		mosese@sopac.org
Noa Tokavou	Adviser, Disaster Management	SPC, SOPAC Division, Suva		noa@sopac.org
Milika Tuita	Program Analyst	UNDP, Tonga		milika.tuita@undp.org
Shigeki Ishigaki	(Project Formulation Adviser	JICA, Tonga		ishigaki.shigeki@jica.go.jp
Alfred Vaka	JICA	Program Officer	7738194	Alfredvaka.TO@jica.gov.jp
Anne Witheford	PPCR Team Leader Martin	PARD/ADB		awitheford@adb.org
Saia Faletau	Liaison Officer	ADB/World Bank,		
Maria Melei,	Tonga Country Team Leader	ADB, Manila		mmelei@adb.org
Martin Jensen	Investment Specialist	ADB, Manila		mjensen@adb.org
Marc Overmars	Climate Change Specialist, SPSO	ADB, Fiji		movermars.consultant@adb.org
John Austin	Manager	PIAC, Sydney		Jaustin.consultant@adb.org
Nina Mines	Operation Officer	PIAC, Sydney		Nmines.consultant@adb@org
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Sione Faka'osi	Consultant	GHD Consultant Team		

Annex 5

Climate Change Risk Assessment

Water Sector Risk Assessment

Water Sector Working Group Members

Name	Institution
1. Qudus Fielea – Chair	Tonga Water Board
2. Talita Helu	Waste Authority Ltd
3. Rennie Vaiomo'unga	Geology Unit, MLSNR
4. Niu Fakakovi'aetau	Ministry of Health
5. Peti Veikoso	PUMA
6. Sione Manumanu	Hihifo District Officer
7. Kakau Foliaki	Energy
8. Lu'isa Tu'iafitu	JNAP Team Leader
9. Nalesoni Leka	GIZ-CCCPIR
10. 'Ofa Kaisamy	JNAP Technical
11. 'Olivia Moana	'Aloua Ma'a Tonga

125. **Step 1: Stocktaking and Establishing the Context -** collect together all relevant documents/strategies/programs pertaining to climate change risks affecting the country and various sectors, and undertake a stocktaking to define the nature of the climate change risk to be evaluated in the context of each of the PPCR Technical Working Groups (e.g. agriculture, water, health, etc). The stocktaking should ensure that information on the following have been considered - development trends, investment trends, migration trends, social status/capital, loss situation (casualties, injury, livelihood, agricultural lands, crops, human health, livestock, forest, environmental health), pollution situation

List additional reports/documents:

Organization / Ministry	Projects	Plans
Tonga Water Board	1. Water Supply Improvement Project (WSIP), ADB funded. Commence in 2012 for 3 year. *Focus* – improve water supply, extend field well fields (15 new water boreholes at Tongamai well field. Expands storage at Mataki'eua well field. Upgrade water pipes at Mataki'eua well field 2. WSIP – JICA funded. Commence in 2012 for 3 years. *Focus* – in urban areas in Neiafu (Vv), Lifuka (Hp) and 'Eua	1. Water Master Plan for Tonga (review and update). Seek funding for implementation
Geology, MLNSR	1. Integrated Water Resource Management Projects (IWRM), GEF/UNDP funded from 2008 – 2013. *Focus* - is to improve quality of water in Neiafu, VV. And to enact Water Resource Bill. 2. B Envelope Project, EU funded for 1 year commencing in January 2011 to upgrade 13 rural village wells and ensure water safety	none

	(23 urban)	
Ministry of Health	None	Water Safety Plan Public Health Act
PUMA	1. SUEMP – Sustainable Urban Environment Management Project, EU funded from 2010 to June 2012. *Focus* – formulate Greater Nuku'alofa Strategic Plan, 2011 – 2031 – looking at environment, infrastructure (water, sanitation and drainage, transportation. 2. UPMS – Urban Planning Management System Project Focus – National Spatial Plan and Management Bill (2008 – 2009)	Urban Planning Guidelines approved by Cabinet in 2007
Waste Authority Ltd	1. Tapuhia project (Waste Management Facility. AusAID funded and ongoing. 2. Proposal stage – WAL supplies garbage bin to every household, WAL funded.	
Energy Planning Unit, MLSNR	1. Pacific Japan Fund. Focus on solar water pumping, water desalination from 2010 to 2013. Project Site is yet to be identified. 2. SIOS Doc focus on solar water pumping, proposal stage yet to secure funding.	None
Hihifo Village Water Committee	1 PACC Project, a regional project funded by GEF/UNDP/SPREP. It is focus on improving water resource management as adaptation to climate change	None

126. **Step 2: Summarize the Risks -** With reference to each of the relevant adaptation reports, (and other relevant documents collected during the stocktaking), the PPCR Technical Working Group will summarize the nature of the risks from climate change to the relevant sector. The initial step is to identify ***event risk*** (i.e. the "risk of occurrence of any particular hazard or extreme event" for example flood, drought, increased hurricane intensity) and ***outcome risk*** (i.e. "the risk of a particular outcome" for example loss of life, loss of income, loss of property, increase in pests/disease, increase in water/vector borne disease).

Task 1: Summary of Risks

Event Risks	Outcome Risks
Drought (reduced rainfall)	Health Sector: • increase diarrhea from poor sanitation • typhoid outbreak • skin diseases Geology: • increase salinity rate of underground due to increase water demand and increase pumping rate (less recharge) • water scarcity for consumption Waste Authority Ltd : • increase waste (plastic water bottles and soft drinks) Water Sector • rainwater tank running dry • dramatic increase in salinity in some wells

	• increased demand for potable reticulated water • led to declaration of a State of National Disaster which highlighted the needs for the appropriate quantitative measures of the severity of droughts • provide warning on their onset • Identify start, duration and end of drought
Heavy Rainfall	• water logging • increase breeding sites for mosquitoes • increased rainfall and associated increase in flood event would increase the chance of diarrhea and typhoid disease outbreak through disruptions to sanitation systems and contaminate water resources. • increase in dengue, esp. in low lying areas • overflowing pit latrines causing diarrhea in young children • water contamination polluting both urban and rural water resources • contaminate/pollute surface water e.g. 'Eua
Sea level rise	• sea water intrusion increase groundwater salinity • less recharge of groundwater lens and less water available for human use
Increased temperature	• increase demand on water resources and decrease water availability • increase evaporation, decrease recharge, decrease water availability (water scarcity)
Tropical Cyclone (Frequency and Intensity)	• damage to water facilities(e.g. water tanks) • increase rainfall negativity affect underground water • contaminate rainwater & underground water

127. **Task 2: List of Priority Events/Outcome Risks identified by the Sectoral Working Groups.**

2a. Drought/increase salinity of underground water
2b. Tropical cyclone/damage to water facilities
2c. Increased temperatures/increase demand on water sources
2d. Sea level rise/seawater intrusion, increase salt concentration and increase salinity
2e. Heavy Rainfall/water source contamination

128. **Step 3: Estimate Risks -** Using the summary of risks to the relevant sector developed under *Step 2,* the PPCR Team will assist each PPCR Technical Working Group in undertaking an estimation of the following key elements of risks to the relevant sector (if possible by location), namely:

129. **Task 1: Estimate the Severity of the Impact (Event and Outcome Risks)**

- In the context of climate change adaptation, the PPCR Technical Working Group can choose to include non-financial criteria such as the loss of life, effect on GDP, impact on social capital and quality of basic services, environmental impacts or any other relevant measure that is suited to best expressing the potential impacts in measurable terms.
- The PPCR Technical Working Group develops an impact severity rating scale appropriate to the risk scenarios (*event* and *outcome*).

Table 2a: Drought/increase salinity of underground water

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low	X		X					X			
Low				X							
Moderate											
High		X			X	X					
Very high							X		X	X	X

Table 2b: Tropical cyclone/damage to water facilities

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low	X							X			
Low			X								
Moderate											
High		X		X			X				X
Very high					X	X			X	X	

Table 2c: Increased temperature and drought/increase demand on water

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low	X										
Low			X								
Moderate					X						
High		X		X		X	X	X		X	X
Very high									X		

Table 2d: Sea level rise/seawater intrusion, increase salt concentration and increase salinity

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low								X			
Moderate											
High	X	X	X	X	X	X	X				
Very high									X	X	X

Table 2e: Heavy rainfall/water source contamination

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low								X			
Low	X		X	X	X						
Moderate											
High		X				X	X				
Very high									X	X	X

Table 2f: Heavy rainfall/increase in vector borne disease

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low	x				x	x		x			
Low			x								X
Moderate				x			x			x	
High									X		
Very high		x									

Table 2g: Sea level rise/loss of land due to inundation/recharge area

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low								X			
Low			X	X							
Moderate		X			X						
High	X					X	X				X
Very high									X	X	

130. **Task 2: Estimate Frequency or Probability of Event**

The PPCR Technical Working Group will estimate the frequency or probability of an event identified in the relevant reports based on their expert judgment.

Table 3: Frequency/probability rating (based on climate risks that are likely to occur during SPCR period > 5 years)

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

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

Table 3a: Frequency/probability rating based on high scoring outcomes (see table 2a – 2g)

Event/Outcome Risk	**Frequency/Probability Rating**
Drought/increase salinity of underground water	5
Tropical Cyclone/damage to water facilities	5
Increased temperature/increase demand on water source	5
Sea level rise/seawater intrusion, increase salt concentration and increase salinity	5
Heavy rainfall/water source contamination	5
Sea level rise/loss of recharge land	4

131. **Step 4: Evaluate the Risk -** Based on expert judgment, identified risks are examined by each PPCR Technical Working Group in terms of costs (*Note: costs are to be qualified not quantified*), benefits and acceptability, considering the needs, issues and concerns of stakeholders. The purpose of this evaluation is to give consideration to:

- ranking the risks from "least severe" to "most severe" from the analyses completed earlier and the perceptions of the stakeholders – see *Table 3*;
- estimating the costs of potential losses;
- assessing the acceptability of the risks.

132. The following activities may be conducted to assist in this step.

- Qualify the costs of the impacts within the 5 year SPCR program and any unexpected benefits (e.g. diversification of crop production in response to threat of droughts) that may be apparent.
- Consider and analyze perceptions of key stakeholders, including the general public.
- Assess the acceptability of risks, cost, benefits, etc., to stakeholders (including governments, communities, economic sectors, etc.). It is important to remember that people who deal regularly with risks view them differently than laypersons. This makes an interactive dialogue with stakeholders very important at this step to accurately determine the level of acceptability of the risk to the various stakeholder groups.
- Undertake dialogue with key stakeholders/communities at high risk locations and begin identifying various adaptation (risk control, avoidance or prevention) strategies for risks that are unacceptable

133. The PPCR Technical Working Group will compare levels of risk and acceptability of risk scenarios by reviewing the data that has been recorded during the risk estimation process.

Table 4: Risk Assessment Matrix – Summary

	Frequency and Probability				
	Very unlikely in happen	**Occasional occurrence**	**Moderately frequent**	**Occurs often**	**Likely to Occur Regularly**
Extreme					2d (10)
Major					2b, 2c
Moderate				2g	2a,2e
Low					
Very low					

134. **Step 5: Identify Priority Risks and Vulnerable Communities**

Priority Risk	**Top Three Vulnerable Communities**
1. Sea level rise/seawater intrusion, increase salt concentration and increase salinity	Hihifo, Outer islands, Nuku'alofa
2. Increased temperature and drought/increase demand on water source	All of Tonga
3. Tropical Cyclone/damage to water facilities	All village water supply, outer islands

Drought/increase salinity of underground water	Hihifo, Outer islands, Nuku'alofa, water bottled business
Heavy rainfall/water source contamination	All of Tonga

135. **Step 6: Identify Viable Intervention and investment to address above priority risks**

From Table 2d: Sea level rise/seawater intrusion, increase salt concentration and increase salinity (10)

- Strengthen/capacity building/financially empower town water committees to manage all water supplies –town, and rainwater (56 committees) $500,000
- Increased water catchment, rainwater harvesting, more roofs and roof catchment
- Catchments at town plot e.g., cement tank (as per old days) or public/community church/hall rainwater catchment - $2 million all Tonga
- Awareness/information to communities on rainwater management, household financial assistance and technical training to repair and maintain roof catchment system

From Table 2c: Increased temperature and drought/increase demand on water (8)

- Investigate and implement alternative water sources and second borefield (enough water is available if treated correctly - Tongatapu) $300,000 investigation; $1.5 million for infrastructure
- Pilot wind/solar desalination plant in outer islands (not Tongatapu)
- Water harvesting for agriculture from airport runway, roads - $1,000,000
- Nuku'alofa pilot for demand management program -training in basic plumbing, financial assistance to repair leaks, meter repairs, water wise awareness - $2,000,000

From Table 2b: Tropical Cyclone/damage to water facilities (7)

- Make water stations/tanks comply with building standards – retrofit program (standards already exist) - $500,000
- Assessment of how village water supplies comply with standards and then retrofit/upgrade to be cyclone proof - $1,000,000
- New infrastructure built to be cyclone proof
- Awareness to households on water quality after cyclone

TOTAL $7,000,000

Agricultural, Forestry, Fisheries and Food Sector Risk Assessment

Food Security Working Group Members

Name	Institution
Dr. Viliami Manu (Chair)	Ministry of Agriculture, Forestry, Fisheries and Food
‘Ofa Fa’anunu	Tonga Meteorology
‘Ofa Fakalata	Organic Ma’ui’ui
Holomesi Malolo	Energy
Talo Fulivai	JNAP
Maka Matekitonga	PUMA
Grace Afeaki	Fishing Industry Association of Tonga

136. **Step 1: Stocktaking and Establishing the Context** - collect together all relevant documents/strategies/programs pertaining to climate change risks affecting the country and various sectors, and undertake a stocktaking to define the nature of the climate change risk to be evaluated in the context of each of the PPCR Technical Working Groups (e.g. agriculture, water, health, etc). The stocktaking should ensure that information on the following have been considered - development trends, investment trends, migration trends, social status/capital, loss situation (casualties, injury, livelihood, agricultural lands, crops, human health, livestock, forest, environmental health), pollution situation

List additional reports/documents:

- MAFFF - Food Security,
    - people produce their own food,
    - Chinese Biogas Project (Piggery)
- MoF – Special Management Areas
- FIAT – vessels needed within the industry
- Energy – solar electrification of outer islands program
- TMO – monitoring, warning about daily weather forecast, climate prediction (type of work)
    - Strategic planning: WMO Region 5 strategic plan
    - Projects: Sea level Monitoring Project, Pacific Climate Science Program, Renew Maritime Radio, Re-build weather Station (Tsunami); Corporate Plan
- PUMA – Urban Planning Policy/Act?
- MECC – Sustainable Land Management Project, GIZ Climate Change Adaptation Project, Biosafety Framework, Land Use Policy

137. **Step 2: Summarize the Risks -** With reference to each of the relevant adaptation reports, (and other relevant documents collected during the stocktaking), the PPCR Technical Working Group will summarize the nature of the risks from climate change to the relevant sector. The initial step is to identify ***event risk*** (i.e. the “risk of occurrence of any particular hazard or extreme event” for example flood, drought, increased hurricane intensity) and ***outcome risk*** (i.e. “the risk of a particular outcome” for example loss of life, loss of income, loss of property, increase in pests/disease, increase in water/vector borne disease).

Task 1: Summary of Risks

Event Risks	Outcome Risks
Heavy Rainfall	- Loss of fertile/top soil - Loss of cops
Severe drought events	- Soil degradation - crops develop skin diseases - less agricultural production - loss of livestock
Increase strength & frequency of tropical cyclone	- destruction of crops & reef ecosystems - food shortage - decrease agricultural productivity - loss of livestock
Increase temperature	- affect seasonality of crops - introduce pests & diseases - reduction in productivity - coral bleaches and less fish in the reef
Sea Level Rise	- coastal erosion and inundation - salt water intrusion - loss of coastal forest and protection

138. **Task 2: List of Priority Event/Outcome Risks identified by the Sectoral Working Group.**

2a. High incidence of Heavy Rainfall/Loss of fertile top soil/increase incidences of pests and diseases/less food production
2b. Severe drought events/less production
2c. Increase strength & frequency of tropical cyclone/less production both agriculture and fisheries which affect food security
2d. Increase temperature/pests & diseases
2e. Increase in sea temperature/coral bleaching , fisheries resources and food security
2f. Sea level rise/loss of production land

139. **Step 3: Estimate Risks -** Using the summary of risks to the relevant sector developed under *Step 2,* the PPCR Team will assist each PPCR Technical Working Group in undertaking an estimation of the following key elements of risks to the relevant sector (if possible by location), namely:

140. **Task 1: Estimate the Severity of the Impact (Event and Outcome Risks)**

- In the context of climate change adaptation, the PPCR Technical Working Group can choose to include non-financial criteria such as the loss of life, effect on GDP, impact on social capital and quality of basic services, environmental impacts or any other relevant measure that is suited to best expressing the potential impacts in measurable terms.
- The PPCR Technical Working Group develops an impact severity rating scale appropriate to the risk scenarios (*event* and *outcome*).

Table 2a: Heavy rainfall/loss of fertile top soil / increase incidences of pests and diseases/less food production (5)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low	X										
Low								X	X		
Moderate		X	X		X						
High						X	X			X	X
Very high				X							

Table 2b: Severe drought events/less production (8)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low								X			
Low	X										
Moderate					X						
High		X	X	X						X	X
Very high						X	X		X		

Table 2c: Increase strength & frequency of tropical cyclone/less production both agriculture and fisheries which affect food security (8)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low											
Moderate								X	X	X	
High		X	X	X							X
Very high	X				X	X	X				

Table 2d: Increase temperature/pests & diseases (9)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low	X				X						
Moderate											
High			X	X		X	X	X	X	X	X
Very high		X									

Table 2e: Increase in sea temperature/coral bleaching fisheries resources and food security (6)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services

Very Low											
Low								X	X	X	
Moderate	X		X								
High		X			X	X	X				
Very high				X							X

Table 2f: Sea level rise/loss of production land (7)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low								X			
Moderate		X				X	X				
High			X	X					X	X	X
Very high	X				X						

Task 2: Estimate Frequency or Probability of Event

141. The PPCR Technical Working Group will estimate the frequency or probability of an event identified in the relevant reports based on their expert judgment.

Table 3: Frequency/probability rating (based on climate risks that are likely to occur during SPCR period > 5 years)

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

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

Table 3a: Frequency/probability rating based on high scoring outcomes (tables 2a–2f)

Event/Outcome Risk	Frequency/Probability Rating
2b. Severe drought events/less production (8)	4
2c. Increase strength & frequent tropical cyclone/loss of production both agriculture and fisheries which affect food security (8)	5
2d. Increase temperature/increase pests and diseases (9)	4
2e. Increase in sea temperature/coral bleaching , fisheries resources and food security (6)	4
2f. Sea level rise/loss of production land (7)	5

142. **Step 4: Evaluate the Risk -** Based on expert judgment, identified risks are examined by each PPCR Technical Working Group in terms of costs (*Note: costs are to be qualified not quantified*), benefits and acceptability, considering the needs, issues and concerns of stakeholders. The purpose of this evaluation is to give consideration to:

- ranking the risks from “least severe” to “most severe” from the analyses completed earlier and the perceptions of the stakeholders – see *Table 3*;

- estimating the costs of potential losses;
- assessing the acceptability of the risks.

143. The following activities may be conducted to assist in this step.

- Qualify the costs of the impacts within the 5 year SPCR program and any unexpected benefits (e.g. diversification of crop production in response to threat of droughts) that may be apparent.
- Consider and analyze perceptions of key stakeholders, including the general public.
- Assess the acceptability of risks, cost, benefits, etc., to stakeholders (including governments, communities, economic sectors, etc.). It is important to remember that people who deal regularly with risks view them differently than laypersons. This makes an interactive dialogue with stakeholders very important at this step to accurately determine the level of acceptability of the risk to the various stakeholder groups.
- Undertake dialogue with key stakeholders/communities at high risk locations and begin identifying various adaptation (risk control, avoidance or prevention) strategies for risks that are unacceptable

144. The PPCR Technical Working Group will compare levels of risk and acceptability of risk scenarios by reviewing the data that has been recorded during the risk estimation process.

Table 4: Risk assessment matrix – summary

	Frequency and Probability				
	Very unlikely in happen	**Occasional occurrence**	**Moderately frequent**	**Occurs often**	**Likely to Occur Regularly**
Extreme					
Major		2e	2d, 2f	2b	2c
Moderate					
Low					
Very low					

Step 5: Identify Priority Risks and Vulnerable Communities.

Priority Risk	**Top Three Vulnerable Communities**
1. Increase strength & frequent tropical cyclone/loss of production	Commercial farmers, fishing industry/coastal communities
2. Severe drought events/less production	Commercial farmers, fishing industry/coastal communities
3. Heavy Rainfall/Loss of fertile top soil	All communities (soil loss), coastal communities (land-based pollution)
3. Increase temperature/increase pests and diseases	Commercial farmers
3. Increase in sea temperature/coral bleaching Loss of cool temperature crops (onion, potatoes)	Coastal communities, commercial fishing Commercial farmers

3. Sea level rise/loss of production land	Coastal communities

Step 6: Identify Viable Intervention and investment to address above priority risks

1. Scaling Fisheries Community Special Managed Areas in Tonga
2. Encourage In-situ conservation. Example natural habitat and ex-situ conservation e.g. germplasm collection/traditional famine crops and stock breed for livestock
3. Conservation and cultivation techniques. Sloping land conservation systems e.g. Eua
4. Technological interventions – hydroponics, green houses,
5. Tree planting/agroforestry practices
6. Awareness

Health Sector Risk Assessment

Health Sector Working Group Members

Name	Institution
Niu Fakakovi'aetau	Ministry of Health
Kelela Tonga	Ministry of Transport
Robin Wilson	PUMA
Peti Veikoso	PUMA
Vanesa Lolohea	Tonga National Youth Congress
Polotu Fakafanua Paunga	MEWAC

145. **Step 1: Stocktaking and Establishing the Context** - collect together all relevant documents/strategies/programs pertaining to climate change risks affecting the country and various sectors, and undertake a stocktaking to define the nature of the climate change risk to be evaluated in the context of each of the PPCR Technical Working Groups (e.g. agriculture, water, health, etc). The stocktaking should ensure that information on the following have been considered - development trends, investment trends, migration trends, social status/capital, loss situation (casualties, injury, livelihood, agricultural lands, crops, human health, livestock, forest, environmental health), pollution situation

List additional reports/documents:

1. Health Sector
   - National Strategies for Non-Communicable Diseases (NCDs) – focusing on Physical Activity Promotion, Alcohol Harm Reduction, Tobacco Control, Healthy Eating Promotion and incorporate the impacts of climate change on NCDs
   - Village Inspection – looking for Environmental Sanitation (normal routine)
   - Rural Water Supply Maintenance – repaired and fixed pump and water engine
   - Vector Control – Clean up and destroy of breeding place of flies and Mosquito
2. Women Affairs & Culture (M.O.E)
   - National Policy on Gender and Development
   - 2001 revised in May, 2011 (Community Consultation)
   - *Area on Climate Change Adaptation
   - Developing Policy & Legislation on Violence against women
   - Write proposal for women's group – Langafonua a Fefine Tonga.
   - Gender Mainstreaming – Build Partnership with CC Ministry & Stakeholder
   - To conduct gender analysis on need assessment, activities and outcomes.
3. Ministry of Transportation.
   - National strategies action plan for Tonga on Ballast water management – develop it for Jan, 2012.
   - Marine Pollution Act – 2001 – national contingency plan for marine pollution – 2006
   - Shipping Act
4. Tonga National Youth Congress.
   - GEF – Park Management Conservation – (GPS & PTA)
   - SMA – Special Management area (Ministry of Fisheries)
   - Land Management – Organic Agriculture (future organic farmer)
   - Environment Stewardship – 'replanting trees'
   - Energy 350.Org – to lower carbon emission (Promotion no power day or no car day)
5. PUMA
   - NSPM - National spatial Planning Management Bill – 2010.

- Land use Planning & Management of Environment
- SUEM – Sustainable Urban Environment Management – 20 years plan

146. **Step 2: Summarize the Risks -** With reference to each of the relevant adaptation reports, (and other relevant documents collected during the stocktaking), the PPCR Technical Working Group will summarize the nature of the risks from climate change to the relevant sector. The initial step is to identify *event risk* (i.e. the "risk of occurrence of any particular hazard or extreme event" for example flood, drought, increased hurricane intensity) and *outcome risk* (i.e. "the risk of a particular outcome" for example loss of life, loss of income, loss of property, increase in pests/disease, increase in water/vector borne disease).

Task 1: Summary of Risks

Event Risk	Outcome Risks
1. Heavy Rainfall	• Increase incident in mosquito (Outbreak of waterborne/vector diseases) • Flooding of low lying area which lead to overflowing of septic tank • contamination of water supply source • soil erosions (killing marine life) • Los of income
2. Drought	• Food security (famine malnutrition) • Water shortage (consumption of household) • Cause dust (pink eye disease, asthmatic problem) • Water contamination (diarrhea) • Loss if income • Poor sanitation (cause typhoid)
3. Increased Temperature	• Increase asthma cases • Water shortage – increase need for water • Heat stress (cause skin disease) • Loss of income – food source • Killing marine lives of the coastline
4. Sea Level Rise	• Displacement/relocation of people • Coastal – impact on livelihoods fishing/income/food source and impact on quality and quantity of food intake • Damage to house near the coast • Affect of the underground water (more salinity)
5. Tropical Cyclone	• Loss of life • Disruption of basic supply (medical, food, water, transportation and communication) • Contamination of water supply sources • Infrastructure affected inhabited /transportation of casualties (burial of the death)

147. **Step 3: Estimate Risks -** Using the summary of risks to the relevant sector developed under *Step 2,* the PPCR Team will assist each PPCR Technical Working Group in undertaking an estimation of the following key elements of risks to the relevant sector (if possible by location), namely:

148. **Task 1: Estimate the *Severity of the Impact (Event and Outcome Risks)***

- In the context of climate change adaptation, the PPCR Technical Working Group can choose to include non-financial criteria such as the loss of life, effect on

GDP, impact on social capital and quality of basic services, environmental impacts or any other relevant measure that is suited to best expressing the potential impacts in measurable terms.

- The PPCR Technical Working Group develops an impact severity rating scale appropriate to the risk scenarios (*event* and *outcome*)

Table 2a. Heavy rainfall - outbreak of water borne disease and vector borne (dengue outbreak) (8)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss??	Air	Water	Land	Biodiversity/ecosystem services
Very Low	X							x			
Low			x								
Moderate											
High				x	x	x	x			x	x
Very high		X							x		

Table 2b. Drought – water shortage for consumption (household use) (8)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss??	Air	Water	Land	Biodiversity/ecosystem services
Very Low	X										
Low					x						
Moderate			x								
High				x			x	x		x	x
Very high		x				x			x		

Table 2c. Increased temperature – increased asthmatic disease and water shortage (7)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss??	Air	Water	Land	Biodiversity/ecosystem services
Very Low	X		x								
Low					x						
Moderate				x							
High						x	x		x	x	x
Very high		x						x			

Table 2d. Sea level rise – coastal impact on food sources, quality and quantity (7)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss??	Air	Water	Land	Biodiversity/ecosystem services
Very Low	X										
Low					X			x			
Moderate							x				
High			x	x		x					
Very high		x							x	x	x

Task 2: Estimate Frequency or Probability of Event

149. The PPCR Technical Working Group will estimate the frequency or probability of an event identified in the relevant reports based on their expert judgment.

Table 3: Frequency/probability rating (based on climate risks that are likely to occur during SPCR period > 5 years)

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

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

Table 3a: Frequency/Probability rating based on high scoring outcomes (see tables 2a–2d)

Event/Outcome Risk	Frequency/Probability Rating
2a. Heavy Rainfall/cyclone – Outbreak of water/food borne diseases- diarrhea, typhoid and vector borne diseases e.g. Dengue	5 All of Tonga
2b. Drought – Water shortage for consumption (household use)	4 All of Tonga
2c. Increased Temperature – Increase asthmatic disease and water shortage	5 All of Tonga
2d. Sea level rise – Coastal impact on food production (crops, fishing, shellfish)	4 Coastal communities

150. **Step 4: Evaluate the Risk** - Based on expert judgment, identified risks are examined by each PPCR Technical Working Group in terms of costs (*Note: costs are to be qualified not quantified*), benefits and acceptability, considering the needs, issues and concerns of stakeholders. The purpose of this evaluation is to give consideration to:

- ranking the risks from “least severe” to “most severe” from the analyses completed earlier and the perceptions of the stakeholders – see *Table 3*;
- estimating the costs of potential losses;
- Assessing the acceptability of the risks.

The following activities may be conducted to assist in this step.

- Qualify the costs of the impacts within the 5 year SPCR program and any unexpected benefits (e.g. diversification of crop production in response to threat of droughts) that may be apparent.

- Consider and analyze perceptions of key stakeholders, including the general public.

- Assess the acceptability of risks, cost, benefits, etc., to stakeholders (including governments, communities, economic sectors, etc.). It is important to remember that people who deal regularly with risks view them differently than laypersons. This makes an interactive dialogue with stakeholders very important at this step to accurately determine the level of acceptability of the risk to the various stakeholder groups.

- Undertake dialogue with key stakeholders/communities at high risk locations and begin identifying various adaptation (risk control, avoidance or prevention) strategies for risks that are unacceptable

151. The PPCR Technical Working Group will compare levels of risk and acceptability of risk scenarios by reviewing the data that has been recorded during the risk estimation process.

Table 4: **Risk assessment matrix – summary**

Frequency and Probability					
	Very unlikely in happen	**Occasional occurrence**	**Moderately frequent**	**Occurs often**	**Likely to Occur Regularly**
Extreme				2b	2a
Major				2d	2c
Moderate					
Low					
Very low					

Step 5: Identify Priority Risks and Vulnerable Communities

Priority Risk	**Top Three Vulnerable Communities**
1. Heavy Rainfall/cyclone – Outbreak of water borne and vector borne disease (dengue outbreak)	All of Tonga
2. Drought – Water shortage for consumption (household use)	All of Tonga
3. Increased Temperature – Increase asthmatic disease and water shortage	All of Tonga
4. Sea level rise – Coastal impact on food production (fishing/crops/shellfish)	Coastal communities

Event Risks and Outcome Risks	**Ranking of Risks**
1. Heavy Rainfall/cyclone – Outbreak of water borne and vector borne disease (dengue outbreak)	**8**
2. Drought – Water shortage for consumption (household use)	**8**
3. Increased Temperature – Increase asthmatic disease and water shortage	**7**
4. Sea level rise – Coastal impact on food production (fishing/crops/shellfish)	**7**

Step 6: Identify viable interventions and investments to address above priority risks

1. Heavy Rainfall/cyclone – Outbreak of water borne (diarrhea, typhoid), and vector borne disease (dengue)	Improve drainage (Nuku'alofa) (check what other donors are doing e.g. TNIIP to determine a suitable pilot for implementation) Mu'a district pilot septic tank and sanitation

	improvements $500,000 Water, sanitation and hygiene awareness $300,000
2. Drought – Water shortage for consumption (household use)	Water resource assessment, Increase water supply, water demand management/conservation program (see water sector)
3. Increased Temperature – Increase asthmatic disease and water shortage	Improve water supply collection More medical resources and equipment e.g. inhalers and awareness $300,000
4. Sea level rise – Coastal impact on food production (fishing/crops/shellfish)	Assess alternative nutritional foods and crops; implement to show people how to grow and cook alternate foods $250,000

Private Sector Risk Assessment

Private Sector Working Group Members

Name	Institution
George Nakao (Chair)	Tonga Chamber of Commerce
Dr. Cecile Quesada Moaeteau	Tonga Chamber of Commerce
Maka Matekitonga	PUMA
Sita Tu'ihalamaka	Ministry of Tourism
'Ungatea Palu	Ministry of Labour, Commerce and Industries

152. **Step 1: Stocktaking and Establishing the Context -** collect together all relevant documents/strategies/programs pertaining to climate change risks affecting the country and various sectors, and undertake a stocktaking to define the nature of the climate change risk to be evaluated in the context of each of the PPCR Technical Working Groups (e.g. agriculture, water, health, etc). The stocktaking should ensure that information on the following have been considered - development trends, investment trends, migration trends, social status/capital, loss situation (casualties, injury, livelihood, agricultural lands, crops, human health, livestock, forest, environmental health), pollution situation

List additional reports/documents:

- Business License Act & Regulations?
- Foreign Investment Act?
- Urban Planning Bill
- Environment Legislation on Environmental Impact Assessment
- Fishing and Agriculture regulations
- ABD, IFC reports?
- TCCI Business Survey
- PUMA?

153. **Step 2: Summarize the Risks -** With reference to each of the relevant adaptation reports, (and other relevant documents collected during the stocktaking), the PPCR Technical Working Group will summarize the nature of the risks from climate change to the relevant sector. The initial step is to identify ***event risk*** (i.e. the "risk of occurrence of any particular hazard or extreme event" for example flood, drought, increased hurricane intensity) and ***outcome risk*** (i.e. "the risk of a particular outcome" for example loss of life, loss of income, loss of property, increase in pests/disease, increase in water/vector borne disease).

Task 1: Summary of Risks

Event Risk	Outcome Risk
Flooding	- Destruction of assets/supplies (VV & 'Eua) - Destruction of infrastructures esp. roads - Destruction of crops
Sea level rise	- Destruction of beach resorts & other assets/supplies - Destruction of coastal infrastructures esp. wharves - Insurances refusing to insure or raising premiums - loss of investors
Drought	- Water scarcity for dependant businesses - Water scarcity for crops irrigation - Water scarcity for livestock watering
	- Coral bleaching impact on diving industry

Sea temperature rise	- changing fish & seafood habitat patterns (esp., tuna, sea cucumber)
Temperature rise	- Energy costs (esp. air conditioning in tourism) - Shortening of tourism season - Drop in workforce efficiency - Impact on non-heat resistant crops - Invasion of pests – destruction of crops - diseases – impact on workforce
Cyclones	- Destruction of assets/supplies - Destruction of infrastructures - Loss of life affecting workforce & customer base - Water contamination of dependant industry - Insurances refusing to insure or raising premiums - Loss of investors - Disruption of tourism season
Migration	- Workforce distribution esp. desertion of tourism destinations (outer islands) - Stress on infrastructure & services in Tongatapu

Task 2: List of Priority Events/Outcome Risks identified by the Sectoral Working Groups. Private Sector

2a. Sea level rise/ destruction of property & infrastructure
2b. Sea level rise/ insurance (tourism sector)
2c. Sea level rise/ investment
2d. Drought/ impact on the water industry
2e. Drought/ destruction of crops and livestock
2f. Sea temperature rise/ tourism (reef destruction/diving)
2g. Sea temperature rise/ fishing (tuna, sea cucumber)
2h. Temperature rise/ crops
2i. Temperature rise/ pests affecting crops
2j. Cyclone/ destruction of property & infrastructure
2k. Cyclone/ insurance
2l. Cyclone/ investment
2m. Cyclone/ Tourism season

154. **Step 3: Estimate Risks -** Using the summary of risks to the relevant sector developed under *Step 2,* the PPCR Team will assist each PPCR Technical Working Group in undertaking an estimation of the following key elements of risks to the relevant sector (if possible by location), namely:

155. **Task 1: Estimate the Severity of the Impact (Event and Outcome Risks)**

- In the context of climate change adaptation, the PPCR Technical Working Group can choose to include non-financial criteria such as the loss of life, effect on GDP, impact on social capital and quality of basic services, environmental impacts or any other relevant measure that is suited to best expressing the potential impacts in measurable terms.
- The PPCR Technical Working Group develops an impact severity rating scale appropriate to the risk scenarios (*event* and *outcome*).

Sector: Private Sector

Table 2a: Sea level rise/ destruction of property & infrastructure +insurance & investment (8)

Impact	Social			Economic				Environmental			
Severity	Displace-ment	Health	Cultural Aspects	Loss of liveli-hood	Property loss (house/ land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity /ecosystem services
Very Low											
Low								x	x		
Moderate											
High		x								x	x
Very high	X		x	x	X	X	x				

Table 2b: Temperature rise & drought/ crops (9)

Impact	Social					Economic		Environmental			
Severity	Displace-ment	Health	Cultural Aspects	Loss of livelihood	Property loss (house /land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low								x	x		
Moderate											
High	x										
Very high		x	x	x	X	x	X			x	X

Table 2c: Sea temperature rise / fisheries and tourism (8)

Impact	Social			Economic				Environmental			
Severity	Displace ment	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low								x	x	x	
Moderate											
High											
Very high	x	x	x	X	X	X	X				X

Table 2d: Cyclones / properties + insurance & investment (10)

Impact	Social			Economic				Environmental			
Severity	Displace ment	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/eco system services
Very Low											
Low								x			
Moderate											
High											
Very high	x	x	x	x	X	x	X		x	x	X

Task 2: Estimate Frequency or Probability of Event

156. The PPCR Technical Working Group will estimate the frequency or probability of an event identified in the relevant reports based on their expert judgment.

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

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

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

Table 3a – Frequency/probability rating based on high scoring outcomes (see table 2a – 2k)

Event/Outcome Risk	Frequency/Probability Rating
2a. Sea level rise/ tourism properties, insurance & investment (8)	5
2b. Sea temperature rise / fisheries & tourism (9)	5
2c. Temperature rise + drought / crops (8)	4
2d.Cyclone / properties, insurance & investment (10)	5

157. **Step 4: Evaluate the Risk -** Based on expert judgment, identified risks are examined by each PPCR Technical Working Group in terms of costs (*Note: costs are to be qualified not quantified*), benefits and acceptability, considering the needs, issues and concerns of stakeholders. The purpose of this evaluation is to give consideration to:

- ranking the risks from “least severe” to “most severe” from the analyses completed earlier and the perceptions of the stakeholders – see *Table 3*;
- estimating the costs of potential losses;
- assessing the acceptability of the risks.

158. The following activities may be conducted to assist in this step.

- Qualify the costs of the impacts within the 5 year SPCR program and any unexpected benefits (e.g. diversification of crop production in response to threat of droughts) that may be apparent.
- Consider and analyze perceptions of key stakeholders, including the general public.
- Assess the acceptability of risks, cost, benefits, etc., to stakeholders (including governments, communities, economic sectors, etc.). It is important to remember that people who deal regularly with risks view them differently than laypersons. This makes an interactive dialogue with stakeholders very important at this step to accurately determine the level of acceptability of the risk to the various stakeholder groups.
- Undertake dialogue with key stakeholders/communities at high risk locations and

begin identifying various adaptation (risk control, avoidance or prevention) strategies for risks that are unacceptable

159. The PPCR Technical Working Group will compare levels of risk and acceptability of risk scenarios by reviewing the data that has been recorded during the risk estimation process.

Table 4: Risk assessment matrix – summary

	Frequency and Probability				
	Very unlikely in happen	**Occasional occurrence**	**Moderately frequent**	**Occurs often**	**Likely to Occur Regularly**
Extreme					2d
Major				2c	2a, 2b
Moderate					
Low					
Very low					

Step 5: Identify Priority Risks and Vulnerable Communities

Priority Risk	**Top Three Vulnerable Communities**
Cyclone / properties, investment & insurance (10)	All businesses
Sea temperature rise / fisheries & tourism (9)	Fishermen & tourism
Temperature rise & drought / crops & livestock (8)	Farmers
Sea level rise / tourism (8)	Tourism

Step 6: Response/Interventions to Risks –

1. Cyclone / properties, investment & insurance

- Review of building codes – $1 million including private sector capacity building to implement climate proofed building codes
- Review of insurance system & legislation = integrate climate change risk management into the insurance and banking sector - $0.2 million

2. Temperature rise & drought / crops & livestock

- Nurseries & integration of resistant species = private sector to develop gene banks of drought resistant seeds and market these seeds and technologies– $1 million including capacity building
- Sustainable irrigation system = introduce water conserving irrigation systems and market them to the agriculture sector - $0.1 million

3. Sea temperature rise / fisheries & tourism

- Aquaculture/ combined with crops nurseries = private sector to do a pilot hydroponic project - technology for aquaculture and sustainable waste management pilot = $0.25

4. Sea level rise / tourism

- Review of building codes (integrated with cyclone)
- Train private sector building businesses - $0.25 million
- Review of Tourism Act (hotels to be built on posts and other climate proof techniques) - $0.25 million

Build Private sector climate change and disaster risk management capacity across sectors– $0.5 million

Total: $3.55 million

Infrastructure Sector Risk Assessment

Infrastructure Sector Working Group Members

Names	Institution
Pesalili Tuiano (Chair)	Ministry of Work
Fuka Kitekei'aho	GEOCARE
Nailati Kupu	PUMA
Kelela Tonga	Ministry of Transport
Norma Fifita	Tonga Airport Ltd
'Ofa Sefana	ENergy

160. **Step 1: Stocktaking and Establishing the Context -** collect together all relevant documents/strategies/programs pertaining to climate change risks affecting the country and various sectors, and undertake a stocktaking to define the nature of the climate change risk to be evaluated in the context of each of the PPCR Technical Working Groups (e.g. agriculture, water, health, etc). The stocktaking should ensure that information on the following have been considered - development trends, investment trends, migration trends, social status/capital, loss situation (casualties, injury, livelihood, agricultural lands, crops, human health, livestock, forest, environmental health), pollution situation

List additional reports/documents:

- MOW – Engineering Coordinating and Management Infrastructure Project,
    - Tonga National Road Improvement Project, Phase I – Phase III
    - Tonga Intergraded Urban Development Project, Phase I
    - Vaipua Causeway Reconstruction Project
    - Foa Causeway Upgrading Project
- MOT – Transport Sector Consolidation Project
    - Maritime, Navigation Light Project
    - Aviation & TAL, Runway Rehabilitation Project
    - Land Transport, Road Maintenance Project
- PUMA – Development Project
    - Sustainable Urban – Environmental Management Project, Roads
    - Tsunami Evacuation Bridge, Fanga'uta
- Energy – Supply Security Project (Related to JANP)
    - Submarine Cabling, Tonga Cable Limited & TCC
- 'Eua Development Committee – NZAID & MOT Infrastructure Project
    - Foreshore Projection Project for Nafanua Habour
    - Airport Upgrading Project
- Nuku'alofa Development Council – CBD Infrastructure Project
    - High Rise Buildings Project
    - Vuna Wharf Upgrading Project
    - Roads Rehabilitation Project
- GEOCARE – JNAP Related Project
- General Government National Relevant Document
    - PUMA, National Spatial Planning Management Bill – Aims to improve all infrastructures in Tonga
    - PUMA, Urban Planning Guideline 2007
    - MOW, Building Code
    - TAL, Environmental Management Plan
    - MECC, Environmental Impact Assessments Act 2003

161. **Step 2: Summarize the Risks -** With reference to each of the relevant adaptation reports, (and other relevant documents collected during the stocktaking), the PPCR Technical Working Group will summarize the nature of the risks from climate change to the relevant sector. The initial step is to identify ***event risk*** (i.e. the "risk of occurrence of any particular hazard or extreme event" for example flood, drought, increased hurricane intensity) and ***outcome risk*** (i.e. "the risk of a particular outcome" for example loss of life, loss of income, loss of property, increase in pests/disease, increase in water/vector borne disease).

Task 1: Summary of Risks

Event Risks	Outcome Risks
2.a. Rise of Sea Level **Output** – Coastal Erosion **Outcome** - Destructed and Weakening all the Marine Infrastructures such as Foreshore Protection, Harbors, Wharfs, Causeways and Jetties	- Loss of Life - Loss of Income - loss of Assets
2.b. Increase temperature **Output** – Dryness and Heat **Outcome** - Destructed and Weakening the Infrastructures such as Roads, Buildings, Runways & Apron and all Marine Infrastructures	- Loss of Life - Loss of Income - loss of Assets
2.c. Seasonal Changes / Temperature Change **Output** – Increase in Humidity **Outcome** - Destructed and Weakening the Infrastructures such as Roads, Buildings, Runways & Apron and all Marine Infrastructures	- Loss of Life - Loss of Income - loss of Assets
2.d. Heavy Rainfall **Output** – Flooding **Outcome** - Destructed and Weakening the Infrastructures such as Roads and Buildings **Output** – Coastal Erosion **Outcome** - Destructed and Weakening all the Marine Infrastructures such as Foreshore Protection, Harbors, Wharfs, Causeways and Jetties	- Loss of Life - Loss of Income - Loss of Assets
2.e. Drought **Output** – Dryness and Heat **Outcome** - Destructed and Weakening the Infrastructures such as Roads, Buildings, Runways & Apron and all Marine Infrastructures	- Loss of Life - Loss of Income - Loss of Assets
2.f. Tropical Cyclone and Storm **Output** – Flooding **Outcome** - Destructed and Weakening the Infrastructures such as Roads and Buildings **Output** – Coastal Erosion **Outcome** - Destructed and Weakening all	- Loss of Life - Loss of Income - Loss of Assets

the Marine Infrastructures such as Foreshore Protection, Harbors, Wharfs, Causeways and Jetties	
2.g. Humidity **Output** – Dryness and Heat **Outcome** - Destructed and Weakening the Infrastructures such as Roads, Buildings, Runways & Apron and all Marine Infrastructures	- Loss of Life - Loss of Income - Loss of Assets

162. **Task 2: List of Priority Events/Outcome Risks identified by the Sectoral Working Groups.**

2.a. Sea level rise/Coastal Erosion
2.b. Increase temperature/Dryness and Heat
2.c. Seasonal Change/Increase in Humidity
2.d. Heavy Rainfall/Flooding, Coastal Erosion
2.e. Drought/Dryness and Heat
2.f. Tropical Cyclone & Storm/Flooding, Coastal Erosion
2.g. Humidity/Dryness and Heat

163. **Step 3: Estimate Risks -** Using the summary of risks to the relevant sector developed under *Step 2,* the PPCR Team will assist each PPCR Technical Working Group in undertaking an estimation of the following key elements of risks to the relevant sector (if possible by location), namely:

164. **Task 1: Estimate the Severity of the Impact (Event and Outcome Risks)**

- In the context of climate change adaptation, the PPCR Technical Working Group can choose to include non-financial criteria such as the loss of life, effect on GDP, impact on social capital and quality of basic services, environmental impacts or any other relevant measure that is suited to best expressing the potential impacts in measurable terms.
- The PPCR Technical Working Group develops an impact severity rating scale appropriate to the risk scenarios (***event*** and ***outcome***).

Table 2a: Sea level rise/coastal erosion 7

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low								X			
Moderate	X	X									X
High			X		X	X			X	X	
Very high				X			X				

Table 2b: Increased climatic variability/ droughts/ floods/ high temperature 6

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low								X			
Moderate			X		X		X				X
High	X	X		X		X				X	

Very high									X		

Table 2c: tropical cyclone & storm surge/flooding, wind damage, coastal erosion 8

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low								X			
Moderate	X		X								
High				X	X	X	X		X	X	X
Very high		X									

Task 2: Estimate Frequency or Probability of Event

165. The PPCR Technical Working Group will estimate the frequency or probability of an event identified in the relevant reports based on their expert judgment.

Table 3: Frequency/probability rating (based on climate risks that are likely to occur during SPCR period > 5 years)

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

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

Table 3a: Frequency/probability rating based on high scoring outcomes (see tables 2a–2c)

Event/Outcome Risk	Frequency/Probability Rating
2a) Sea Level Rise/Coastal Erosion (7)	4
2b) Increased climatic variability/ Droughts/ Floods/ High Temperature (6)	4
2c) Tropical Cyclone & Storm Surge Flooding, Coastal Erosion (8)	5

166. **Step 4: Evaluate the Risk -** Based on expert judgment, identified risks are examined by each PPCR Technical Working Group in terms of costs (*Note: costs are to be qualified not quantified*), benefits and acceptability, considering the needs, issues and concerns of stakeholders. The purpose of this evaluation is to give consideration to:

- ranking the risks from “least severe” to “most severe” from the analyses completed earlier and the perceptions of the stakeholders – see *Table 3*;
- estimating the costs of potential losses;
- assessing the acceptability of the risks.

167. The following activities may be conducted to assist in this step.

- Qualify the costs of the impacts within the 5 year SPCR program and any unexpected benefits (e.g. diversification of crop production in response to threat of

droughts) that may be apparent.

- Consider and analyze perceptions of key stakeholders, including the general public.
- Assess the acceptability of risks, cost, benefits, etc., to stakeholders (including governments, communities, economic sectors, etc.). It is important to remember that people who deal regularly with risks view them differently than laypersons. This makes an interactive dialogue with stakeholders very important at this step to accurately determine the level of acceptability of the risk to the various stakeholder groups.
- Undertake dialogue with key stakeholders/communities at high risk locations and begin identifying various adaptation (risk control, avoidance or prevention) strategies for risks that are unacceptable

168. The PPCR Technical Working Group will compare levels of risk and acceptability of risk scenarios by reviewing the data that has been recorded during the risk estimation process.

Table 4: risk assessment matrix – summary

	Frequency and Probability				
	Very unlikely in happen	**Occasional occurrence**	**Moderately frequent**	**Occurs often**	**Likely to Occur Regularly**
Extreme		.		2.a., 2.b.	2c
Major					
Moderate					
Low					
Very low					

Step 5: Identify Priority Risks and Vulnerable Communities

Priority Risk	**Top Three Vulnerable Communities**
2.c Tropical Cyclone & Storm Surge/Flooding, Coastal Erosion	All of Tonga
2.a Sea Level Rise/coastal erosion	Low lying coastal areas of Tonga -
2.b Increased climatic variability/ Droughts/ Floods/ High Temperature	All of Tonga

Step 6: Identify viable intervention and investment to address the above risks

169. **From tables 2a and 2c:** For new infrastructure, climate-proof designs and the building approval process (including building codes and train key agencies) and EIA process.
For existing infrastructure, identify international best practice applicable to Tonga to protect infrastructure, and develop cost / benefit analysis techniques to answer the question, should be we protect it or move it?

170. **From Table 2b:** For new infrastructure, climate-proof designs and the building approval process (including building codes and train key agencies) and EIA process.
For existing infrastructure, factor increased maintenance costs and shorter design lives into

annual operational budgets.

Cost: $5 million for Tonga ($1million per annum in TA and training for 5 years) + benefit from some regional activity applicable to Tonga.

Energy Sector Risk Assessment

Energy Sector Working Group Members

Name	Institution
Kakau Foliaki (Chair)	Energy Unit
Holomesi Malolo	Energy Unit
‘Ofa Masila	MEWAC
Taniela Kula	PUMA

171. **Step 1: Stocktaking and Establishing the Context -** collect together all relevant documents/strategies/programs pertaining to climate change risks affecting the country and various sectors, and undertake a stocktaking to define the nature of the climate change risk to be evaluated in the context of each of the PPCR Technical Working Groups (e.g. agriculture, water, health, etc). The stocktaking should ensure that information on the following have been considered - development trends, investment trends, migration trends, social status/capital, loss situation (casualties, injury, livelihood, agricultural lands, crops, human health, livestock, forest, environmental health), pollution situation

List additional reports/documents:

Energy Division (MAFFF)

- Renewable Energy Act

Current Project

- Rehabilitation of Mango & Mo’unga’one Solar electrification (IUCN Fund)
- Lofanga Island Solar Electrification (IUCN)
- Clean Energy Project (JICA)
- Planting Scheme Project (PTH)

Plan

- Energy integration to School Curriculum (PIGGAREP)
- Solar Water Pumping (PEC Fund)
- Solar Water Pumping (SIDS DOCK)
- Risk Assessment on critical energy infrastructure

PUMA

- Realignment of Utilities
- Development Control
- Niua Development
- Hihifo Town Square Concept Plan
- Disaster Risk Strategy

Women Affair (MEWAC)

- National Gender Policy

Plan

- Community Survey on Energy Requirement
- Capacity building on Energy Efficiency (Community basis)

Step 2: Summarize the Risks - With reference to each of the relevant adaptation reports,

(and other relevant documents collected during the stocktaking), the PPCR Technical Working Group will summarize the nature of the risks from climate change to the relevant sector. The initial step is to identify ***event risk*** (i.e. the "risk of occurrence of any particular hazard or extreme event" for example flood, drought, increased hurricane intensity) and ***outcome risk*** (i.e. "the risk of a particular outcome" for example loss of life, loss of income, loss of property, increase in pests/disease, increase in water/vector borne disease).

Task 1: Summary of Risks

Event Risk (identified in JNAP & Initial Communication)	**Outcome Impacts** (identified in JNAP & Initial Communication)
Tropical Cyclone	• *Damage to Infrastructure such as Petroleum Storage, Power Station, Transmission Line. Solar Home System etc* • Damage to Biofuel and Biomass resources
Storm Surge	• *Damage to Biofuel and Biomass Resources* • Damage to Petroleum Storage and Power Station
Increase Temperature	• *Increase burning of fossil fuel for Air condition and Transportation* • Reduce Biofuel production
Sea Level Rise	• *Increase costing for relocation and upgrading of vulnerable energy services (Solar Home System, TPL,Total,Pacific Energy, etc)* • Reduction if Biofuel and Biomass Resources
Heavy Rainfall	• *Increase in usage of fossil fuel for Air Condition and transportation* • Reduction in Solar performance

172. **Task 2: List of Priority Events/Outcome Risks identified by the Sectoral Working Groups.**

2a. Tropical Cyclone
2b. Storm Surge
2c. Increase Temperature
2d. Sea level Rising
2e. Heavy Rainfall

Step 3: Estimate Risks - Using the summary of risks to the relevant sector developed under *Step 2,* the PPCR Team will assist each PPCR Technical Working Group in undertaking an estimation of the following key elements of risks to the relevant sector (if possible by location), namely:

173. **Task 1: Estimate the Severity of the Impact (Event and Outcome Risks)**

- In the context of climate change adaptation, the PPCR Technical Working Group can choose to include non-financial criteria such as the loss of life, effect on GDP, impact on social capital and quality of basic services, environmental impacts or any other relevant measure that is suited to best expressing the potential impacts in measurable terms.

- The PPCR Technical Working Group develops an impact severity rating scale appropriate to the risk scenarios (*event* and *outcome*).

Table 2a: Cyclone/ damage to infrastructure such as petroleum storage, power station, transmission line. solar home system, etc. (7)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low											
Moderate		X	x	x				x			
High	X								x	x	
Very high					x	x	x				x

Table 2b: Cyclone / storm surge/ damage to biofuel and biomass resources (5)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low			X	x				x			
Moderate		X							x		X
High	X				x	X	x			x	
Very high											

Table 2c: Increase temperature/ increase burning of fossil fuel for air condition and water production resulting in increased costs (5)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low											
Moderate	x		x	x	X					x	x
High		x				x	x	X	X		
Very high											

Table 2d: Sea level rising/ increase costing for relocation and upgrading of vulnerable energy services (solar home system, TPL, total, Pacific energy, etc.) (4)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss	Air	Water	Land	Biodiversity/ecosystem services
Very Low									x		
Low			x					x		x	
Moderate		x		x	X						
High	X					x	x				X
Very high											

Task 2: Estimate Frequency or Probability of Event

174. The PPCR Technical Working Group will estimate the frequency or probability of an event identified in the relevant reports based on their expert judgment.

Table 3: Frequency/probability rating (based on climate risks that are likely to occur during SPCR period > 5 years)

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

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

Table 3a: Frequency/probability rating based on high scoring outcomes (see table 2a – 2d)

Event/Outcome Risk	Frequency/Probability Rating
1. Cyclone/ damage to infrastructure such as petroleum storage, power station, transmission line. solar home system, etc	5

175. **Step 4: Evaluate the Risk -** Based on expert judgment, identified risks are examined by each PPCR Technical Working Group in terms of costs (*Note: costs are to be qualified not quantified*), benefits and acceptability, considering the needs, issues and concerns of stakeholders. The purpose of this evaluation is to give consideration to:

- ranking the risks from "least severe" to "most severe" from the analyses completed earlier and the perceptions of the stakeholders – see *Table 3*;
- estimating the costs of potential losses;
- assessing the acceptability of the risks.

176. The following activities may be conducted to assist in this step.

- Qualify the costs of the impacts within the 5 year SPCR program and any unexpected benefits (e.g. diversification of crop production in response to threat of droughts) that may be apparent.
- Consider and analyze perceptions of key stakeholders, including the general public.
- Assess the acceptability of risks, cost, benefits, etc., to stakeholders (including governments, communities, economic sectors, etc.). It is important to remember that people who deal regularly with risks view them differently than laypersons. This makes an interactive dialogue with stakeholders very important at this step to accurately determine the level of acceptability of the risk to the various stakeholder groups.
- Undertake dialogue with key stakeholders/communities at high risk locations and begin identifying various adaptation (risk control, avoidance or prevention) strategies for risks that are unacceptable

177. The PPCR Technical Working Group will compare levels of risk and acceptability of risk scenarios by reviewing the data that has been recorded during the risk estimation process.

Table 4: Risk assessment matrix – summary

	Frequency and Probability				
	Very unlikely in happen	**Occasional occurrence**	**Moderately frequent**	**Occurs often**	**Likely to Occur Regularly**
Extreme					2a
Major					
Moderate					
Low					
Very low					

178. **Step 5: Identify Priority Risks and Vulnerable Communities**

Priority Risk	**Top Three Vulnerable Communities**
1. Cyclone/ *Damage to Infrastructure such as Petroleum Storage, Power Station, Transmission Line. Solar Home System etc*	Nuku'alofa, Lifuka, Neiafu, Eua

179. **Step 6: Identify viable interventions and investments to address above priority risks**

Assess cost / benefits of protection measures versus moving the facilities to a new, safer location. If (after CBA) energy infrastructure needs to be rebuilt or protected, climate-proof designs and the building approval process (including building codes and train key agencies) and EIA process.
Cost $500,000

Coastal Sector Risk Assessment

Coastal Sector Working Group Members

Name	Institution
Fuka Kitekei'aho (Chair)	GEOCARE
Lu'isa Tu'iafitu Malolo (Assistant Chair)	JNAP Secretariat
'Ofa Kaisamy	JNAP Secretariat
Nalesoni Leka	GIZ-
Nailati Kupu	PUMA
'Ofa Fakalata	Ma'ui'ui Organic
Maka Fifita	PUMA
Talo Fulivai	JNAP

Step 1: Stocktaking and Establishing the Context

Ministry /Organization	Projects	Legislation/Policy/Plan, Reports
*Geographical Information System (GIS) Section, Ministry of Lands, Survey & Natural Resources (MLSNR)	*none	*MLSNR Corporate Plan (3yrs plan) *MLSNR Annual Management Plan of GIS is to provide maps to Ministry of Environment and Climate Change upon request
*Geology Section, MLSNR	*Integrated Water Resource Management (IWRM) Project -SOPAC funded project *Focus;* -improve water quality in Neiafu, Vava'u - To enact the Water Resource Bill **please also refer to information as reported in the Water Sector	*Land Act (year to be included!) *Sand Mining Act *MLSNR Corporate Plan *Annual Management Plan Report on Offshore sand mining by Mr. Fuka Geocare
*Planning and Urban Management Agency (PUMA), MLSNR	*Sustainable Urban, Environment Management Project (SUEMP) -EU funded -Jan 2011-June 2012 *Focus:* -undertake risk assessment and relocate people that are living on highly vulnerable sites on the coast	*National Spatial Planning and Management Bill (still with Crown Law) *Lagoon Reclamation Plan (plan to relocate government offices from vulnerable sites on the coast further inland) *MLSNR Corporate Plan *Annual Management Plan
*Ma'ui'ui Organic Enterprise	*Organic Gardening Project (solid & liquid composts) -self funded -ongoing *Focus:* -promote use of organic fertilizers -improve soil fertility -improve crop production/yield -increase biodiversity -sustain integrity of ecosystems -reduce pollution	*Report on Commercialised Organic Farming System in Tonga (prepared by 'Ofa Fakalata and funded by AUSAID)
*GEOCARE Company	*Assessment of the impacts of	*Reports on EIA

	infrastructures on coastal processes *Environment Impact Assessment (with climate proofing including) of infrastructural development on the coast of Tonga Name of infrastructural development; -Vuna Wharf Development, Tongatapu -Foa Causeway, Ha'apai -Touliki Navy Base, Tongatapu -Energy Security, Tonga	*Reports on Impact Assessment of infrastructures on coastal processes (reports prepared by Fuka Geocare)
*Ministry of Environment and Climate Change (MECC)	Climate Change Projects *Initial National Communication Project *Second National Communication Project *JNAP *PASAP (LIDAR survey (TBU & Hp) and coastal feasibility studies in Lifuka , Ha'apai *PCCSP *PACC Project (Water Resource Mgt) *PACC plus (WRMgt & Coastal Zone Mgt) *MESCAL Project *GIZ Project Climate Change Related Projects *Sustainable Land Management Project *National Biodiversity Strategic Action Project *National Capacity Self Assessment Project *Persistent Organic Pollutant Project *International Water Project *PoWPA Project *Ozone Depleting Substances Project	*Initial National Communication Report *JNAP on CCADRM *Project Documents *EIA Act 2010 *EIA Regulation *EMA 2010 *Chemical and Hazardous Waste Act (year to be included) *Ozone Layer Protection Act, 2010 *National Climate Change Policy, 2006 *National Water Policy, 2011 *NBSAP *IWP Reports *POP reports *Biosafety Reports *NCSA Reports *MECC Corporate Plan *MECC Annual Management Report

Step 2: a) Summary of Event and Outcome Risks

EVENT RISK	**OUTCOME IMPACTS**
*Heavy Rainfall	-coastal erosion -contaminate coastal and marine environment (surface runoffs from steep sloppy areas e.g. Tefisi, Vava'u) -loss of livelihoods -loss of income -wash off pollutants cause algal bloom that deprives oxygen used by marine organisms hence results in death of these organisms
*Drought	-loss of habitat -loss of livelihoods -affect marine biodiversity

	-affect crops -affect coastal vegetation -affect underground water
*Increased Temperature	-increase pests and diseases -loss of social interest due to increase heat -skin cancer due to exposure to too much UV radiation -affect coastal trees -affect fisheries resources (Coral bleaching and loss of fish habitat; fish migration)
*Sea Level Rise	-coastal erosion -loss of property -loss of livelihood -seawater intrusion contaminates underground water -displacement - affect coastal vegetation
*Tropical Cyclone	-coastal erosion -storm surge exacerbates coastal erosion -loss of property -loss of livelihoods -underground water contamination -displacement -loss of lives -loss of economy

Step 2: b) Prioritization

Criteria Used to Prioritize Event and Outcome Risks

MODE

i. Event & Impacts as Direct -4 or Indirect- 2 or Both Direct and Indirect -6
ii. Area
    a. Localized - 2
    b. Regional -4
iii. Types
    a. Reversible - 2
    b. Irreversible -4
iv. Duration
    a. Short term-2
    b. Long term-4

Equation to contribute to Prioritization process ; Add all Modes X Probability = Solution

*Heavy rainfall = 6+2+4+2= 14
*Drought = 6+4+2+2=14
*Increased Temperature= 6+4+2+2=14
*Sea Level rise= 6+4+4+4= 18
*Tropical Cyclone= 6+4+2+2=14

Priorities;

Highest: Sea level Rise – coastal erosion
Tropical Cyclone- loss of property and lives
Increased Temperature- affects fisheries resources
Heavy Rainfall-affect coastal and marine ecosystems and livelihoods

Lowest: Drought –impact on marine biodiversity/livelihoods

Step 2: c) Estimate Frequency/Probability of Event

Event/outcome risk	Frequency/probability rating
*Sea level rise	5
*Increased Temperature	5
*Tropical Cyclone	4
*Heavy Rainfall	4
*Drought	3

180. **Step 3: Estimate Risks** - Using the summary of risks to the relevant sector developed under *Step 2,* the PPCR Team will assist each PPCR Technical Working Group in undertaking an estimation of the following key elements of risks to the relevant sector (if possible by location), namely:

181. **Task 1: Estimate the Severity of the Impact (Event and Outcome Risks)**

- In the context of climate change adaptation, the PPCR Technical Working Group can choose to include non-financial criteria such as the loss of life, effect on GDP, impact on social capital and quality of basic services, environmental impacts or any other relevant measure that is suited to best expressing the potential impacts in measurable terms.
- The PPCR Technical Working Group develops an impact severity rating scale appropriate to the risk scenarios (*event* and *outcome*).

Table 2a: Sea level rise – coastal erosion - Score = 8

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low								X			
Moderate			X								X
High	X	X		X	X	X	X			X	
Very high									X		

Table 2b: Increased temperature – Impact of fisheries resources (fish migration, coral bleaching and loss of habitat) – Score = 4

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low	X		X		X					X	
Moderate				X		X					X
High		X					X	X			
Very high									X		

Table 2c: Heavy Rainfall – impacts on coastal and marine ecosystems and livelihoods – Score = 4

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low	X		X					X			
Moderate					X	X	X				X
High		X		X					X	X	
Very high											

Table 2d: Drought – impact on marine biodiversity/livelihoods – Score = 3

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low	X			X	X	X	X				
Moderate			X					X			X
High		X								X	
Very high									X		

Table 2e: Tropical cyclone – loss of property and lives - Score = 8

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low											
Moderate	X		X					X			
High		X									
Very high				X	X	X	X		X	X	X

Step 4: Evaluate the Risk

1. *Sea Level Rise – Extreme, Likely to occur regularly (coastal erosion and inundation)
2. * Tropical Cyclone – Major, Moderately frequent (coastal erosion & inundation)
3. *Increased Temperature – Extreme, Likely to occur regularly

Step 5: Identify Priority Risks and Vulnerable Communities

Priority Risk	Top Three Vulnerable Communities
1. *Sea level rise – extreme, likely to occur regularly	Low lying coastal – Northern Tongatapu, Hp islands, Vava'u motu, Niuatoputapu
2. * Tropical cyclone – major, moderately frequent	2. All island group sectors
3. *Increased temperature – extreme, likely to occur regularly	3. Fishing industry, SMAs

182. **Step 6: Strategies for Addressing Risks**

Interventions:

183. There are existing projects funded by the Australian Government to undertake LIDAR surveys in Ha'apai and Tongatapu. These surveys have already been undertaken and the images will be available shortly (end of 2011, early 2012). This data will enable coastal modeling to be developed.

184. PASAP (Australian Government) is also undertaking a coastal feasibility study in Ha'apai and it is expected to be completed in December 2012.

- AusAID has also committed A$1.7 million to undertake studies on water resources as well as a coastal feasibility study for the area from Sopul to Haatafu (west side of Tongatapu). This coastal study will involve coastal feasibility, coastal design, and EIA.

185. The aim of this work is to develop an integrated strategy for coastal management in the identified sector of coastline.

186. It is recommended that based on the outcomes of these 2 coastal studies, funds from the PPCR process go to implementing the recommendations from the studies. It is expected that this will involve a combination of both hard and soft structures/strategies i.e. sea wall, natural barriers (mangroves, replanting), awareness raising,

187. It is suggested that 3-5 different sites be selected from these studies to explore different characteristics (i.e. makatea, low-lying, sloping land, etc) and determine which types of protection are most cost effective. These 3-5 sites will enable pilots to be explored and costed for application in other areas. This type of information is not yet available.

Suggest $1.5 million per site for a total of $7.5 million.
Seawall Costs: $1 million per km.

Finance and Economic Sector Risk Assessment

188. **Economic Sector Working Group Members**

Name	Institution
Kilisitina Tuaimei'api (Chair)	Ministry of Finance and National Planning
Saane Lolo	Ministry of Finance and National Planning
Milika Tuita	UNDP
Fono Hola	Ministry of Finance and National Planning
Taniela Kula	PUMA

189. **Step 1: Stocktaking and Establishing the Context -** collect together all relevant documents/strategies/programs pertaining to climate change risks affecting the country and various sectors, and undertake a stocktaking to define the nature of the climate change risk to be evaluated in the context of each of the PPCR Technical Working Groups (e.g. agriculture, water, health, etc). The stocktaking should ensure that information on the following have been considered - development trends, investment trends, migration trends, social status/capital, loss situation (casualties, injury, livelihood, agricultural lands, crops, human health, livestock, forest, environmental health), pollution situation

List additional reports/documents:

- Tonga National Strategic Development Framework
- Tonga National Infrastructure Investment Plan
- Development Partnership Programs (AusAID, UNDP, ADB, WB, NZAid, EU, Republic of Korea, JICA, People's Republic of China)
- Relocation Strategy – development progress
- Insurance Policies on climatic events such as impacts of cyclone on properties

190. **Step 2: Summarize the Risks** - With reference to each of the relevant adaptation reports, (and other relevant documents collected during the stocktaking), the PPCR Technical Working Group will summarize the nature of the risks from climate change to the relevant sector. The initial step is to identify ***event risk*** (i.e. the "risk of occurrence of any particular hazard or extreme event" for example flood, drought, increased hurricane intensity) and ***outcome risk*** (i.e. "the risk of a particular outcome" for example loss of life, loss of income, loss of property, increase in pests/disease, increase in water/vector borne disease).

191. **Task 1: Summary of Risks**

Event Risks	Outcome Risks
Heavy Rainfall (Flood)	- Loss of income to farmers - increase cost on healthcare
Drought	- loss of income from agricultural sector - decline in GDP - increase cost of transporting water to vulnerable communities - increase cost for recovery
Increase temperature	- increase energy cost - decline in GDP - increase balance of payment/budget deficit
Tropical cyclone	- increase loss of investment/property - increase cost of recovery for household
Cyclone/Storm surge/Sea	- increase cost of investment

level rise	- increase expenditure to coastal settlement - Loss of investment/housing - loss of income from tourism sector
Tropical Cyclone/Storm surge/Drought (Accumulate Impacts)	- High Loss of Investment and Recovery

192. **Task 2: List of Priority Events/Outcome Risks identified by the Sectoral Working Groups.**

- 2a. Tropical cyclone/high cost of recovery and loss of investment
- 2b. Drought/high cost of recovery
- 2c. Storm surge (short term)/sea level rise (long term/high cost of recovery and loss of investment
- 2d. heavy rainfall (flooding)/inundation
- 2e. Tropical cyclone/storm surge/drought (accumulate impacts)

Note:
Critical nature when two events and outcome risks

193. **Step 3: Estimate Risks** - Using the summary of risks to the relevant sector developed under *Step 2,* the PPCR Team will assist each PPCR Technical Working Group in undertaking an estimation of the following key elements of risks to the relevant sector (if possible by location), namely:

194. **Task 1: Estimate the Severity of the Impact (Event and Outcome Risks)**

- In the context of climate change adaptation, the PPCR Technical Working Group can choose to include non-financial criteria such as the loss of life, effect on GDP, impact on social capital and quality of basic services, environmental impacts or any other relevant measure that is suited to best expressing the potential impacts in measurable terms.
- The PPCR Technical Working Group develops an impact severity rating scale appropriate to the risk scenarios (*event* and *outcome*).

Table 2a: Tropical cyclone/high cost of recovery and loss of investment (5)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low								X			
Low			X								X
Moderate	X	X								X	
High				X					X		
Very high					X	X	X				

Table 2b: Drought/high cost of recovery (9)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low	X										
Low											
Moderate			X								
High		X		X	X	X	X	X			
Very high									X	X	X

Table 2c: Cyclone/storm surge (short term)/sea level rise (long term)/high cost of recovery and loss of investment from coastal inundation (8)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low											
Moderate			X					X			X
High	X	X		X	X	X	X		X		
Very high										X	

Table 2d: Heavy rainfall (flooding)/ inundation (4)

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low	X		X			X	X	X			
Moderate				X							X
High		X								X	
Very high					X				X		

Table 2e: **Accumulative impacts i.e. tropical cyclone/storm surge/drought/high loss of investment and recovery (9)**

Impact	Social			Economic				Environmental			
Severity	Displacement	Health	Cultural Aspects	Loss of livelihood	Property loss (house/land)	Financial loss (crop and livestock)	GDP loss ??	Air	Water	Land	Biodiversity/ecosystem services
Very Low											
Low								X			
Moderate			X								
High	X	X								X	X
Very high				X	X	X	X		X		

Task 2: Estimate Frequency or Probability of Event

195. The PPCR Technical Working Group will estimate the frequency or probability of an event identified in the relevant reports based on their expert judgment.

Table 3: Frequency/probability rating (based on climate risks that are likely to occur during SPCR period > 5 years)

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

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

Table 3a – Frequency/probability rating based on high scoring outcomes (see tables 2a–2e)

Event/Outcome Risk	Frequency/Probability Rating
2c. Cyclone/Storm Surge (short term)/sea level rise (long term)/high cost of recovery and loss of investment from coastal inundation (8)	5
2e. Accumulative Impacts i.e. Tropical Cyclone/Storm surge/Drought/High Loss of Investment and Recovery (9)	3
2b. Drought/high cost of recovery (9)	3

196. **Step 4: Evaluate the Risk** - Based on expert judgment, identified risks are examined by each PPCR Technical Working Group in terms of costs (*Note: costs are to be qualified not quantified*), benefits and acceptability, considering the needs, issues and concerns of stakeholders. The purpose of this evaluation is to give consideration to:

- ranking the risks from "least severe" to "most severe" from the analyses completed earlier and the perceptions of the stakeholders – see *Table 3*;
- estimating the costs of potential losses;
- assessing the acceptability of the risks.

The following activities may be conducted to assist in this step.

- Qualify the costs of the impacts within the 5 year SPCR program and any unexpected benefits (e.g. diversification of crop production in response to threat of droughts) that may be apparent.
- Consider and analyze perceptions of key stakeholders, including the general public.
- Assess the acceptability of risks, cost, benefits, etc., to stakeholders (including governments, communities, economic sectors, etc.). It is important to remember that people who deal regularly with risks view them differently than laypersons. This makes an interactive dialogue with stakeholders very important at this step to accurately determine the level of acceptability of the risk to the various stakeholder groups.
- Undertake dialogue with key stakeholders/communities at high risk locations and begin identifying various adaptation (risk control, avoidance or prevention) strategies for risks that are unacceptable

197. The PPCR Technical Working Group will compare levels of risk and acceptability of risk scenarios by reviewing the data that has been recorded during the risk estimation process.

Table 4: Risk assessment matrix – summary

Frequency and Probability					
	Very unlikely in happen	**Occasional occurrence**	**Moderately frequent**	**Occurs often**	**Likely to Occur Regularly**
Extreme			2e		2c
Major			2b		
Moderate					
Low					
Very low					

Step 5: Identify Priority Risks and Vulnerable Communities

Priority Risk	Top Three Vulnerable Communities
2c.Cyclone/Storm Surge (short term)/sea level rise (long term)/high cost of recovery and loss of investment from coastal inundation (9)	- coastal communities (HH), farming, & business
2b.Drought/high cost of recovery (9)	– all island groups depending on location, coastal communities (HH), farming, & business
2e. Accumulative Impacts i.e. Tropical Cyclone/Storm surge/Drought/High Loss of Investment and Recovery (9)	- all island groups in general

Step 6: Identify Viable Intervention and investment to Address Above Priority Risks

1. Review and identify existing climate change (CC)-resilient plans and programs in addition to proposed new initiatives.
    - Critical to note that there are existing initiatives that have stalled in implementation due to lack of resources. These programs, however, are comprehensive with supporting legislation and ready-made management infrastructures.
2. Set up CC trust funds or foundations to ensure a rolling program
    - Drafting of Act or regulations – $0.3 million
    - $1.9 million – seed money
    - Levy/tax – plastic bags, coastal areas, tourism tax, petrol, etc
3. Microfinance/micro-Insurance
    - Such as Vulnerability Program (ADB), Social Protection Program (WB/AusAID/NZAid), Vulnerability Program (MORDI/IFAD/NZAid)
    - Can utilize some of the seed funds – approximately $6.0million
    - Other challenges from using this microfinance/micro insurance can be dealt with through consultations.
4. Government annual budget – contingency funds $T3.0 million
5. Emergency funds – based on the program requirements (conditional)
6. Partnership with commercial banks

Annex 6

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

Part 1 - Indicators to measures progress in the adaptation process at the National Level

198. This assessment will evaluate progress achieved in implementing a stage-by-stage process towards adaptation planning and management at the national level as recommended during the First Meeting of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) (COP-1, Berlin, 1995), where the decision was taken to approach adaptation in three stages:

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

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

Stage I: Planning, which includes studies of possible impacts of climate change, to identify particularly vulnerable countries or regions and policy options for adaptation and appropriate capacity-building. Such Stage I adaptation activities will[2], amongst other matters, identify options to facilitate adequate adaptation to climate change. These activities could encompass the following:

Capacity Building Activities	Status
i. Sensitization and building awareness of climate change impacts and risks at national and local levels and within vulnerable sectors and population groups, including awareness on economic costs of climate change impacts;	Nationwide consultations (national, local) have been conducted with and by government ministries, NGOs, statutory boards, private sector, donors and development partners. awareness campaign has been ongoing, utilizing television, radio, and print mediums. Economic costs of climate change impacts are being addressed through socio-economic surveys. Climate proofing strategies are being reviewed in reference to future climate impacts.
ii Building climate monitoring and analytical capacity, including climate modeling and climate data/records;	Climate monitoring and analytical capacity has been initiated with the upgrading of Meteorological services climate database, and climate change database, GIS mapping, and climate change modeling software
iii. Building adaptation planning	The JNAPCCADRM is an overarching national

[2] GEF Operational Strategy on Climate Change

capacity at national and local levels and within vulnerable sectors and vulnerable population groups, initially by facilitating the creation of climate change coordinating mechanism (climate change focal point, climate change committee) which is afforded political power by being attached to a senior political office or powerful ministry of government, stakeholder analysis of existing policies and strategies that may be affected by climate change impacts, and evaluation of functions and risks management capacities of institutions and organizations (at national and local levels), and identifying and prioritizing opportunities for addressing identified climate change risks;	plan which incorporates the up-grading of cross-sectoral adaptation planning capacity at both national and local levels, and is also aligned to national, regional and international climate and Disaster related frameworks. Tonga's current institutional arrangements have climate change and disaster represented at all levels which allows for stringent review processes during all stages of adaptation planning. A Climate Change hierarchy is in place with MECC serving as national focal point for all climate related activities. There also exist three higher level committees, namely National Environment Coordinating Committee, Climate Change Cabinet Committee, and Parliamentary Standing Committee on Environment, Climate Change, and Disaster Risk Management. Endorsement of all climate related activities are channeled through these committees. At the lower end of the spectrum are district and regional (island grouping) committees which align climate related activities stated in their respective regional development plans to the JNAPCCADRM and Tonga's Strategic Development Framework 2010-2015 (TSDF)
iv. Undertake a vulnerability and adaptation assessment to identify general strengths and weaknesses of baseline conditions and specific needs and concerns, such as potential barriers to adaptation in critical areas or sectors, and opportunities and priorities for adaptation.	Vulnerability and adaptation assessments were implemented and completed under both Tonga's First and Second National Communications, and Tonga Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management 2010 - 2015 (JNAPCCADRM). Future assessments will be conducted with the commencement of Tonga's Third National Communication, and a proposed second JNAPCCADRM 2015 - 2020
v. Assessment of national, regional and/or subregional vulnerability to climate change, where appropriate, rely on related data-gathering systems to measure climate change effects in particularly vulnerable countries or regions and strengthen such systems as necessary, and identify a near-term research and development agenda to understand sensitivity to climate change.	National and regional vulnerability assessments have been conducted by MDBs, such as ADB, UNDP,WHO, SPREP, SPC, and SOPAC.
vi. Evaluation and assessment of policy frameworks for implementing adaptation measures and response strategies in the context of disaster preparedness, agriculture, fisheries, health, economic development and forestry, with a view of integrating climate change impact information, as appropriate, into national strategic	Mainstreaming of climate change and disaster risk into all government planning is a core objective of Tonga Strategic Development Framework (Goal 7). Elements of Tonga's Climate Change Policy 2006 have already been drafted into National Forestry Policy, National Water Policy, and are currently being drafted into Tonga National Water Bill.

planning processes.	
vii. Develop, in a participatory manner, climate change adaptation strategy (or Nation Adaptation Plan of Action - NAPA) which identifies priority approaches, methods and tools for adaptation, and prioritizes institutional capacity building requirements at the national, local and municipal levels and within vulnerable sectors.	Tonga Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management 2010-2015, identifies priority approaches, methods and tools for adaptation, and prioritizes institutional capacity building requirements at the national, local, and municipal levels and within vulnerable sectors.
2. **Stage II: Measures to Prepare for Adaptation**, including further capacity-building, which may be taken to prepare for adaptation[3], and measures that promote cooperation in preparing for adaptation to the impacts of climate change. These activities could encompass the following:	
i. Establish capacity building measures to support adaptation planning at national level (as outlined in national adaptation strategy or policy), including	
a. integration of climate change risk into the environmental impact assessment process;	Activity 3.9 of the JNAPCCADRM requires the integration of Climate Change Risk Assessment into the Environmental Impact Assessment Process
b. Integration of risk assessment and management in the design of infrastructure projects;	The JNAPCCADRM addresses integration of climate and disaster risks through the review of current building codes and formulation of national infrastructural standards
c. Integration of risk assessment and management in the urban planning process whereby vulnerable areas are spatially identified, and adequate risk management measures established through byelaws, zoning, setbacks, covenants, building restrictions;	Activity 1.4 of the JNAPCCADRM requires the mainstreaming of Climate Change Adaptation and Disaster Risk Management into Corporate and Annual Management Plans of key National Stakeholders. An example of this it the Tonga Planning and Urban Management Agency (PUMA) and GIS Unit of the Ministry of Lands, Survey, and Natural Resources, whom have already initiated activities by providing community vulnerability maps, that have been spatially identified. Risk assessment has already been integrated into Urban Planning and Development.
d. evaluation of engineering design criteria and building codes to ensure adequately reflect climate change projections in regards to loadings, tolerances and return periods;	Activities under the JNAPCCADRM include the review of National Building Code and Standards. These activities are targeted for completion on or before 2013.
e. integration of climate change risk assessment and adaptation management in financial and insurance sector;	At the current stage there is no budget allocation or insurance mechanisms for climate change activities.
f. integration of climate change risk and adaptation into formal and	Consultations with Ministry of Education Curriculum Development Unit have led to

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

informal education programs;	incorporation of climate and disaster risks into (secondary) school syllabus.
g. develop and elaborate appropriate and integrated plans for water resources and agriculture, and for the protection and rehabilitation of areas affected by drought and desertification, as well as floods;	The Ministry of Environment and Climate Change is currently implementing UNDP funded Sustainable Land Management (SLM) project. This project was initiated in 2009. MECC are also currently implementing the GIZCCCPIR project which has a strong focus on forestry, agriculture, energy, education, land use, and land use management. national action plans and strategies are required outputs of both projects.
h. integration of climate change risk assessment and adaptation management into sectoral policies and programs, and national development strategies (e.g. sustainable development, water resource management, disaster management, biodiversity conservation, health, education, and coastal protection).	Climate change adaptation and disaster risk have been integrated into Tonga Strategic Development Framework (TSDF). Goal 7 of TSDF requires Tonga's JNAPCCADRM is a cross sectoral strategy.
ii. Establish capacity building measures to support adaptation planning measures at local and community level, including development of climate information and decision-making tools (vulnerability atlases, community-level risk management strategy).	The JNAPCCADRM addresses adaptation and disaster risk planning measures at the community level through workshops, development of Regional Development Plans, establishment of Community Climate and Disaster Committees.
iii. Establish capacity building measures to support adaptation risk assessment and management measures within vulnerable sectors, including financial sector (banks and insurance industry), agricultural sector, as follows:	At the current stage there is no budget allocation for Climate Change activities
a. Build and strengthen formal & informal research and adaptation management networks	
b. Tool development to identify impacts & adaptation options	Tonga has utilized various tools and methodologies for identifying impacts and adaptation options: 1. IPCC Technical Guidelines 2. IPCC Common Methodology on Sea-Level Rise 3. MAGICC SCENGEN 4. Tonga SimCLIM 5. PlantGRO 4.0 6. WATBAL9F 7. CHARM 8. Climate Futures Tool (PCCSP under ICCAI) 9. MAP Info 10. ARC GIS
c Disseminate and train on use of guides/tools for vulnerability assessment and adaptation	Members from relevant ministries, NGOs, and key stakeholders were trained in the use of the above-mentioned Tools and Methodologies.

management.	Training workshops were conducted to ensure that all Climate and Disaster relevant stakeholders would be self-sufficient with regard the use of guides/tools for vulnerability assessment and adaptation management.
iv. Establish capacity building measures to support risk management and adaptation planning measures within vulnerable population groups, including vulnerable communities, farmers, women, youth, elderly.	The JNAPCCADRM addresses the need for enhancing current capacity of already established Community Based Climate and Disaster plans, and committees. The Pacific Adaptation to Climate Change (PACC) Project has already implemented water based adaptation activities for six (6) vulnerable communities along the Western District. The JNAP Secretariat is currently in the drafting stages for addressing climate and disaster related soil erosion projects.
3. **Stage III: Measures to Facilitate Adequate Adaptation**, including insurance and other adaptation measures[4]. Formulate, implement, publish and regularly update national and, where appropriate, regional programmers containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change. These activities could encompass the following:	
i. Mainstreaming of climate change adaptation that results in the shift of responsibility for climate change adaptation from single ministries or agencies to all sectors of government, civil society and the private sector – guided by national multi-stakeholder committee/council.	Mainstreaming activities were already being executed by Tonga Second National Communication whereby elements of Tonga's Climate Change Policy were incorporated into other sectoral policies. Other committees such as National Environment Coordinating Committee (act as a steering committee) are comprised of senior (CEO/Directors) members of climate relevant ministries, as well as Directors from NGO groups, Chamber of Commerce (Private Sector), and Statutory boards. The PPCR project will further address mainstreaming of climate risks in Tonga.
ii. climate change risk assessments being undertaken for all new infrastructure projects, and risk management measures incorporated into design and operation of infrastructure projects.	Tonga PPCR is currently in the drafting stages of Phase 2 component, which will address climate proofing activities. In this context, it is projected that risk management measures will be incorporated into the designs and operations of future infrastructure projects
i. assimilation of adaptation activities within development budgets (at national, local and municipal levels) to ensure that these interventions continue to be properly funded over the long term, integrated into relevant sector priorities and balanced against other competing priorities.	At the current stage there is no Budget Allocation for Climate Change activities
ii. climate change risk assessment and management a formal part of urban	Climate change risk assessment and management for urban planning processes and

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

	planning processes and vulnerability atlases developed and used to inform urban growth.	development of vulnerability atlases used to inform urban growth, is currently in deliberation stages with Tonga Planning and Urban Management Agency (PUMA) is currently
iii.	climate change relevant engineering design criteria and building codes used for infrastructure design and construction.	Tonga PPCR is currently in the drafting stages of Phase 2 component, which will address climate proofing activities. In this context, it is projected that risk management measures will be incorporated into the designs and operations of future infrastructure projects. The JNAPCCADRM addresses integration of climate and disaster risks through the review of current building codes and formulation of national infrastructural standards. The EIA Act and EIA regulations already in existence will provide measures for the enforcement of proper infrastructural design and construction
iv.	lending and insurance programs have adequate risk management measures in place (e.g. site vulnerability assessments as part of loan process, re-insurance schemes established to cover catastrophic loss from extreme events, etc.).	NOT APPLICABLE
v.	climate change risk and adaptation a formal part of the education curricula in formal education and profession education programs.	Consultations with Ministry of Education Curriculum Development Unit have led to incorporation of Climate and Disaster risks into (Secondary) school syllabus.
vi.	vulnerability atlases used as part of early warning systems for disaster management at national, local and community levels.	The GIS Unit, housed within the Ministry of Lands, Survey, and Natural resources have already developed Tsunami Evacuation Maps.
vii.	health service delivery made resilient to stressors caused by climate change impacts and population made more resilient to climate change health impacts.	Activities already implemented under Goal 3 of JNAPCCADRM namely activity 3.1.3 is focused on Conducting assessment and training on climate change impacts on vector/water borne, and nutritional related diseases
viii.	undertake monitoring and evaluation, and amend ongoing adaptation measures, policies and programs as necessary.	Monitoring and evaluating JNAPCCADRM implementation

Annex 7

Component 1. Capacity Building to Support Transformation to a Climate Resilient Development Path

Objectives

200. This component supports much needed capacity building to mainstream CCA and DRM into development planning at the national, sectoral, and community levels.

Outcomes/

201. Key outcome will be the establishment in Tonga of a pool or trained and qualified specialists to support CCA and DRM mainstreaming activities at national and sectoral levels and within vulnerable communities.

Activities

202. Capacity building is a critical input into any developing country's efforts to build resilience to climate change. The implementation of this component ensures that this capacity is not centralized in one overarching institution (e.g. MECC or JNAP) but rather is dispersed through the entire national system, e.g., community institutions, civil society organizations, sectoral technical personnel/ministries, and professional organizations (Institution of Professional Engineers of Tonga - IPET). This approach ensures that there is greater buy in from a wider cross section of key stakeholders in the entire exercise and broadens the national capacity base. For example in the community vulnerability work , working with the community in such a way that ensures that at the end of the process the capacity to carry out such action in the future resides in the community will pay dividends in the long run. Across all ministries and especially at the level of the ministries responsible for planning and finance capacity building (and to a great extent awareness) will be strengthened for incorporating climate risk management into their decision making process. In particular capacity will be strengthened in the Ministry of Planning and Finance to inculcate a risk management ethic that not only informs their work but demands reciprocal consideration from all the other sectoral Ministries whenever sectoral development plans and budgets are being considered. A mentoring program will be the focus of any capacity building technical assistance provided under the SPCR, thereby ensuring that expert input is informed by the local circumstances and, much more importantly, that capacity is left behind after the completion of the SPCR. All SPCR capacity building activities will build upon and, where necessary, adapt to local circumstances the wide range of CCA/DRM training material that has emerged over the past decade and should take advantage of these developments to be selective in courses to be utilized so as to ensure that they are the most appropriate for local circumstances.

203. Component 1 will support the following activities:

(a) $1 million for design and implementation, in collaboration with the JNAP/PPCR Implementation Unit (see Component 1 (c) and (d) below), of broad-based in-country ***train-the-trainer program and subsequent roll-out of training programs*** for public (particular MOFNP) and private sectors, NGOs, civil society, Outer Island Councils, the media, parliamentarians, and vulnerable communities on a broad range of climate change adaptation and disaster risk management topics, including:

- climate change and disaster risk management;
- the economics of climate change adaptation and disaster risk management;

- coastal engineering and climate proofing critical coastal infrastructure;
- integration of climate change adaptation and disaster risk management into physical planning, natural resource management, and the planning/construction/operation/maintenance of critical infrastructure;
- integration of climate change adaptation and disaster risk management into national/sectoral budgetary processes and accounts;
- climate change and health;
- climate change, food security and agricultural diversification;
- climate change, food security and fisheries management.
- science of climate change;
- climate change policy and law;
- community-based vulnerability mapping, adaptation planning and disaster risk management;
- integration of climate change adaptation and disaster risk management into the Environmental Impact Assessment (EIA) process and project design/development;
- evaluating and managing risk from climate change and natural disasters for the insurance and finance sectors.

The training program will be developed through a capacity and training needs assessment tied to the Public Sector Qualifications Framework, with particular focus on identifying the CCA/DRM skills, job descriptions and training needs for individuals in government, private sector, civil society and at the island and district levels . The training program shall include a range of delivery mechanisms including formal and informal training, professional development training, certification in climate change risk management, and mentoring programs.

(b) $250,000 to support five ***scholarships*** for Tonga government technicians/managers to attend University-level programs (at USP, in New Zealand/Australia, United Kingdom) on climate change risk management complementing existing EU, AusAID and SPC scholarship programs, with priority being given to the following:

- economics of climate change for Ministry of Finance and National Planning staff;
- coastal engineering and climate proofing critical coastal infrastructure;
- integration of climate change adaptation and disaster risk management into physical planning and natural resource management;
- science of climate change including climate modeling and projections;
- climate change policy and law.

Recognizing that the EU is supporting a wide range of scholarships for the Pacific region, the scholarships supported under the SPCR are to specifically cater for building local/national CCA capacity needs for Tonga, on the understanding that there is no Tongan in the current EU/USP scholarships scheme for the priority areas outlined above. Individuals from government who will receive these scholarships will be required (bonded) to work in Tonga for a period no less than the time spent attending University, and will be supported by government in ensuring that their skills and knowledge are applied to mainstreaming CCA/DRM in the government agency where they are employed.

(c) $200,000 to develop, through broad-based consultative process, of appropriate enabling ***legal framework for climate change adaptation and disaster risk***

management to:

- give force and effect to the JNAP Policy;
- establish and empower the JNAP Secretariat to coordinate national climate change adaptation and disaster risk management programs, projects and activities,
- mandate climate change adaptation and disaster risk management standards including the integration of climate change adaptation and disaster risk management considerations into building codes and development permits,
- require and coordinate the integration of climate change adaptation and disaster risk management into physical planning, natural resource management, and the operation of infrastructure agencies;

Existing DRR related legislation does not empower the work of JNAP to advance the climate change adaptation agenda at the national level. This activity will support a comprehensive review of existing legislation and an analysis of CCA/DRM legal regimes in other jurisdiction in order to: (a) develop an overall/umbrella Climate Change legislation/regulation; or (b) strengthen climate change aspects on existing sectoral legislation.

(d) $1,350,000 for ***project management*** and to support the ***staffing/training of the JNAP/SPCR Project Management Unit (PMU)*** which will be responsible for coordinating and managing Component 1 (capacity building) activities and PPCR delivery, including:

- Establishment of, training and building capacity within community climate change and disaster risk management committees;
- Establishment of, training and building capacity of Island Climate Change Officers to develop island level coastal zone management plans and early warning systems built upon community vulnerability mapping and adaptation plans that can be integrated into Island and National coastal zone management plans (see Component 3 (a) below);
- Training and building capacity of the JNAP Secretariat in managing donor inputs to climate change adaptation to maximize alignment with Tonga's national interests and priorities;
- Training and building capacity in insurance and finance sectors to evaluate and manage risk from climate change and natural disasters.

This activity targets setting up of a SPCR Project Management Unit (PMU) separate from but working in close collaboration with MECC and the JNAP Team – with individuals for the PMU retained under international competitive bidding in accordance with ADB Procurement Guidelines and tasked to provide mentoring to counterpart staff. The PMU will focus on the implementation of the SPCR, including public outreach and awareness on the SPCR program, while JNAP Team has a much wider jurisdiction and scope in relation to coordination of all CCA/DDR related activities. The training program for the JNAP Secretariat will be developed through a capacity and training needs assessment tied to the Public Sector Qualifications Framework, with particular focus on identifying the skills, job descriptions and training needs for individuals to support CCA/DRM mainstreaming in government, private sector, civil society and at the island and district levels Other MECC permanent staff shall benefit from these capacity training programs since there is a need to build capacity of JNAP/SPCR Program Management Unit as well as MECC permanent staff. Although JNAP contract staff have project management skills, experience shows that new projects require ongoing capacity building in order for staff to understand the individual project management/reporting needs and to better deliver

the specific outputs of individual project that may be lacking by staff. These skills will be developed through a mentoring program with PMU staff. Secondly, staff capacity will need to be strengthened in specific areas that are being supported under the SPCR, including community vulnerability mapping, the management and administration of the Small Grants Program under the Climate Change Trust Fund, and integrating CCA/DRM considerations into physical planning and infrastructure development/maintenance.

(e) $450,000 to train and assist vulnerable communities and civil society to undertake ***community-level climate change vulnerability mapping and adaptation planning and disaster risk management*** (*building on the accomplishments achieved under ADB SGA pilot project in Cook Islands for methodology* – ADB Regional Technical Assistance 6420) and integrate community vulnerability maps and risk management plans into Island and national coastal zone management planning process and national coastal and water resource management policies and plans (see Component 3 (a) below). The community vulnerability mapping – to be undertaken using GPS equipment - shall utilize all available regional/national information/databases and result in the development of a central GIS database identifying community level risk, vulnerability and risks management measures that is made available to multiple users to inform and guide physical planning, coastal zone management and community and island level CCA/DRM. These activities will be linked with SPCR component 3 assistance.

(f) $550,000 to develop and establish ***community based early warning systems*** based on community vulnerability mapping (see Component 3 (e) above) and real-time hydro-met data (see Component 3 (a) below) and establish pilot multi-use (climate and earthquake resilient) community emergency shelters. It is intended that these community early warning systems be established to provide vulnerable communities with timely advance notice of extreme events (cyclones, drought, storm surges) and be linked with real time hydro-met data. The design of the early warning systems will also give consideration for slow onset disasters such as El Nino Droughts which require drought monitoring, drought response plans and water conservation/water management plans.

Key Indicators & Baseline

204. Climate risk management is still to be integrated holistically into Tonga's policy, planning, and budgetary processes. There is limited budget to meet even current priority development needs, let alone the cost of adaptation, with resulting limited understanding of climate risks, and a lack of technical or financial capacity to integrate climate risk management into planning processes. There is also no evidence of any capacity at national, sectoral, or provincial/local levels to undertake climate change risk management. There is still need for considerable capacity building to ensure effective mainstreaming at the national, sectoral and community level and within vulnerable sectors including the private sector, which to date, has had minimal engagement in the JNAPP process. There is limited donor coordination so as not to overwhelm national agencies responsible for climate change adaptation programming. Climate change risk management is still the domain of Government, with little understanding that this is a responsibility that must be shared with civil society. There are virtually no tools or mechanisms to support civil society engagement in climate change risk management, or to facilitate civil society management of their own climate change risks.

Risks

205. The greatest risks to the sustained success of Tonga's CCA/DRM program – and SPCR investments that strategically support CCA/DRM capacity building - are from a weakening of the high level of political support for this approach that has so far been evident, and the fact that much of the technical support for this transformational work is vested in a handful of JNAP staff. The first risk will only be successfully managed if Tonga's integrated CCA/DRM approach continues to generate political, economic and institutional benefits for government. It is proposed that SPCR investments address the second risk by expanding and broadening the pool of CCA/DRM experts at the national, sectoral and community level ands within civil society.

Investment Costing - Component 1 Budget

Budget Item	Grant Request ($)	Cofinancing and Parallel Financing
Design/implement train-the-trainer program and roll-out training	1,000,000	GCCA USP (shared) EU 8,000,000 GIZ/SPC CCCPIR (shared) Euro 4,200,000
Scholarships	250,000	
Develop enabling legal framework for CCA and DRM	200,000	
Staffing/training of the JNAP/PPCR management unit + PPCR project management	1,350,000	Multiple donors supporting
Train/assist pilot vulnerable communities to undertake community-level climate change vulnerability mapping, adaptation planning, and disaster risk management	450,000	GIZ/SPC CCCPIR (shared) Euro 4,200,000
Develop/establish community-based early warning systems in pilot communities	550,000	AusAID SPSLCMP funded under A$150,000,000 ICCAI
Total	3,800.000	

Annex 8

Component 2. Sustainable Climate Change Financing

Objectives

206. To establish nationally driven, responsive, and transparent "fast start" climate change financing framework to:

- support priority climate change adaptation and disaster risk management projects in vulnerable communities and sectors;
- provide social safety net for vulnerable communities and sectors to address impacts from climate change extreme event on livelihoods and food security thereby supporting poverty alleviation.

/Outcomes

207. Principal outcome will be the legal establishment and effective operation of Climate Change Trust Fund, and through the Trust Fund, launch of:

(i) a "Small Grants" program that will provide "fast start" financing for priority climate change adaptation and disaster risk management projects in vulnerable communities and sectors, focusing primarily on infrastructure climate proofing activities using viable hard and soft engineering solutions, and potentially

(ii) climate change and disaster risk microfinance and micro-insurance program for farmers, fishers, and vulnerable communities, in particular women.

Activities

208. Insurance for small farmers and fishers is a challenge throughout the developing world and is a key requirement in addressing food security and poverty alleviation. Additionally, during discussions with stakeholders concerning the range of sustainable climate change financing that is required, the need for a regional re-insurance scheme modeled on the Caribbean Catastrophe Risk Insurance Facility was raised as a priority by stakeholders during SPCR preparation. The Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) will be undertaking this on a sub-regional level through its third phase to be led by the World Bank, and therefore, to avoid unnecessary duplication, it was considered that SPCR investments should focus on supporting the establishment of a Climate Change Trust Fund that could channel much needed resources to vulnerable communities and a micro-insurance program for vulnerable communities.

209. Component 2 will support the following activities:

(a) $200,000 to legally establish (in accordance with the Tonga Government Cabinet decision), through broad-based consultative process, a ***Climate Change Trust Fund*** – with funds raised from market-based instruments that will not raise the local tax base (e.g. carbon levy on energy use with donors providing matching funds), which shall be open, transparent, accountable and external to government revenue – administered by a Board of Trustees, and empowered to support the financing of priority climate change adaptation and disaster risk management projects in vulnerable communities and sectors. There will be a strong emphasis on ensuring that an appropriate governance structure is established for the ***Climate Change Trust Fund***, with clear accountable and transparent decision making processes. The program design will incorporate best practice grants management techniques. The decision making panel will include both government officials and civil society

representatives. Clear criteria will be established to determine how applications to the Trust Fund will be ranked, ensuring that highly vulnerable communities are prioritized. This activity will support an evaluation of experience and lessons from neighboring island countries that have established or are in the process of establishing Trust Fund (e.g. Tuvalu Trust Fund, Maldives Climate Change Trust Fund, Samoa Climate Change Trust Fund, Saint Lucia Climate Change Trust Fund, Cook Islands Environmental Protection Fund etc), in order to inform and guide the development of an appropriate legally established Trust Fund in Tonga. This activity will compliment funds provided by Australia to strengthen delivery of climate change adaptation programs in Tonga, which includes support to MECC for the establishment of the JNAP Secretariat, assessment of national options to improve access to and management of climate change resources, and establishment of an appropriate climate change financing mechanism. Consideration shall be given to accrediting the Trust Fund under UNFCCC.

(b) $5 million in seed money will be provided to the ***Climate Change Trust Fund*** under this component to:

(i) establish the Small Grants program of the Climate Change Trust Fund (modeled on GEF Small Grants Program) to provide sustainable "fast start" financing that can be accessed by vulnerable communities to implement community climate change risk management plans developed under Component 1 (e) – primarily focusing on climate proofing community critical infrastructure using hard and soft engineering solutions - and early warning systems developed under Component 1. It is anticipated that the proposed Small Grants program could support, for example, community projects exploring innovative solutions such as salt water reverse osmosis plants powered by solar energy, or water harvesting and grey water recycling facilities. Consideration will also be given to providing support under the Small Grants envelope of the Trust Fund to retro-fitting vulnerable homes in the form of a loan which will be provided at very concessional rates. The intent is to establish a revolving fund which is constantly being replenished. Retrofitting costs can be kept to a minimum if community labor is utilized through training of a cadre of community artisans to carry out such actions on request. Based on lessons learned from UNDP in the implementation of the GEF Small Grants Program and the Disaster Response Fund, support will also be provided under this component to train and build capacity within NGOs, private sector and community climate change committees to design and implement pilot climate change adaptation projects funded under Small Grants program of the *Climate Change Trust Fund.* This component will support a review current community climate change adaptation projects that suffer from lack of funding /resources and institutional capacity, and the establishment of the supporting environment to access "fast start" climate change risk financing by vulnerable communities – especially measures required to climate proof critical infrastructure (including community climate resilient infrastructure initiatives for access roads, jetties/wharves and water supplies***)***. Removing these constraints will be priority in order to meet CCDS and SPCR objectives. Support will also be directed to ensuring transparency in the selection and management of the Trust Fund learning from existing models such as the GEF /UNDP Small Grant Program[1].

[1] Australia has provided A12 million (2009-2016) to assist communities adapt to the adverse impacts of climate change through the GEF Small Grants Program. The program provides small grants to reduce vulnerability

(ii) support the establishment of a ***climate change and disaster risk microfinance and micro-insurance program*** for farmers, fishers and vulnerable communities, in particular women (50% of funding to be reserved for women and women's organizations). The activity will support an analysis of existing micro-financing provided for vulnerable groups under the social protection program with ADB, and the costs associated with design/establishment of the architecture and the incremental costs to establish the delivery mechanism to ensure effective extension of climate change micro—finance instruments to remote vulnerable communities. Seed financing to establish microfinance and micro-insurance programs for vulnerable segments of society may be provided under the Climate Change Trust Fund. Also, consideration will be given to engaging local insurance companies provide cover at concessionary rates to those who retrofit their homes.

Key Indicators & Baseline

210. Although Tonga is the beneficiary of a number of CCA/DRM programs supported by a variety of development partners, there is no discretionary and responsive "fast start" climate change funding available for the government to support priority climate change initiatives identified by civil society and vulnerable communities. Additionally, micro-financing and micro-insurance is not widely available to assist farmers and fishers address losses from extreme weather events and other disasters.

Risks

211. The greatest risk facing the establishment and effective operation of the Climate Change Trust Fund is that – due to political interference - it fails to achieve the high levels of autonomy, fiduciary management, accountability, transparency and responsiveness that are needed to ensure that it achieves its short, medium and long-term objective.

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and increase adaptive capacity of communities, to manage the additional risks posed by climate change. The program focuses on communities living in Small Island Developing States, including the Pacific.

Investment Costing - Component 2 Budget

Budget Item	Grant Request ($)	Co financing and Parallel Financing
Legally establish and operationalize the Climate Change Trust Fund.	200,000	AusAID A$70,000
Provide seed funding to the Climate Change Trust Fund to launch a small grants program to implement community climate change risk management measures, primarily focusing on (i) climate proofing critical infrastructure using hard and soft options (including community climate resilient infrastructure initiatives for access roads, jetties/wharves, and water supplies), and (ii) support for climate change and disaster risk microfinance and micro-insurance program - for farmers, fishers, and vulnerable communities and groups, in particular women.	5,000,000	UNDP/GEF small grants program $70,000
Total	5,200,000	

Annex 9

Component 3. Building Ecosystem Resilience and Climate Proofing Critical Infrastructure (including Coastal Protection Systems

Objectives

212. Strengthen physical planning and development processes in order to improve the resilience of vulnerable coastal ecosystems to climate change impacts while climate proofing existing critical infrastructure.

/Outcomes

213. Key outcomes are:

- Climate change adaptation and disaster risk management integrated into Tonga's physical planning processes
- Tonga's coastal fishery/agriculture/protected areas more resilient to impacts from climate change
- Critical ports and associated infrastructure less vulnerable to impacts from climate change and disasters through the adoption of a revised national infrastructure investment plan (NIIP) reflecting potential climate impacts and resilience to such impacts through "climate proofed" infrastructure investments under an enabling policy and legislative framework.

Activities

214. Capacity building activities envisaged under the this Component, which amongst other activities, will establish an enabling framework for climate proofing critical ports and associated infrastructure, are complex and require several inputs from a multidisciplinary team. The intent is to undertake these activities in collaboration with the regional track program as this activity is a key measure to build climate resilience for all South Pacific small

island states. To be most effective and to get the best output from the investment under the SPCR, it is intended that a regional approach be established to work out scheduling and technical input - climate projections, vulnerability assessments building codes etc. There shall be some input through the national and regional SPCR programs to develop a robust risk management tool to climate proof critical marine transport infrastructure and associated assets that can be utilized widely through the South Pacific SIDS (generic tool which can be customized for the individual islands through use of site specific quantitative information). Fortunately the region is not starting from scratch in this effort as most of the islands have been exposed to the use of the risk management tool CHARM. CHARM can now be utilized as the basis for the development of a robust risk management tool for critical marine transport infrastructure and associated assets through the incorporation of some of the latest risk management techniques and for countries through the utilization of more quantitative information becoming available from e.g. the site specific climate scenarios.

215. Component 3 will support the following activities:

(a) $1.5 million to upgrade the national system of ***hydro-meteorological and coastal monitoring stations*** to provide real-time data to establish community-level early warning systems, and to strengthen the capacity of the Tonga Metrological Services. This component will be implemented in collaboration with support provided under the Global Facility for Disaster Risk Reduction and Recovery (GFDRR) *Africa Caribbean Pacific EU Natural Disaster Risk Reduction Programs for the Pacific.* These activities will also be linked with SPCR component 1 assistance on community vulnerability mapping.

(b) $1.5 million for water resource inventory (surface and underground), assessment of water demand and water balance, water conservation opportunities, rain-water harvesting potential, and development of an ***Integrated Coastal and Water Resource Management Plan*** that shall constitute an integral component of the Physical Planning process.

(c) $1 million to undertake ***ecosystem-based climate-resilient fisheries/ agricultural/protected areas management*** in pilot vulnerable communities. To include capacity building to improve crop diversification, land use (e.g. sloping land conservation systems such as Eua), and farming techniques (hydroponics, green houses, organic farming, agro-forestry, drip irrigation, water harvesting and storage for irrigation, mulch agriculture, simple preservation techniques (solar drying, use of climate information to make decisions of planting times and types, to introduce climate and pest resilient crops, facilitate access to markets, improve food preservation, storage and processing, encourage In-situ conservation (e.g. germplasm collection/traditional famine crops and stock breeding for livestock), establishment of community-based marine management systems and community marine protected areas (MPAs). This component will support pilot community and school climate resilient gardening projects, and facilitate capacity building in communities and private sector to undertaken climate resilient agriculture/fisheries development (aquaculture, hydroponics).

(d) $2 million (grant) to:

(i) develop a “climate-resilient” National Infrastructure Investment Plan (NIIP) through mentoring and training of local counterparts including an assessment of climate change risks and associated costs on existing pipeline of projects under the 2010 NIIP and the prioritized new projects in the updated NIIP. The Tonga National Infrastructure Investment Plan (NIIP) outlines the Government

of Tonga's priorities and plans for major infrastructure initiatives over the next 5 to10 years and was prepared by the Pacific Infrastructure Advisory Center (PIAC). It is Government's intention to regularly update the NIIP as part of the national planning and budgeting process. The Plan covers infrastructure initiatives of national, regional or local significance, and presents a detailed plan for the period 2010 to 2015. It also sets out the broad directions for infrastructure development for the period 2015 to 2020. It is the result of extensive consultation with infrastructure managers, users, civil society and funding partners. It is intended that the 2010 and the updated NIIP integrates environmental sustainability and climate change into all planning and delivery of programs. Such objectives can achieved by using resources more efficiently; considering least cost options during planning; life cycle costing; appropriate urban planning; **adapting for climate change**; and **educating consumers** of infrastructure services. The NIIP updating (Q2-3 2012) and SPCR detailed project design (Q3-4 2012) processes will occur in tandem and inform each other.

(ii) pioneer the ***establishment of an "enabling framework" for climate proofing critical ports and associated infrastructure*** (including wharves, access, navigation lights, safety equipment, communications systems, information systems, etc.) and integrating climate change adaptation and disaster risk management into the day-to-day operations of ports infrastructure. It will also support ***initial physical investments.*** Entry point to this activity is the formulation of an Asset Management Strategy and Plan. This activity will be implemented by the Ministry of Transport and supported by PRIF[2] through PIAC. This will be implemented under this project with a view to replicating in other pacific island countries under the regional track SPCR. The enabling framework for climate proofing critical ports infrastructure will include the following elements (and be linked, as appropriate, with SPCR assistance under components 1 and 2):

1. *Legislation / Policy / Strategy*. Infrastructure agencies would benefit from a clear policy to guide climate proofing activities. However, site and operations specific climate change risk assessment needs to precede policy development and cost / benefit analysis is needed to support specific policy development. Thereafter, infrastructure agencies will need to establish the in-house capacity to design, build and maintain critical infrastructure that addresses climate change and disaster risks. To achieve this goal, infrastructure agencies need technical assistance (TA) as the skills are not available at present. Policy and strategic plans based on that policy all need to be subject to continuous M&E to ensure that focus is maintained and new technology and approaches are being monitored, evaluated and constantly improved. The project will support the development of a climate change risk management policy and strategy for key infrastructure agencies, including legal drafting support for

[2] The *Pacific Region Infrastructure Facility* (PRIF), a multi-partner infrastructure coordination and financing mechanism formed by the Asian Development Bank (ADB), the Australian Agency for International Development (AusAID), European Commission and \European Investment Bank (EIB, the New Zealand Government via the New Zealand Aid Programme (NZMFAT), and the World Bank Group (WBG). PRIF provides a framework for better engagement of countries and development partners to ensure more effective use of available funding and deliver better infrastructure services.

any legislative changes required to integrate climate change risks management into the operations of key infrastructure agencies (see Component 1 (c) above).

2. *Climate Change Projections*. The Australian Government is assisting in this area and a recent report by CSIRO is providing some guidance – but the projections are not infrastructure-specific nor site specific. Climate change projections need to be supported by good science to be credible, and they need to be site specific to be directly useful in climate-proofing individual infrastructure agency operations and assets. The project will support the development of site specific climate change projections and vulnerability assessments for critical coastal infrastructure under the management of the key infrastructure agencies, based on real-time hydro-met data (see Component 3 (a) above).

3. *Building Codes and Engineering Design Criteria*. Tonga currently uses a mixture of building codes and engineering design criteria which have been locally developed, and those from Australia and /or New Zealand. However, the climate proofing of the Australian and New Zealand codes is a work in progress. The project will support the evaluation of building codes and engineering design criteria relevant to critical ports infrastructure including design, location, building, operation and maintenance and revision to address climate change risks based on site specific climate change projections developed under activity 2 above. The project will also support the development and presentation of training programs to marine engineers, architects, developers and planners on the climate proofed building codes relevant to critical ports infrastructure (see Component 1 (a) above). This will be undertaken in close collaboration with the regional track SPCR program.

4. *Training*. The project will support climate change risk management training (see Component 1 (a) above), targeted not only at engineers but also surveyors, architects, building inspectors, key personnel working in infrastructure agencies and tradespeople including trade associations, project managers and planners. The training will also be targeted to those responsible for developing and approving financial operational budgets and budgets for infrastructure capital projects, and the insurance industry that provides insurance for infrastructure agency assets and operations.

5. *Capacity Building*. Capacity is needed at individual, institutional and systems levels in the infrastructure agencies. At the institutional level, the infrastructure agencies will need trained individuals to head their respective planning and climate change risks management unit. Capacity also needs to be built for managers, employees, and contractors in order to support the whole climate change risks management process. The project will support the establishment of a comprehensive climate change risk management capacity within key infrastructure agencies, supported by agency specific climate change and disaster risk management guidelines, protocols and operational procedures.

6. *Cost-Benefit Analysis*. Budget allocations for infrastructure agencies do not consider climate change risks - this needs to become a standard operational procedure in the planning and approval process for all agencies managing critical infrastructure. Infrastructure agencies currently

include cost / benefit analysis in their decision making processes, but this does not include the cost / benefit of climate change risk management. The cost of not taking climate change and disaster risks into account is often the direct cost of repairing, or even replacing, damaged infrastructure. Training in climate change risk cost / benefit analysis techniques will be needed at all levels within the infrastructure agencies (see Component 1 (a) above).

7. *Education and Awareness Raising*. Education and awareness on climate change risks and appropriate management options needs to be provided at all levels within infrastructure agencies. Climate change risks management costs time and money, therefore broad corporate support is needed. The project will support the design and implementation of a comprehensive climate change and disaster risk management awareness and education program within infrastructure agencies, and for contractors, stevedores and private sector infrastructure workers.

8. *Sustainable Financing*. Finance for climate change risk management as a process to be incorporated at all levels within infrastructure agencies clearly costs money; and for it to be sustained beyond SPCR interventions, these infrastructure agencies will need to establish a source of climate change risk financing. The project will support the evaluation of possible sustainable financing mechanisms to sustain climate change risks management activities after SPCR support finishes (see Component 2 above). Sources of innovative and sustainable financing for climate change risks management will be explored, and an appropriate financing mechanism will be established – not only to cover internal operational costs but also to support the climate proofing of critical infrastructure on a permanent basis. Climate change risks insurance options for critical infrastructure will also be developed.

(e) Climate-proofing of critical infrastructure – based on vulnerability assessments that have been undertaken under items 1-8 above, including the identification/design of viable risk management options, the Government will mobilize resources to support the climate proofing of critical infrastructure, including coastal protection systems and implementation of new coastal protection measures, using appropriate technologies (hard and soft engineering options).

Key Indicators and Baseline

216. Tonga does not have a national system of hydro-meteorological and coastal monitoring stations to provide data and information for sound climate change decision making, or to establishing critically needed community-level early warning systems and community preparedness programs. The absence of a nation-wide water resource inventory (surface and underground) to provide an assessment of water demand and water balance, presents a serious impediment to sound planning efforts aimed at addressing climate change risks to water resources. No Integrated Coastal and Water Resource Management Plan exists to inform and guide physical planning processes in Tonga with the result that poor development practices compound the high vulnerabilities of coastal communities. No capacity exists in Tonga to climate proof critical infrastructure and recurrent costs for damage to such infrastructure continues to place a serious burden on economic and social development programs.

Risks

217. The principal risks that need to be addressed under this component are the high turn-over of qualified and trained staff in the public sector that consistently undermine capacity building and sound programming initiatives such as those proposed under the SPCR. Limited capacity for undertaking community based risk management measures will be addressed through the engagement and training of non-government organizations and outer island councils and committees. Restructuring the physical planning process in Tonga to incorporate climate change considerations is a challenge that can only be initiated under the SPCR, and but will rely largely on capacity building support under the GEF-funded Sustainable Land Management (SLM) project.

Investment Costing - Component 3 Budget

Budget Item	Grant Request ($)	Cofinancing and Parallel Financing
Establish national system of real-time hydro-meteorological and coastal monitoring stations and capacity building for the Tonga Meteorological Service (TMS) and Ministry of Lands, Survey and Natural Resources (MLSNR)	1,500,000	Australian Government PICCPP (shared) budget tbc
Water resource inventory and development of an integrated coastal and water resource management plan	1,500,000	GEF/UNDP/SPREP $700,000 Australian Government PASAP A$1,800,000
Ecosystem-based climate resilient fisheries/agriculture/protected areas management in pilot vulnerable communities	1,000,000	MESCAL (shared) $350,000 GIZ/SPC CCCPIR (shared) Euro 4,200,000 SCICOFISH (shared) Euro 9,000,000
Develop “climate resilient” NIIP through mentoring/training of local counterparts and establishment of “enabling framework” for climate proofing critical ports infrastructure (including climate proof relevant building codes and engineering design). Some initial implementation of physical investments should commence to inform the development of the enabling framework.	2,000,000	AusAID PCCSP (shared) A$20,000,000 EU NDF (shared) Euro 20,000,000
Total	6,000,000	

Annex 10
Results Framework

PPCR Transformative Impact				
Results	**Indicators**	**Baseline**	**Targets**	**Means of Verification**
1. Improved quality of life of people living in areas most affected by climate variability and climate change in Tonga	a) Change in the Global Adaptation Index (GaIn) b) Relevant Millennium Development Goals (MDGs) Indicators c) Percent of people classified as poor (women and men) and food insecure (women and men) in most affected regions d) Number of lives lost/injuries from extreme climatic events (women/men) e) Damage/economic losses ($) from extreme climatic events	To be determined as implementation progresses – include this task in the detailed project preparation phase	To be determined as implementation progresses - include this task in the detailed project preparation phase	Global Adaptation Index Tonga's monitoring and evaluation (M&E)/UN – The Millennium Development Goals Report Tonga's M&E system reports and data bases including MDG reports, JNAP Stocktaking, and Risk Reduction Scorecards Activity-specific M&E designed during the project preparation phase EM-DAT International Disaster Database (http://emdat.be/about)
2. Increased resilience in economic, social,	a) Country outcome indicators: action plans for	To be determined as implementation progresses – include	To be determined as implementation progresses – include	Tonga's M&E systems (results framework of the National Development Plans monitored by

and eco-systems to climate variability and climate change through transformed social and economic development in Tonga	mainstreaming CCA implemented; increased resilience for communities in low lying islands already impacted by rising sea levels, strengthened capacity in Tonga for food security; effective planning for resilient infrastructure; enhanced access to technical resources to assist with the above b) Changes in budget allocations of all levels of government to take into account effects of climate variability and climate change across sectors and the regional level.	this task in the detailed project preparation phase	this task in the detailed project preparation phase	the Ministry of Finance & National Planning (MoF&NP) Public expenditure reviews undertaken by appropriate agencies/departments and monitored at a higher level by MoF&NP
3. Improved institutional structures and processes at national / local government levels to facilitate response to climate variability and climate change in Tonga	a) Number and quality of national / local government level policies introduced in Tonga to address climate change risks b) Quality of participatory planning process (as assessed by private sector, CSOs) c) Extent to which	To be determined as implementation progresses – include this task in the detailed project preparation phase	To be determined as implementation progresses – include this task in the detailed project preparation phase	National / local government M&E systems Satisfaction surveys

	Tonga's results monitoring and evaluation systems include processes to monitor adaptation efforts (at all levels of government) and related indicators are publicly available d) Extent to which Tonga's development decision making is made based on country-specific information and knowledge products based on climate science, local climate knowledge (regional and eco-regional level), and (gender-sensitive) vulnerability studies e) Staff in key line agencies at the national / local government level in Tonga promote climate resilience integrated with DRM as part of their development agendas			Periodic qualitative assessment at the national / local government level Activity specific M&E designed during the project preparation phase Periodic qualitative assessment at the national / local government level Component level M&E reports produced by the SPCR PMU
4. Scaled-up investments in	a) Number and value of climate-proofed	To be determined as implementation	To be determined as implementation	Country M&E system reports and data bases including MDG reports,

climate resilience and their replication in most vulnerable regions of Tonga	investments (national and local government, non government, private sector, etc) in infrastructure (including coastal roads, water management and ports) b) Evidence of integrating lessons learned (regional, national and local government level, non government organizations, private sector) from PPCR pilot projects/programs and their replication across Tonga Evidence of increased capacity to manage climate resilient investments at the national/ local government levels.	progresses – include this task in the detailed project preparation phase	progresses – include this task in the detailed project preparation phase	JNAP Stocktaking, and Risk Reduction Scorecards Budget allocations at all levels Activity specific M&E designed during the project preparation phase MDB qualitative review Component level M&E reports produced by the SPCR PMU
5. Replication of Tonga PPCR learning up-scaled from the pilot scale	a) Number of Tonga government agencies and sectors applying climate proofing and resilience principles in development strategy planning and sharing it through PPCR	To be determined as implementation progresses – include this task in the detailed project preparation phase	To be determined as implementation progresses – include this task in the detailed project preparation phase	Country M&E system reports and data bases including MDG reports, JNAP Stocktaking, and Risk Reduction Scorecards Activity specific M&E designed during the project preparation phase

	knowledge management			

PPCR outputs and outcomes				
1. Improved integration of CCA and DRM through mainstreaming of CCA and DRM (facilitated by a pool of trained and qualified specialists) into Tonga's development strategies, plans, and policies at the national and sector levels and within vulnerable communities, including through vulnerability mapping, adaptation planning, and critical infrastructure planning.	a) Number of development plans that integrate climate change adaptation and disaster risk reduction (including gender dimension) and include measures that reduce and/or improve the management of climate change related related risks. b) Budget resources (at all levels) consistent with effective management of climate change risks across sectors and regions, including financing from external sources. c) Number of train-the-trainer programs implemented and subsequently rolled-out in training programs. d) Number of training programs undertaken to assist	Initial consultation to mainstream CCA and DRM across ministries and sectors ongoing Inadequate budget allocations to address CCA and DRM in vulnerable sectors Limited opportunities for climate change adaptation-specific training available Insufficient knowledge, inadequate skills and means to undertake climate change vulnerability mapping and adaptation planning Existing early warning system is not accessible to all vulnerable island communities	CCA and DRM are mainstreamed in priority sectors, such as infrastructure, coastal resources management targeted at highly vulnerable communities Adequate budget allocated to high priority sectors Five hundred people trained under a train-the-trainer program	Periodic qualitative review of strategies and other development plans and policies Country M&E system reports and data bases including MDG reports, JNAP Stocktaking, and Risk Reduction Scorecards Periodic public expenditure reviews – budget allocations and funds sourced from development partners and CCA programs Component level M&E reports produced by the SPCR PMU

	vulnerable communities and civil society to undertake community-level climate change vulnerability mapping, adaptation planning and disaster risk management. Coverage of community early warning systems.		Early warning system expanded to cover a minimum of 1,000 households among the most vulnerable communities	
2. Increased capacity to integrate CCA and DRM into Tonga's country or sector development strategies, and physical planning and development processes, that improve the resilience of vulnerable coastal ecosystems to climate change impacts while climate proofing existing critical infrastructure.	a. Adoption and enforcement of policies and sector-specific legislation that integrates CCA and DRM into physical planning and development processes. b. Number of line ministries and/or functional agencies updating or revising country or sector development strategies to address climate change risks (moving from "outside management" to country ownership) at the country level. c. Evidence of an	Sector specific policies and legislation yet to be promulgated A capacity building needs assessment workshop conducted for critical infrastructure agencies showed that none have the knowledge, skills and means to climate proof their infrastructure investments Very limited access to a real time hydro-met	Key climate change vulnerable ministries / sectors have established appropriate policies and implementation mechanisms to mainstream CCA / DRM Working through the Ministry of Transport and Tonga Ports Authority, an enabling framework for climate proofing infrastructure has been developed and tested, and lessons learned are available for other key infrastructure sectors. A national system of real time hydro met stations established	Government Gazette proclaiming enactment of legislation Periodic qualitative review of strategies and other development plans, policies and institutional mechanisms Country M&E system reports and data bases including MDG reports, JNAP Stocktaking, and Risk Reduction Scorecards SPCR M & E by SPCR PMU MoF&NP allocations for

	enacted legal framework for CCA and DRM. d. Number of hydro-meteorological and coastal monitoring stations established. e. Climate change risks to critical infrastructure addressed in the National Infrastructure Investment Plan (NIIP). f. Number of communities practicing ecosystem based climate-resilient fisheries/agriculture.	monitoring station network Tonga's NIIP contains scant reference to CCA Practical demonstration of ecosystem based climate resilient fisheries / agriculture yet to be established	and feeding data to support CCA and DRM initiatives A climate-sensitive NIIP developed Ecosystem based climate resilient fisheries / agriculture management piloted in 5 vulnerable communities	incremental costs for climate proofing and Annual Reports of Ministry of Transport and Tonga Ports Authority Component level M&E reports produced by the SPCR PMU
3. Increased knowledge and awareness of climate change risks and impacts (e.g., through climate change modeling, climate change impact assessments, evaluation of adaptation options) in government, education sector, private sector, and civil society.	a) Coverage (comprehensiveness) of climate change risk analysis and vulnerability assessments of vulnerable sectors and communities disaggregated by sector, geographical area, sex, communities, and locations.). b) Number of Tonga government technicians/managers who acquire	Limited coverage of climate risk analysis and vulnerability assessments Limited scholarships available for Tonga government technicians / managers Inadequate inventories available	Analyses and assessments undertaken and routinely updated for all vulnerable communities At least five persons receive scholarships and return to government service Inventories undertaken and routinely updated	SPCR M & E – qualitative assessment Media Monitoring Country M&E system reports and data bases including MDG reports, JNAP Stocktaking, and Risk Reduction Scorecards Hydro and meteorological assessment reports by Tonga Met. Service Component level M&E reports produced by the SPCR PMU

	expertise and skills in climate change risk management disciplines, including advanced degrees facilitated through scholarships awarded. Water resource inventories undertaken successfully in support of an Integrated Coastal and Water Resource Management Plan.			
4. Improved access to knowledge products and information on CCA and DRM at the local, national, and regional to support climate-resilient development planning, and implementation.	a) Relevance (demonstrated by complementing and integration with other initiatives) and quality (stated by external experts) of knowledge assets (e.g., publications, studies, knowledge sharing platforms, learning briefs, communities of practice, etc.) created. b) Documentary evidence of use knowledge and learning. Documentary evidence of use of expertise available under the Regional	Limited availability of CCA and DRM knowledge products Mechanism will be established under the Pacific Regional SPCR	CCA and DRM – relevant knowledge products made available to all vulnerable communities and routinely used by the communities Tonga avails itself of expertise drawn from the Mechanism on a needs basis	SPCR documents, M & E undertaken by the SPCR PMU CIF – AU qualitative assessment Country M&E system reports and data bases including MDG reports, JNAP Stocktaking, and Risk Reduction Scorecards JNAP Secretariat Annual Report Reporting from the Pacific SPCR

	Technical Support Mechanism.			
5. Access to the "fast start" climate change financing framework to support priority projects in vulnerable communities and sectors; and to provide a social safety net for vulnerable communities to address impacts from climate change on livelihoods and food security thereby supporting poverty alleviation.	a. Legal establishment and effective operation of a Climate Change Trust Fund; and the launch of the "Small Grants" program. b. Launch of climate change and disaster risk microfinance and micro-insurance programs for farmers, fishers, and vulnerable communities, in particular women.	Tonga does not have an enabling legal framework established for climate change adaptation and DRM financing	An enabling legal framework is established and enacted for climate change adaptation and DRM financing Climate Change Trust Fund; Small Grants program; and microfinance and micro insurance programs established	SPCR Project M & E done by the SPCR PMU Country M&E system reports and data bases including MDG reports, JNAP Stocktaking, and Risk Reduction Scorecards Increase in government budgets and donor funds targeted at climate resilient investments Component level M&E reports produced by the SPCR PMU

Annex 11

Project Preparation Grant Request

Tonga's Strategic Program for Climate Resilience Project/Program Preparation Grant Request			
1. **Country/Region**:	Tonga	2. **CIF Project ID**#:	(Trustee will assign ID)
3. **Project Name:**	Tonga's Strategic Program on Climate Resilience (SPCR) - Components 1-3		
4. **Tentative Funding Request (in USD million total) for Project[3] at the time of SPCR submission (concept stage):**	*Grant:*$15 million	*Loan*	
5. **Preparation Grant Request (in $ million):**	$0.75 million	*MDB: Asian Development Bank*	
6. **National Project Focal Point**:	Asipeli Palaki, Director Climate Change and Environment Ministry of Environment and Climate Change (MECC) Tiofilusi Tiueti, Secretary Ministry of Finance and National Planning (MoFNP)		
7. **National Implementing Agency (project/program):**	Ministry of Environment and Climate Change (MECC) Ministry of Finance and National Planning (MoFNP)		
8. **MDB PPCR Focal Point and Project/Program Task Team Leader (TTL)**:	Daniele Ponzi (ADB)	Anne Witheford (ADB)	
9. **Description of activities covered by the preparation grant:** Tonga, with a combined land and sea area of 720,000 square kilometers (km^2), is an archipelago of 172 named islands, of which 36 islands with a total area of 670 km^2 are inhabited. Most of Tonga's atoll islands, including the main island, are very flat with an average altitude of 2–5 meters above sea level, and are hence highly vulnerable to sea level rise, flooding from storm surges, tsunami inundation, and impacts from climate change. Tonga's *Initial Communication to the United Nations Framework Convention on Climate Change (UNFCCC)* (July 2005) reported that all key sectors are likely to be significantly affected by climate change, with major environmental, economic, and social consequences. Particular concerns included impacts on agricultural production, water supply, and coastal resources.			

[3] Including the preparation grant request.

The effects of climate change have exacerbated naturally occurring phenomena, such as tsunamis, cyclones, coastal flooding, and droughts. Low-lying areas of the islands are affected by rising sea levels, with extensive tidal flooding damaging coastal villages and critical infrastructure. Impacts of sea level rise will affect groundwater supplies, agricultural production, and food security. Climate change will bring about increased incidence of heavy rainfall, causing flooding and prolonged ponding of water, posing health risks associated with increasing water-borne and vector-borne disease. Since the country depends on rainwater for domestic use and the production of marine/terrestrial produce for export, increased incidence of severe drought will seriously affect Tonga's revenue-earning capacity, people's health, livelihoods, and water/food supply, as well as socioeconomic development. Warmer seas during El Niño events will continue to affect Tonga's fishing industry, resulting in significant declines in exports of fish and other marine products. Increases in temperature continue to cause an increase in heat stress and asthma, while also reducing soil moisture/fertility, affecting agricultural production and food security. Events of coral bleaching are becoming common due to increases in sea temperature, resulting in coral mortality, destruction of habitats for reef species, and reduction in diversity of reef species, which affects fisheries production and food security. Tropical storms and cyclones continue to cause severe damage to crops and food supply, infrastructure, tourist resorts, natural ecosystems, and buildings, and disrupt essential services, thus affecting the health/well-being of the people in addition to causing considerable financial loss.

In response to these threats, Tonga has pioneered a unique approach to climate change adaptation, which is being replicated and expanded in other vulnerable Pacific island countries, including the Cook Islands, Nauru, and Republic of the Marshall Islands. Tonga's approach is to address current vulnerability to existing extreme events as the mechanism to build resilience to climate change impacts. In the context of limited resources and ability to undertake climate modeling and research, decision making on priority adaptation interventions is proceeding. Tonga has embarked on a national program to incorporate climate change adaptation (CCA) and disaster risk management (DRM) into development planning. The integration of CCA and DRM through a single harmonized framework (conceptual, financial, and institutional) also has the effect of addressing pressing resource constraints faced by Tonga and similar small island countries.

Despite country commitment and a solid national strategy, the JNAP, for such an integrated approach, there have been only initial ad hoc measures on mainstreaming. Further, such efforts are limited and severely resource-constrained. While MECC submits costings for the JNAP to the Tonga Government's Cabinet for the annual budget proposal, climate change risk management is still to be implemented into planning and budgetary processes. There is limited budget to meet even current priority development needs, let alone the cost of adaptation. Limited understanding of climate risks and lack of technical capacity to integrate climate risk management into planning processes also hampers JNAP implementation. There is extremely limited capacity at national, sectoral, and local levels to undertake climate change risk management. There is still need for considerable capacity building to ensure effective mainstreaming at the national, sectoral and community levels and within vulnerable sectors including the private sector, which to date has had minimal engagement in the JNAP process.

Based on priority risks and needs identified by stakeholders, inputs received from development partners and regional agencies outlining which priority needs are being supported under other projects and consultations with the Government of Tonga and other stakeholders to identify priority areas that still remain unfunded, the following priority investments for support under Tonga's SPCR have been identified:

Component 1 - Capacity Building to Support Transformation to a Climate Resilient Development Path

This component supports much needed capacity building to mainstream CCA and DRM into development planning at the national, sectoral, and community levels. Component 1 supports the following activities:

a) design and implementation of broad-based in-country ***train-the-trainer programs and subsequent roll-out of training programs*** for public (particular MOFNP) and private sectors, NGOs, civil society, Outer Island Councils, the media, parliamentarians, and vulnerable communities on a broad range of climate change adaptation and disaster risk management topics;

b) ***scholarships*** for Tonga government technicians/managers to attend University-level programs (on climate change risk management, including; the economics of climate change, coastal engineering and climate proofing critical coastal infrastructure, the integration of CCA and DRM into physical planning and natural resource management; the science of climate change; climate change policy and law;

c) development, through broad-based consultative processes, of an appropriate ***enabling legal framework for CCA and DRM;***

d) ***Project management*** and ***staffing/training of the JNAP/SPCR Project Management Unit (PMU);***

e) Training and assisting pilot vulnerable communities and civil society to undertake ***community-level climate change vulnerability mapping and adaptation planning and disaster risk management;***

f) establishment of ***community-based early warning systems*** in pilot vulnerable communities.

Component 2 – Sustainable Climate Change Financing

This component supports the establishment of a nationally driven, responsive and transparent "fast start" climate change financing framework to support priority climate change adaptation and disaster risk management projects in vulnerable communities and sectors while providing a much needed social safety net for vulnerable communities and sectors to address impacts from climate change extreme events on livelihoods and food security, thereby supporting poverty alleviation. Component 2 supports the following activities:

(a) legal establishment, through broad-based consultative processes, of Tonga's ***Climate Change Trust Fund***;

(b) provision of seed funding to Tonga's ***Climate Change Trust Fund*** to launch a "Small Grants" program that will provide "fast start" financing for priority CA and DRM projects in vulnerable communities. The grants will be used to implement community climate change risk management plans developed under Component 1 (e) – primarily focusing on climate proofing critical community infrastructure, such as access roads, jetties/wharves, water supplies, rural energy systems or infrastructure associated with food production by using both hard and soft engineering solutions; and developing pilot early warning systems developed under Component 1 (f). Additionally, the Climate Change Trust Fund could provide support to establish a ***climate change and disaster risk microfinance and micro-insurance program*** for farmers, fishers and vulnerable communities, in particular women (50% of funding to be reserved for women and women's organizations).

Component 3 – Building Ecosystem Resilience and Climate Proofing Existing Critical Infrastructure (including coastal protection systems)

Principal objectives of this component are to strengthen physical planning and development processes in order to improve the resilience of vulnerable coastal ecosystems to climate change impacts while climate proof existing critical infrastructure. Component 3 supports the following activities:

(a) establish a national system of real-time ***hydro-meteorological and coastal monitoring stations*** and capacity building for the Tonga Meteorological Services***;***

(b) conduct a water resource inventory in order to develop an ***Integrated Coastal and Water Resource Management Plan;***
(c) implement ***ecosystem based climate resilient fisheries/ agriculture /protected areas management*** in pilot vulnerable communities;
(d) ***develop a climate-resilient National Infrastructure Investment Plan (NIIP)*** through mentoring/training of local counterparts and pilot an "enabling framework" for climate proofing critical ports and associated infrastructure (including consideration of climate proofing relevant building codes and engineering design), as well as undertaking some initial physical investments in order to inform the development of this enabling framework. The NIIP updating (Q2-3 2012) and SPCR detailed project design (Q3-4 2012) processes will occur in tandem and inform each other.

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

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

10. **Outputs:**

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

11. **Budget (indicative):**

Expenditures[4]	**Amount ($) -** estimates
Consultants	460,000
Equipment	10,000
Workshops/seminars	25,000

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

Travel/transportation	170,000
Others (admin costs/operational costs)	10,000
Contingencies (max. 10%)	75,000
Total Cost	**750,000**
Other contributions:	
• Government	
• MDB	
• Private Sector	

12. **Timeframe** (tentative)

Submission of Project Preparation Grant request to PPCR Sub-Committee: May 2012
Expected TA approval by Asian Development Bank Board: 30 October 2012

13. **Other Partners involved in project design and implementation**:

The Project Preparatory Technical Assistance (TA) will be implemented through a participatory and consultative approach with MECC and MoFNP, and other stakeholders including the private sector, civil society, vulnerable communities, and development partners, such as AusAID, PRIF partners, UNDP, World Bank, and bilateral donors. Stakeholder consultation will be a key activity to reach consensus on detailed project design. Detailed project preparation activities will be undertaken in close collaboration with project preparation activities under the Regional SPCR to ensure harmonization of scheduling and timing of technical inputs requiring CCA/DRM experts under the Tonga SPCR and Regional SPCR Regional Technical Support Mechanism (RTSM).

14. **If applicable, explanation for why the grant is MDB executed:** Standard Asian Development Bank procedure (ADB executes all such grants to its developing member countries)

15. **Implementation Arrangements** (incl. procurement of goods and services)**:**
The Ministry of Environment and Climate Change (MECC) combined with the Ministry of Finance and National Planning (MoFNP), will be responsible for overall coordination of detailed project preparation, and for overall oversight of TA development. MECC will report to the Cabinet Committee on Climate Change to provide regular reports on project preparation activities. The Technical Working Group (TWG) for Climate Change, comprised of technical experts from government, NGOs and statutory boards, and the PPCR working level focal points (MoF and MECC) will provide technical input during project preparation.

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

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

requirement:

Name of Position	Person Months
International	
Team Leader	4
Climate Change Mainstreaming/Training Specialist	2
Climate Change Risk (Infrastructure) Specialist	2
Hydro-geologist	1
Weather and Coastal Monitoring Station Technician	1
Project Economist	1
Other TA	1
National	
Climate Change Mainstreaming Specialist / Deputy Team Leader	4
Physical Planner /Infrastructure	3
Environmental and Gender Analysis Specialists (1.5 each)	3
Safeguard Specialist	1
Community Capacity Building Specialist	2
Legal Specialist	1
Project Economist / Financial Management Specialist	2
Other TA	4

Annex 12
Request for Payment of Preparation and Supervision Costs of ADB

<table>
<tr><th colspan="5">PILOT PROGRAM FOR CLIMATE RESILIENCE

Request for Payment of MDB Preparation and Supervision Costs</th></tr>
<tr><td>1. Country/Region:</td><td>Tonga</td><td>2. CIF Project ID#:</td><td colspan="2">(Trustee will assign ID)</td></tr>
<tr><td>3. Project Title:</td><td colspan="4">Strategic Program for Climate Resilience – Tonga</td></tr>
<tr><td>4. Tentative Project Funding Request (in USD million):</td><td colspan="2">At time of SPCR Submission: : $15,000,000 (including $750,000 for project preparation grants)</td><td colspan="2">At time of project approval:</td></tr>
<tr><td rowspan="2">5. Request for MDB Preparation and Supervision Costs (in USD million):</td><td rowspan="2">$398.750</td><td colspan="2">MDB: Asian Development Bank</td></tr>
<tr><td colspan="2">Date:30 March 2012</td></tr>
<tr><td>6. Project/Program Financing Category</td><td colspan="4">a - Investment financing - additional to ongoing MDB project ☐
b- Investment financing - blended with proposed MDB project ☐
c - Investment financing - stand-alone ☐
d - Capacity building - stand alone X</td></tr>
<tr><td>7. Expected project duration (no. of years)</td><td colspan="4">Five years</td></tr>
<tr><td>8. Payment requested</td><td colspan="2">for services during preparation phase

for services during supervision phase

TOTAL:</td><td colspan="2">$213,750

$$185,000 ($57,000 per year for 5 years)

$398,750</td></tr>
</table>

9. **Justification for proposed stand-alone financing in cases of above 6 c or d:**

Based on the review of ongoing and planned activities by development partners and the Government of Tonga, it has not been possible to blend the proposed investments due to the priority need to address capacity constraints at the sector level to facilitate such blending. The proposed SPCR investments are, however, in accordance with Tonga's Joint National Action Plan for Climate Change Adaptation and Disaster Risk Management (JNAP), approved by Cabinet in July 2010. The proposed investments will support and facilitate achievement of JNAP's strategic goals, which are: improved good governance for climate change adaptation and disaster risk management (mainstreaming, decision making, and organizational and institutional policy frameworks); enhanced technical knowledge base, information, education, and understanding of climate change adaptation and effective disaster risk management; analysis and assessments of vulnerability to climate change impacts and disaster risks; enhanced community preparedness and resilience to impacts of all disasters; technically reliable, economically affordable, and environmentally sound energy to support the sustainable development of the Kingdom; and strong partnerships, cooperation, and collaboration within government agencies and with civil Society, NGOs and the private sector.

Moreover, JNAP is in alignment with the Tonga National Strategic Planning Framework (NSPF) and consistent with regional CCA/DRM strategies, including the Pacific Plan, Pacific Islands Framework for Action on Climate Change 2006–2015 (PIFACC), and Pacific Disaster Risk Reduction and Disaster Management Framework for Action (2005–2015).

The proposed SPCR investments are consistent with current ADB programming, which supports capacity building for mainstreaming climate change in planning and development. ADB's ongoing Nuku'alofa Urban Development Sector Project, the Implementing Strategic Economic Management Project, and the forthcoming Public Finance Management Road Map, all have provided ADB with a clear understanding of the challenges involved in mainstreaming climate change considerations into government operations. The Road Map, which will strengthen the capacity of the Department of Finance, provides an opportunity to introduce climate change considerations into central government planning and budgeting processes. Moreover, ADB's Climate Change Implementation Plan (CCIP) prepared in 2009, has highlighted the strategic program for mainstreaming climate change considerations into country programming. Design and implementation of SPCR investments will be undertaken in complementarity with other development partner-initiated programs and projects to ensure no duplication of effort.

Annex 13

Reviewer’s Comments and Response

PILOT PROGRAM FOR CLIMATE RESILIENCE

REVIEWER'S COMMENTS ON DRAFT SPCR TONGA

1. Title of the SPCR: Strategic Program for Climate Resilience(Tonga)

2. Name of the reviewer: Ulric O'D Trotz

3. Date of submission: 22.03. 11

Part I: Compliance with PPCR Specific Criteria

PPCR specific

a) Climate risk assessment: The SPCR has been developed on the basis of available information on the assessment of the key climate impacts in the Pacific region, including the countries participating in the Pacific regional program; the vulnerabilities to the region and in all relevant sectors, populations and ecosystems; and the economic, social and ecological implications of climate change impacts.

This was accomplished.

b) Institutions/ co-ordination: The SPCR specifies the coordination arrangements to address climate change: cross-sectoral; between regional institutions and with relevant government institutions of the countries participating in the regional program; and including other relevant actors in the Pacific region (e.g., private sector, civil society, academia, donors, etc).

Good – well articulated coordination arrangements

c) Prioritization: The SPCR for the regional track has adequately prioritized activities taking into account relevant climate/risks and vulnerabilities and development priorities in the region, strategies and plans supporting regional collaboration; ongoing national policy reform processes and existing, relevant activities and strategies in the countries participating in the regional program.

This was rigorously carried out utilizing current available tools for the process.

d) Stakeholder engagement/ participation: The SPCR for the regional track has identified and addressed the needs of highly vulnerable groups in the region and the countries participating in the regional program. Governments of countries participating in the Pacific regional program have been adequately involved in the design of the SPCR for the regional track and the SPCR addresses their needs and expectations in terms of regional collaboration supported by proposed activities in the SPCR for the regional track.

Satisfactory

Part II: Compliance with General Criteria

General

a) complies with the principles, objectives and criteria of the PPCR as specified in the design document; programming modalities and the guidance provided for regional programs;

Good compliance.

b) takes into account the executing agency's capacity to implement the SPCR, including its capacity to partner with the governments of countries participating in the Pacific regional program;

This has been taken into account and resources have been allocated to ensure that this capacity meets the challenges of implementation.

c) has been developed on the basis of sound technical assessments;

This is certainly the case.

d) demonstrates how it will initiate transformative impact in the Pacific region and support the transformative aspirations of the countries participating in the Pacific regional program;

It does demonstrate how it hopes to accomplish these requirements.

e) provides for prioritization of investments, adequate capturing and dissemination of lessons learned across the region and countries participating in the regional program in particular, and monitoring and evaluation and links to the results framework in the SPCR and linkages to the results frameworks in the SPCRs submitted by the countries participating in the Pacific regional program (if available);

To a certain extent does satisfy most criteria indicated except that I cannot comment on linkages to the results frameworks in the SPCRs submitted by the other participating countries.

f) has been proposed with sufficient stakeholder consultation and provides for appropriate stakeholder engagement, including the countries participating in the regional program;

Stakeholder consultation has been excellent throughout the process of compiling the SPCR.

g) adequately addresses social and environmental issues, including gender;

These have been adequately addressed

h) supports new investments or funding additional to on-going/planned MDB investments;

Has contributed to complementarity with other activities.

i) takes into account institutional arrangements and coordination;

These are taken into account adequately.

j) promotes poverty reduction; and

Good – the needs of the vulnerable poor have been given ample consideration

k) considers cost effectiveness of investments.

Yes

Part III: Recommendations

Please provide any recommendations that could enhance the quality of the SPCR.

General Comments

Component 1

Capacity building has to be a critical input into any developing country's efforts to build resilience to climate change and the areas identified for capacity building in component 1 are relevant and key areas for attention. However in the implementation of this component care must be taken not to centralise this capacity in one overarching institution (eg MECC or JNAP) but rather to ensure that it is dispersed through the entire national system from community level institutions , civil society organisations , sectoral technical personnel/ministries, professional organisations (Institution of Professional Engineers of Tonga - IPET). Apart from building some redundancy into the capacity building exercise this approach ensures that there is greater buy in from a wider cross section of key stakeholders in the entire exercise and broadens the national capacity base. For example in the community vulnerability work , working with the community in such a way that ensures that at the end of the process the capacity to carry out such action in the future resides in the community will pay dividends in the long run. Again in the infrastructure strengthening work the professional engineering organisation (IPET) should be the main target of the relevant capacity building efforts in this area. The business education initiative from the Chamber of Commerce (establishment of a dedicated training business education centre) could be an effective platform for training the business sector in inculcating climate risk management into business planning. Across all Ministries and especially at the level of the Ministries responsible for Planning and Finance capacity building (and to a great extent awareness) must be strengthened for incorporating climate risk management into their decision making process. In particular the Ministry of Planning and Finance must inculcate a risk management ethic that not only informs their work but demands

reciprocal consideration from all the other sectoral Ministries whenever sectoral development plans and budgets are being considered.

The range of capacity required to address climate change risks is wide and it is unrealistic for small countries like Tonga to envisage a scenario where all the necessary capacity resides in local personnel/institutions. As such the proposed pool of experts under the regional umbrella is a welcome and necessary step and the national capacity building effort should liaise closely with this group to ensure that generic approaches to delivering training are adjusted to reflect local circumstances. Further and this comment is not confined to the capacity building element in the programme the philosophy that should inform the implementation of this programme is that any expert utilised works “with” and not “for” local stakeholders. That approach ensures that the expert input is informed by the local circumstances and much more importantly that capacity is left behind after the completion of the exercise. I am not clear whether or not the expert pool of expertise would be drawn from the region but it should be the intent of the regional programme to develop such an institutional arrangement that key areas of expertise drawn from a regional pool of experts are always available even at the end of the intervention. In other words I am suggesting that this should be institutionalised as a mechanism to deliver key expert services to South Pacific SIDS.

Finally on the capacity building issue operators should be aware of the wide range of training material that has emerged over the past decade and should take advantage of these developments to be selective in courses to be utilised so as to ensure that they are the most appropriate for local circumstances. The activities envisaged under the “establishment of an enabling framework for climate proofing critical ports and associated infrastructure” are quite complex and require several inputs from a multidisciplinary team. The stated intent to undertake these activities in collaboration with the regional track programme should be adhered to as this activity must be key for all South Pacific SIDS. To be most effective and to get the best output from the investment in this exercise I would suggest a regional approach to working out the technical details -- climate projections, vulnerability assessments building codes etc. Is there any possibility of a framework for the harmonisation of legislation and building codes across the region as an output under the regional tranche?? One of the critical capacity building requirements which will be relevant to all SIDS in the Pacific is that of developing the skill to utilise climate risk management in their planning regime. There should be some input through the regional SPCR to develop a robust Risk management tool that can be utilised widely through the South Pacific SIDS (generic tool which can be customised for the individual islands through use of site specific quantitative information). Fortunately the region is not starting from scratch in this effort as most of the islands have been exposed to the use of the risk management tool CHARM. CHARM can now be utilised as the basis for the development of a robust Risk Management tool through the incorporation of some of the latest risk management techniques and for countries through the utilisation of more quantitative information becoming available from e.g. the site specific climate scenarios. But this effort has to be regionally led.

Component 2

Component 2 is well conceived and reflects the direction countries are considering now to address vulnerability especially for the poor and disadvantaged communities. One fully understands the issue of scarce resources available for this type of action at the local level so the use of the PPCR in this manner is commendable. Here are a few suggestions however for your consideration as you move forward with the implementation of this component:

- Sustainability of the funds – consider the grant for adaptation especially if such adaptation has to be for personal property (retrofitting home) as a loan which will be provided at very concessional rates. The idea is to establish a revolving fund which is constantly being replenished. Retrofitting costs can be kept to a minimum if community labour is utilised through training of a cadre of community artisans to carry out such actions on request. Also is it possible to get a local insurance company involved to provide cover at concessionary rates to those who retrofit – rewarding good behaviour so to speak.

- Insurance in a big challenge for SIDS especially for government infrastructure and fast start financing for recovery though critical is usually slow in coming. In the Caribbean governments are now subscribing to a Caribbean Catastrophe Risk Insurance Facility, a model which provides “a tangible example of an operational regional risk pooling mechanism which can be adapted for other regions as part of a comprehensive toolkit available to the developing nations of the world to assist in their adaptation to climate change. Through the pooling of capital into a collective reserve and spreading of risks geographically, the Facility provides extremely cost-efficient coverage options for its participants against extreme natural events, the socio-economic impacts of which are beyond the management capacity of any individual country”. It may be useful if under the regional programme such an approach could be explored for the Pacific SIDS as it has proved to be very effective in the Caribbean.

- Insurance for small farmers is a challenge throughout the developing world and is a key requirement in addressing food security and poverty alleviation. One might consider some sort of parametric insurance in which there is an event trigger assuring the insured expeditious disbursement of resources and allowing the individual to return to the productive mode as soon as possible. With the upgrading of the national hydrometeorological capacity such an insurance system might well be designed and supported.

Component 3

While I agree with the general thrust of the activities articulated under this component I would like to suggest that it may missing an opportunity to promote the concepts of “ building climate resilience” and “integrating actions under climate resilience and disaster risk reduction” through some more visible interventions/actions e.g.

- It is now an accepted fact that Marine Protected Areas are an effective adaptation tool for dealing with climate change impacts on fisheries. Why not invest in strengthening whatever MPAs now exist, strengthen community (fisherfolk) understanding of the role they play in sustaining livelihoods and train them in the management and surveillance of the MPA and provide support to facilitate their ability for proper surveillance (boats, engines etc.). As a parallel exercise get expert analysis of the extent of the present MPA regime with a view to understanding whether this needs to be further extended to meet emerging climate risks, work on effective MPA legislation to incorporate new designated areas and also to promote enforcement.

- In the analysis carried out in the development of this programme food security is identified as a critical issue with I think some 58% of the Tongan population in primary production. The proposal is not too specific in what is intended under the item “ecosystem based agriculture” but here I would suggest there is an opportunity for interventions that would promote actions aimed at farming in a changing climate e.g. organic farming, drip irrigation, water harvesting and storage for irrigation, mulch agriculture, simple preservation techniques (solar drying), se of climate information to make decisions of planting times and types. All this could be part of two or three community garden pilots and certainly of a school gardening programme across the archipelago. With respect to the latter I cannot recall seeing too much about consultation with youth organisations during the consultative process. This school gardening idea will be a useful way of getting this important constituency on board. On the question of consultations I also think that there should be some effort to include faith based groups in the activity stream for although separated by denomination they still have the basic Christian faith as common ground and particularly in the disaster management area can be a powerful ally for getting communities to take desired action. Community & school gardens along the lines articulated above should require a modest allocation of seed money to get the exercise off the ground and should become self sustaining eventually. Finally on this issue some resources should be allocated to capture traditional practices in food production and preservation as part of the exercise to deal with food security and this should not be confined to Tonga but should also form an integral part of the other PPCR programmes in the region.

- I would recommend that some consideration be given to the building of a climate and earthquake resilient community shelter as a major activity under this pilot. This can either be done through retrofitting an existing shelter or building a totally new shelter depending on which is more cost effective. My reason for suggesting this is the strong “symbolism” this action has for the underlying tenet of Tonga’s PPCR which is the integration of disaster risk reduction and building climate resilience. One of the difficult barriers to overcome in achieving the latter is to clearly define the roles of the respective partners in this integrative process. From my perspective as a “climate operator” that role specifically for dealing with climate risks is to provide the knowledge base for decision making. Thus in undertaking the task suggested the project will support building a multihazard resistant community shelter using the new building codes etc. developed under the climate proofing exercise under this component and all the knowledge from the seismic risk community and the disaster

management community working in a collaborative effort. The shelter will also address the critical issues of water availability (adequate water harvesting capacity), energy (totally supported by renewable – photovoltaic) sanitation (adequate and possibly no flush or low flush). The exercise apart from building the type of trust between the different players involved in climate change adaptation and disaster risk reduction will be a platform to display the practical application of some of the knowledge base developed under the PPCR and is replicable.

- Under a programme we have just completed in the Caribbean we have successfully addressed implementing Adaptation activities in two countries and you may consider this as an activity that you may want to replicate. The first addressed acute water problems in a small island community in Bequia. The intervention involved the provision of a Salt Water Reverse Osmosis Plant completely powered by solar energy (photovoltaic). Incidentally this project was part supported by the GEF pilot Adaptation Fund and by Aus AID. The other involved retrofitting a large hotel in Saint Lucia for water harvesting and also for grey water recycling. The SWRO project was implemented in collaboration with two govt. Statutory bodies – the Water Authority and the Power Company. The cost benefit analysis shows that the entire exercise was feasible and replicable. In fact the water is produced at a cheaper rate than that produced on the main island and is of better quality. One of the key features of this project is the fact that the energy generated is in excess of that required for the SWRO operation and is fed directly into the grid. The Power company pays the Water utility for the excess energy generated and as such has revenue to maintain and services the facilities at the SWRO. The exercise with the hotel involved the participation of the hotel owner who invested part of the required capital. The project was in response to the availability of water in a watershed where there were multiple users – domestic, agriculture and light industry, recreation and to the deleterious effect of run-off from these activities on the marine environment. Moreover in times of water stress the hotel used most of the scarce resource due to the priority placed on the tourism sector. At the end of the project the hotelier became one of the most vocal supporters for the intervention as it turned out to have made sound economic sense for him to have done it and other hoteliers are planning g to move in the same direction. The government in the meantime is amending legislation to make water harvesting and grey water recycling a requirement for all new hotel structures in the island.

- However many of these actions may have been considered during the compilation of the SPCR and not pursued due to local/regional activities that might be ongoing or planned and also might not be suitable for local implementation. Nevertheless they should be kept in mind. Overall then my assessment is that this is a very well conceived and constructed proposal, that, if implemented successfully, would contribute significantly to achieving the goals of the PPCR.

  Ulric O'D Trotz

  22. 03. 11

Response to Reviewer's Comments on the Tonga Strategic Program for Climate Resilience

Name of reviewer: Dr. Ulric O'D Trotz

Date of submission of review: 22 March 2012

The Asian Development Bank and the Government of Tonga has considered the independent review of the Strategic Program for Climate Resilience for Tonga, and thanks the reviewer for his insights, practical guidance and advice for further development and refinement of the document.

The reviewer has made several important recommendations which are addressed in this response. We also note other suggestions which are more appropriately addressed during the detailed project preparation stage that will follow the consideration of the proposal by the Sub-Committee.

We note that the reviewer:

- found a high level of compliance with the PPCR specific and general criteria;
- supported the proposed investment in capacity building and made useful suggestions for the focus of, and mode of implementation of, capacity building activities;
- appreciated the inclusion of sustainable climate change adaptation financing and insurance initiatives;
- agreed in principle with the inclusion of activities to build ecosystem resilience and the climate proofing of critical infrastructure; and
- supported the three proposed component areas.

The reviewer raises a number of important issues, including:

- Insurance in a big challenge for SIDS especially for government infrastructure and fast start financing for recovery though critical is usually slow in coming. In the Caribbean governments are now subscribing to a Caribbean Catastrophe Risk Insurance Facility, a model which provides "a tangible example of an operational regional risk pooling mechanism which can be adapted for other regions as part of a comprehensive toolkit available to the developing nations of the world to assist in their adaptation to climate change. Through the pooling of capital into a collective reserve and spreading of risks geographically, the Facility provides extremely cost-efficient coverage options for its participants against extreme natural events, the socio-economic impacts of which are beyond the management capacity of any individual country". It may be useful if under the regional programme, such an approach could be explored for the Pacific SIDS as it has proved to be very effective in the Caribbean.

Response: Agreed. The need for a regional re-insurance scheme modeled on the Caribbean Catastrophe Risk Insurance Facility was raised as a priority by stakeholders during SPCR

preparation. The Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) will be undertaking this on a sub-regional level through its third phase to be led by the World Bank, and therefore, to avoid unnecessary duplication, it was considered that SPCR investments should focus on supporting micro-insurance for vulnerable communities.

- While I agree with the general thrust of the activities articulated under this component (3) I would like to suggest that it may missing an opportunity to promote the concepts of "building climate resilience" and "integrating actions under climate resilience and disaster risk reduction" through some more visible interventions/actions e.g. It is now an accepted fact that Marine Protected Areas are an effective adaptation tool for dealing with climate change impacts on fisheries. Why not invest in strengthening whatever MPAs now exist, strengthen community (fisherfolk) understanding of the role they play in sustaining livelihoods and train them in the management and surveillance of the MPA and provide support to facilitate their ability for proper surveillance (boats, engines etc.). As a parallel exercise get expert analysis of the extent of the present MPA regime with a view to understanding whether this needs to be further extended to meet emerging climate risks, work on effective MPA legislation to incorporate new designated areas and also to promote enforcement.

Response: This helpful suggestion is noted and we advise that this concept is already covered under the reference to 'protected areas' in Component 3, third sub-activity. However, to clarify this intent we have added a reference to the inclusion of MPAs in the SPCR main text on Component 3 and the accompanying annex.

- In the analysis carried out in the development of this programme food security is identified as a critical issue with I think some 58% of the Tongan population in primary production. The proposal is not too specific in what is intended under the item "ecosystem based agriculture" but here I would suggest there is an opportunity for interventions that would promote actions aimed at farming in a changing climate e.g. organic farming, drip irrigation, water harvesting and storage for irrigation, mulch agriculture, simple preservation techniques (solar drying), use of climate information to make decisions of planting times and types.

Response: Component 3 activity envisages these types of possible interventions. However, we have revised the text of the accompanying annex to specifically include such interventions.

- I would recommend that some consideration be given to the building of a climate and earthquake resilient community shelter as a major activity under this pilot. This can either be done through retrofitting an existing shelter or building a totally new shelter depending on which is more cost effective. My reason for suggesting this is the strong "symbolism" this action has for the underlying tenet of Tonga's PPCR which is the integration of disaster risk reduction and building climate resilience.

Our response: Agreed. We have added reference to 'piloting multi-use (climate and earthquake resilient) community emergency shelters in Component 1 sub-activity which covers community based early warning systems.

- Under a programme we have just completed in the Caribbean we have successfully addressed implementing Adaptation activities in two countries and you may consider this as an activity that you may want to replicate. The first addressed acute water problems in a small island community in Bequia. The intervention involved the provision of a Salt Water Reverse Osmosis Plant completely powered by solar energy (photovoltaic). Incidentally this project was part supported by the GEF pilot Adaptation Fund and by AusAID. The other involved retrofitting a large hotel in Saint Lucia for water harvesting and also for grey water recycling.

Response: Agreed with provisos but are noting the difference between the two regions as not all measures practiced in the Caribbean would be appropriate for the Pacific region. Measures to support climate change risks to water resources in Tonga are being supported by a number of development partners, and therefore, to avoid unnecessary duplication, it was considered that SPCR investments should focus on providing support to vulnerable communities under the proposed small grants program sub-activity in Component 2 under which funding could support, for example, community projects exploring alternative solutions.

- Many of these actions may have been considered during the compilation of the SPCR and not pursued due to local/regional activities that might be ongoing or planned and also might not be suitable for local implementation.

Response: All viable adaptation options were considered by stakeholders during the SPCR planning process. Additional examples of good practices and lessons learned from adaptation projects in other regions will be further considered during project preparation.

We note that the reviewer proposes a number of suggestions be addressed during the project preparation stage that will follow the consideration of the proposal by the CIF Sub-Committee. It has not been suggested that the inclusion of additional approaches of good practices and lessons learned from adaptation projects in other regions be undertaken at this stage in the SPCR planning process, but rather be addressed during the project preparation phase, which we fully support. We welcome the reviewer's assessment of the approach and objective of the Tonga SPCR proposal. We also welcome the various suggestions he has proposed for further consideration. Accordingly, we will incorporate responses to the comments and suggestions as detailed in 'Our response' above and during the project preparation stage. Editorial issues will also be addressed, as will issues of consistency between components and the annexes.