

Samoa
Pilot Program on Climate Resilience (PPCR)

Joint Mission, June 3-11, 2010

Introduction

1. The PPCR is one of the programs under the Strategic Climate Fund (SCF) of the Climate Investment Funds (CIF)¹. The PPCR is designed to pilot and demonstrate ways to integrate climate risk and resilience into core development policies, planning and budgeting processes at national and regional level through increased capacity and scaled-up investments. The PPCR is structured in two phases. Phase 1 will develop a Strategic Program for Climate Resilience as an enabling framework to manage climate risks. Phase 2 will implement the strategic program mainly through investments.

2. Samoa is one of three countries selected for participation in the PPCR for the Pacific region². The Pacific PPCR is jointly implemented by the World Bank Group and the Asian Development Bank (ADB). Following Samoa's acceptance of the offer to participate in the Program, an informal scoping mission was held on November 16-17, 2009 to begin discussions with the government and other stakeholders on the relevance, objectives and scope of the PPCR in enhancing the country's climate resilience. In the following months, the Ministry of Finance, as the Focal Point for the PPCR, invited government agencies to participate in a stock-take of ongoing climate adaptation activities, as the premise for the formal joint mission that would launch the Program.

3. The first joint-mission³ led by the Ministry of Finance (MoF) and including World Bank, ADB and AusAID/Department of Climate Change, was fielded in Samoa on June 3-11, 2010. The mission worked particularly closely with Ministry of Natural Resources and Environment (MNRE) and UNDP.

4. Following PPCR guidelines, the main objective of the joint mission was to put in place a clear process for formulating a Strategic Program for Climate Resilience. The main tasks of the joint mission included: (i) taking stock of country level activities on climate resilience, and identifying gaps; (ii) assess opportunities for mainstreaming climate resilience in national and local development policy, planning, regulatory and budgetary processes and in the key

¹ The Climate Investment Funds are comprised of the Clean Technology Fund and the Strategic Climate Fund.

² The Pacific PPCR includes Samoa, Tonga, PNG as well as a regional component.

³ Ms. Silia Kilepoa-Ualesi (PPCR Coordinator, Economic Policy and Planning Division, Ministry of Finance); Ms. Emilia (Milina) Battaglini (PPCR Co-team Leader, World Bank); Mr. Mahendra Kumar (Climate Change Specialist, Asian Development Bank); Mr. Cameron Darragh (Program Manager, Australian Department of Climate Change); Prof. John Hay, (Climate Risk Management Advisor, World Bank). Mr. Sam Wedderburn (PPCR Co-team Leader, World Bank) was not able to join the mission as originally planned.

vulnerable sectors; (iii) carry out broad based consultations with development partners and national stakeholders; (iv) outline the content and implementation arrangements for Phase 1.

5. The mission held discussions with representatives of Government entities, civil society organizations and private sector (see Annex 1 for a list of people/organizations met). The team wishes to thank Mr. Tupa'imatuna Iulai Lavea, CEO MoF, and Mr. Taule'ale'ausumai La'avasa Malua, CEO MNRE, and their staff, for their excellent cooperation and assistance to the mission. The preliminary findings and recommendations of this draft aide memoire were discussed at a mid mission briefing chaired by Mr. Sealiimalietoa Melepone Isara, Deputy CEO MoF, on June 8, 2010. The more detailed findings and recommendations of this draft aide memoire were discussed at an exit meeting chaired by Mr. Tupa'imatuna Iulai Lavea, CEO MoF, on June 11, 2010.

Context for Climate Risk Management (CRM) in Samoa

6. *Climate risks, vulnerabilities and adaptation priorities.* Samoa's Second National Communication to the United Nations Framework Convention on Climate Change (2010) reports best estimates of long term, systematic changes in the future climate for Samoa. Samoa's Second National Communication also includes an updated vulnerability and adaptation assessment for Samoa. The assessment was undertaken on a sectoral basis, covering water resources, health, agriculture, fisheries, biodiversity and infrastructure. These were the sectors where it was considered desirable and possible to build on the 13 sectors considered and prioritized in Samoa's National Adaptation Programme of Action (2004). The sectors considered in the NAPA were agriculture and food security; forestry; water, health, communities, biological diversity; fisheries, trade and industry; works transport and infrastructure; tourism, urban planning and development; coastal environments; and energy.

7. The NAPA identified that around three quarters of these sectors are highly vulnerable to the adverse impacts of climate change and climate variability, including extreme events. The nine sectors considered highly vulnerable from the highest to lowest were the water sector, agriculture and food security sector; forestry sector; health sector; urban settlements; coastal environments; communities; trade and industry sector; and works transport and infrastructure sector. Climate change and climate-induced disasters will cause instability in food production and water availability, affecting income generating activities for communities and the country at large.

8. The NAPA Implementation Strategy was last updated in 2008. Given the increased understanding since then, as evidenced in the Second National Communication, and the considerable effort now going into implementing adaptation interventions, the Strategy needs to be updated.

9. Additional information on Samoa's climate risks, vulnerabilities and adaptation priorities is presented in Annex 2.

10. *Institutional arrangements for CRM.* MNRE is the ministry responsible for developing the key policy documents that guide the climate change programs in Samoa, including the National Policy Statement on Climate Change (2007) and the NAPA. The Ministry serves as the

secretariat for the National Climate Change Country Team (NCCCT) (see Figure 1). The NCCCT, the key members of which are the CEOs of relevant government ministries, is the key coordination mechanism for Samoa's response to climate change. The MoF has been recently designated as the National Implementing Entity for the Adaptation Fund as well as the Designated National Authority for the CDM.

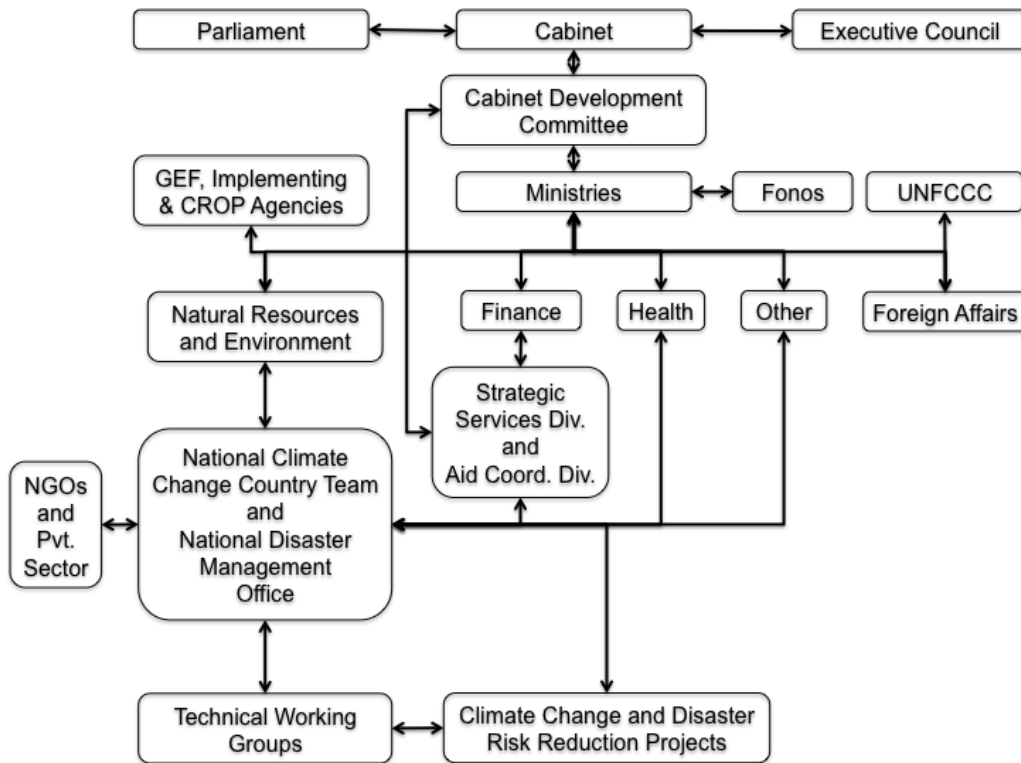


Figure 1. Institutional arrangements for climate change responses in Samoa.

11. **Government and donor-supported initiatives.** Development assistance provided to Samoa by **Australia** is delivered through the Samoa-Australia Partnership for Development. The Partnership establishes a shared vision to work together to meet common challenges and to raise the standard of living for the people of Samoa. In 2009-2010, the Partnership provided a total of US\$1,036,205 to support priority adaptation activities (primarily under NAPA Project Profile 4) and mitigation activities (feasibility assessment of a biomass gasification plant). The partnership also examined sustainable financing mechanisms for climate change adaptation and supported capacity building and mainstreaming. Annual Partnership Talks will take place between senior officials of the Australian and Samoan Governments in early July 2010 to determine future Partnership priorities and allocations.

12. At the regional level, under the International Climate Change Adaptation Initiative (ICCAI), Australia is investing AUD150m from 2008-2011 to meet priority climate adaptation needs in the Asia-Pacific. Through the ICCAI, Samoa has been an active participant in the AUD20m Pacific Climate Change Science Program and has access to the AUD12m Pacific

Adaptation Strategy Assistance Program, the AUD3m Pacific Future Climate Leaders Program and is eligible for support under the Mekong and Asia Pacific Community-Based Adaptation Program (MAP-CBA). Australia has contributed AUD40m to the PPCR through the ICCAI. Samoa is also involved in ongoing programs funded by Australia such as the South Pacific Sea Level and Climate Monitoring Project and the Pacific Islands - Climate Prediction Project. UNDP-GEF.

13. Ongoing support in climate change from **Asian Development Bank** includes a loan for the Samoa Sanitation and Drainage Project (2003). The overall objective of the project is to improve environmental conditions and public health of the Apia urban area. A loan and grant have also been provided for the Power Sector Expansion Project (2007). The project is part of Government's power sector development plan to improve capacity of the sector to provide sustainable and reliable electricity services to all consumers at affordable prices. Components 1 and 2 of the project include establishing the DNA and CEF, while Component 3 strengthens the regulatory framework, including establishing a regulator for electricity services and reviewing the EPC Act. There are two technical assistance projects associated with the Power Sector Expansion project, namely Power Sector Improvement (2007), piggybacked to Power Sector Expansion Program, and Capitalizing the Clean Energy Fund (2008). There are plans for the future to expand on the ongoing activities as follows, a loan for the Sanitation and Drainage Project II (2011), technical assistance for the Power Sector Expansion Project Phase II (2010) There are plans to expand on the ongoing activities, including technical assistance for preparing the Sanitation and Drainage Project (2011), a loan for the Sanitation and Drainage Project II (2012), technical assistance for preparing the Power Sector Expansion Project Phase II (2011) and a loan for the Power Sector Expansion Project Phase II (2012).

14. **The Global Environment Facility** (GEF) through **UNDP** has financed several climate change-related projects in Samoa, from the preparation of the National Adaptation Programme of Action (NAPA) to the implementation of adaptation projects in key economic sectors, including agriculture, health, forestry, tourism and coastal communities (so-called NAPA-1, 2 3 and 5). These projects provide a mix of policy advice, capacity building, early warning systems, community demonstration activities and knowledge management. Building on the NAPA and the National Communications to the UNFCCC, UNDP is carrying out work on vulnerability and climate risk assessments, and mainstreaming of climate change adaptation in sectoral planning especially in agriculture, forestry and health. Through the Samoa GEF small grant program and community development program, UNDP is implementing community-based adaptation projects that use existing village-level delivery mechanisms and strengthen national-local level institutional linkages. The PPCR could build on and expand some of the work piloted by UNDP, scaling up the most successful and innovative interventions.

15. The **World Bank** has been present in Samoa for the last several years with a series of projects addressing post-cyclone reconstruction and infrastructure asset management. The ongoing Samoa Infrastructure Asset Management (SIAM) Phase 2 project aims to enhance the economic, environmental and social sustainability of transport and coastal infrastructure assets, and to manage these assets, natural resources, and disaster risks through an effective partnership with private sector stakeholders. The World Bank support to Samoa increased last year in response to the devastating tsunami of September 2009 with an emergency loan and grant for post-tsunami recovery in the transport sector which includes elements of disaster risk

management and additional financing in the health sector. Looking ahead, future engagement will focus on strengthening agricultural competitiveness, and further work to build on successful investments to improve infrastructure asset maintenance, and “climate proof” investments. The World Bank under the Samoa Asset management program was also engaged in community support projects to enhance resilience

16. The **EU** engagement on climate change issues is mainly through its program in the water sector and the support to civil society. **NZAID** support to climate change adaptation is mainly delivered through multilateral regional programs and mainstreamed into the regular programs for health and sustainable economic development. **Japan** is engaging in the upgrading of the weather observation system for the Meteorological Office, a forest preservation program as well as renewable energy with a focus on solar power. The latter activity is delivered through the regional Pacific Environment Community facility. **China** is particularly active in renewable energy and public infrastructure.

17. The current priorities of the Government are: (i) reviewing the national policy analysis framework; (ii) early warning systems expanded nationally, institutional reorganizing and strengthening, leveraging capital investment for climate proofing infrastructure and for renewable energy technologies, building on existing initiatives such as the national climate-related disease baseline study, and on-the-ground implementation of sector-based adaptation initiatives. Current and planned adaptation interventions are described in Annex 3.

Main Mission Findings

18. ***Building on ongoing government achievements.*** Samoa has been very proactive in tackling the climate change challenge, assessing climate change impacts and vulnerability, identifying and implementing adaptation measures. Samoa is one of the first Pacific countries to have developed a National Adaptation Plan of Action (NAPA 2005) after two years of data collection and extensive consultations across the country. The NAPA identifies the most urgent and immediate adaptation needs and the government of Samoa, under the leadership of MNRE, has very effectively sought donor financing to implement the NAPA through a series of projects targeted to key sectors. NAPA 1 (piloting adaptation in health and agriculture) and NAPA 2 (piloting community-based adaptation for coastal protection) are now under implementation, and MNRE has secured significant funding to finance 3 more NAPA projects. The development and implementation of the NAPA have been instrumental in stimulating the preparation of climate risk and vulnerability assessments, raising awareness around climate change adaptation and building opportunities to work across sectors (for example through the NCCCT).

19. Samoa has developed a framework of strategies, plans and governance structures that are best practice in the region. Climate change adaptation is reflected as a priority in many high level plans and strategies. The Strategy for the Development of Samoa (SDS) for 2008-2012 for example identifies climate change adaptation as a cross cutting issue alongside environmental sustainability. The Samoa Coastal Infrastructure Management Strategy (2001 updated in 2007) defines national and local priorities for coastal management and sets policies and implementation methods for disaster risk reduction and climate adaptation measures. They are seen by government as a key adaptation initiative.

20. While most sector ministries are still struggling with the concept of integrating climate change considerations in their plans and operations, MNRE has taken the lead in mainstreaming climate change (adaptation and mitigation) in its own planning, work programs and budgetary process.

21. **Emerging gaps.** The NAPA, by its own design, is very project-specific, sector-focused and short-term. While it calls for mainstreaming of climate risk management into sectoral plans and operations, government agencies' corporate and business plans often do not refer to climate change adaptation. The stock-take meetings highlighted that many parts of government have still only a limited knowledge of the climate adaptation work carried out by MNRE. This may be due to the limited implementation of the NAPA (one year) but it is also likely due to its sector by sector approach and the "horizontal" relation it supports between MNRE and other sector ministries. From the stock-take discussions a consensus emerged around the need for a more strategic, whole of government approach to climate risk management that supports mainstreaming climate considerations in national plans as well as sector plans and a vertical and horizontal integration within and across government departments. The role of MoF in pursuing the integration of climate risk management objectives in government processes, planning and budgeting is critical especially in light of an efficient and fair allocation of resources. It is however understood that the technical knowledge and capacity to implement climate adaptation measures rest with the sector ministries and agencies.

22. The stock-take meetings also highlighted some areas that were not adequately covered in the NAPA and may need to be re-considered in light of their relevance for climate adaptation measures. The energy sector, for example, was not considered under NAPA, in part because it was looked at only from a climate change mitigation perspective. Similarly, communities and the Ministry of Women, Community and Social Development (MWCSO) do not feature prominently in the NAPA despite their critical role in the implementation of adaptation measures at village level.

23. **Synergies with disaster risk reduction.** One area highlighted as missing from the NAPA is the synergy between disaster risk reduction and climate change adaptation. In practice, and especially at community level, distinguishing between the two is irrelevant as many of the risk reduction measures are the same whether the disaster is climate-related or not. The National Disaster Management Plan of 2007 recognizes climate change, sea level rise, environmental degradation, coastal erosion, water quality and resource management as important issues. In practice, however, the climate change adaptation and the disaster risk management agendas are still dealt with separately. MNRE expressed interest in learning about risk financing mechanisms, another area that is not addressed in the current policies and strategies. The issue is being addressed by the World Bank in the design phase of the support program for the agriculture sector, as well as assessing the appropriate modalities for implementing risk financing activities in the context of Samoa.

24. **Consultation and participation processes.** The mission held discussions with government agencies, donor partners, and a limited number of representatives from civil society and private sector. Among the many stake-holders, the private sector seems to be the least informed and engaged in the debate on climate change adaptation, possibly due to the lack of familiarity with the linkages between a global environmental issue (climate change) and their

day-to-day business operations. The engagement of the private as key agent in the adoption of climate adaptation measures was identified as an area that deserves more attention.

Opportunities for PPCR⁴

25. The advanced stage of government awareness and commitment to adopting climate change adaptation measures at national and local level provides an excellent basis for PPCR to transform the climate change adaptation debate from an environmental issue to a development issue and assist the government in moving towards a climate resilient economic development path. In doing so, the PPCR will build on existing programs and frameworks, including existing implementation modalities that have proved successful. In the course of the discussions with government agencies and other stakeholders several suggestions were made in regard to the focus of the PPCR. These suggestions will be further assessed in the course of the next few weeks as part of the development of the proposal for Phase 1 of the PPCR.

26. Since the NAPA was completed there has been an evolution of the debate around climate change adaptation and climate risk management, changing climate science considerations and new priorities that have emerged since its development, including in sectors not previously considered (such as energy). The PPCR could support the preparation of an Annex to the existing NAPA that addresses these developments. However, an alternative approach, which found initial favor with the Government, was to recognize that the NAPA is near to the end of serving its purpose. There is an opportunity to build on the NAPA and prepare a strategic document that would capture the current and emerging needs of Samoa for adaptation interventions and lay out a road map. Development partners would then be able to see where to target their assistance. The planned PPCR Strategic Program for Climate Resilience would form an integral part of the wider strategic document.

27. The process of mainstreaming climate change considerations in ministry plans, work programs and budgets that is being implemented by MNRE could be replicated and scaled-up throughout government agencies and at national level with the support of PPCR.

28. The government attaches high priority to the implementation of the Coastal Infrastructure Management Plans. The PPCR could support the implementation of updated and prioritized CIM Plans that take into account the consultation program currently carried out by the Ministry of Women, Community and Social Development.

29. It was also suggested that the PPCR could be used to scale-up successful pilot adaptation projects, including community-based adaptation and disaster risk management projects that have been tested and demonstrated throughout the implementation of the NAPA.

30. Samoa stands to receive additional financing for climate change adaptation and mitigation in the coming years through the Adaptation Fund and CDM. Several donors are already supporting climate change activities, often through different mechanisms and

⁴ Possible investment opportunities are listed in Annex 4. Phase 1 of PPCR would assess these and other options, prioritize them and reflect them in both the PPCR Strategic Program for Climate Resilience and in the proposed medium- and longer-term climate change strategy for Samoa.

requirements. The government is very keen to rationalize and increase the efficiency of the management and use of financial resources available to Samoa for climate change and is looking at different options, including setting up a national trust fund for climate change; pooling donor resources; and providing budget support mechanisms to cover the incremental costs of climate proofing development projects. The PPCR could assist the government in investigating and developing the most appropriate mechanism.

31. In order to increase its impact it was suggested that PPCR take a cross-cutting, multi-sectoral approach to exploit the adaptation and mitigation synergies in forest, agriculture and energy as well as the synergies between climate change adaptation and disaster risk management.

32. Phase 1 of the PPCR would assess these and other investment options, and prioritize them based on consultations with government as well as other stakeholders. The prioritized options could be incorporated in a new medium- and longer term climate change program to be developed as a Phase 1 activity. PPCR would contribute to implementing part of the program, as defined in the PPCR Strategic Program for Climate Resilience (SPCR). Other donors and government could take up other investment opportunities indicated in the program. Preparation of the program would have to be a streamlined process in order not to delay PPCR Phase 2 implementation. This is realistic given the opportunity to build on the Second National Communication, the NAPA and other instruments. It should be possible to prepare a robust program by the end of Phase 1.

Implementation Arrangements for PPCR

33. MoF is the Focal Point for PPCR. The role of this ministry is key to the success of the PPCR. Its Economic Policy and Planning Division is best placed to ensure integration of climate risk considerations in government national and sectoral planning, work programs and budgeting processes. It is also the key ministry that interacts with and coordinates external funding through its Aid Coordination Division. MNRE has the technical and scientific knowledge most relevant for the PPCR. It has been the engine behind the development and implementation of the country's climate change work, both at policy and project level.

34. It is suggested that, while the MoF has the lead for coordinating the PPCR nationally, implementation be undertaken in partnership with the MNRE and other relevant agencies in order to take advantage of their comparative advantages and benefit from their synergies and complementarities. It is also recommended that the PPCR use implementation frameworks that are already in place, such as the NCCCT and the sector steering committees.

Outline of Possible Phase 1 Activities⁵

35. *Assessment of Climate Risks in Key Vulnerable Sectors.* Implementation of a risk-based approach to adaptation, and prioritization of PPCR investments to enhance resilience to climate change. This requires a detailed knowledge of both current and anticipated climate risks for the key sectors shown in the Second National Communication and the NAPA to be highly

⁵ Detailed activities and specific Terms of Reference to guide the design of Phase 1 will be prepared in the coming few weeks.

vulnerable to climate change. Currently there is only general information, complemented by quantitative, but somewhat outdated information for the Apia area. This activity would increase the spatial coverage of the quantitative risk information and apply it to relevant sectors.

36. ***Institutional Analysis.*** More sectors and components of society are recognizing the need to enhance resilience to climate change. In addition, there has been some discussion about climate change being given a higher institutional profile in government. This activity will help ensure that institutional arrangements are optimized in terms of both addressing needs and reflecting capacities. The activity will also assess the implications for greater integration of disaster risk reduction and climate change adaptation.

37. ***Mainstreaming Climate Change Considerations into Policy, Planning and Budgetary Processes.*** Some progress has already been made. With the support of the PPCR, the process of mainstreaming climate change (inclusive of disaster risk reduction) considerations in ministry plans, work programs and budgets that is being implemented by MNRE could be replicated and scaled-up throughout government agencies and at national level.

38. ***Preparation of the Strategic Program on Climate Resilience (SPCR) for Samoa and Development of a Medium- and Longer-term Climate Change Program for Samoa.*** There is an opportunity to build on the NAPA and prepare a strategic document that would capture the current and emerging needs of Samoa for adaptation interventions, and lay out a road map. The strategic document would also build on, and be consistent with, the SDS. One focus of the activity will be enhancing integration of disaster risk reduction and climate change adaptation. An outcome of this activity would be development partners more able to see where to target their assistance. The planned activity would include PPCR investment opportunities. Possible opportunities are identified in Annex 4. Another output would be the Strategic Program for Climate Resilience (SPCR), which would describe the portion of the overall national climate change program to be supported directly through the PPCR. The inclusion of the PPCR Strategic Program for Climate Resilience as an integral part of the wider strategic document would help ensure PPCR alignment with climate-related investments and contribute to implementation of the SDS.

39. ***Enhancing the Capacity for Climate Risk Management.*** This activity would build knowledge and raise awareness on climate risk management, including addressing any significant shortcomings in terms of availability of climate data and other relevant information. This includes the institutional capacity to acquire, manage and disseminate such information and to increase integration of disaster risk reduction and climate change adaptation.

40. ***Assessing and Addressing the Social Aspects of Climate Change:*** This activity would consider how best to optimize and facilitate the involvement of all non-government stakeholders in enhancing resilience to climate change, including the participation of communities, community-based and non-governmental organizations and the private sector. A key aspect of the activity would be assessing and integrating gender considerations into climate change adaptation.

Next Steps

41. The proposed next steps are shown in the following table.

Activity	Completed by
MoF consults with other agencies and provides consolidated comments on the draft aide-memoire	June 29, 2010
Aide-Memoire finalized	July 4, 2010
First draft of Phase 1 Program Proposal	July 31, 2010

List of People and Organizations Consulted

Government Roundtable Participant List⁶

	Names	Designation	Ministry/Organisation
1	Mrs. Leilani Matalavea	Information & Communication Specialist	Ministry of Health
2	Mr. Asuao Kirifi Pouono	Chief Executive Officer	Ministry of Agriculture and Fisheries
3	Mr. Ueta Solomona Jr.	Manager Aerodromes & ATS	Samoa Airport Authority
4	Mr. Sealiimalietoa Melepone Isara	Deputy Chief Executive Officer	Ministry of Finance
5	Ms. Eira Elisara	Planning & Development Officer	Samoa Tourism Authority
6	Mr. Ben Gagau	Manager Works & Technical	Samoa Airport Authority
7	Mr. Wairarapa Young	Renewable Energy Officer	Electric Power Corporation
8	Mr. Muaausa Joseph Walter	General Manager	Electric Power Corporation
9	Mr. Sinapati Ulberg	Assistant CEO	Land Transport Authority
10	Mr. Bismarck Crawley	Consultant	Isikuki Punivalu & Associates (IPA)
11	Ms. Shirleen Fuimaono	Marketing Executive	Samoa Ports Authority
12	Mr. Cameron Darragh	Program Manager	Australian Government CCA
13	Mr. Steve Brown	GEF Services Assistant CEO	Ministry of Natural Resources and Environment
14	Ms. Louisa Apelu	Assistant CEO – Division for Women	Min. of Women, Community & Social Development
15	Mr. Peseta Frank Fong	Assistant CEO– Policy Planning Communication	Ministry of Agriculture and Fisheries
16	Ms. Emma Wong	Lecturer	Victoria University (Australia)
17	Ms. Min Jiang	Research Fellow	Victoria University (Australia)
18	Ms. Patila Malua-Amosa	Lecturer/ Head of Science Department	National University of Samoa
19	Mr. Mala Tanei	PEO-Projects	Ministry of Education, Sports and Culture
20	Ms. Emilia (Milina) Battaglini	Sr. Environment Specialist, PPCR Co-team Leder	World Bank
21	Dr. Mahendra Kumar	Climate Change Specialist	Asian Development Bank
22	Ms. Litara Taulealo	Principial Officer- Projects and Sector	Ministry of Finance
23	Ms. Silia Kilepoa-Ualesi	Energy Coordinator	Ministry of Finance
24	Ms. Heremoni Suapaia-Ah Hoy	Energy Officer	Ministry of Finance
25	Ms. Noumea Simi	ACEO Aid Coordination	Ministry of Finance

⁶ Samoa Umbrella for Non-Governmental Organisation (SUNGO) submitted their apologies for being absent from this roundtable. However, they participated in the pre-mission roundtable where they were informed of the PPCR and they made a submission to the PPCR preparations (see Annex 3).

Private Sector Roundtable Participants

	Names	Designation	Ministry / Organisation
1	Mrs. Karen Mapusua	Associate Director	Women in Business Development Inc.
2	Mr. Afoa Amituanai Faleulu Maui	President Samoa Hotel Association (SHA)	Samoa Hotel Association
3	Mr. Tuaepepe Felix Wendt	President Farmers Association	Samoa Farmers Association
4	Mr. Papalii Grant Percival	COCI / SAME EC Member	COCI/ SAME
5	Mr. Sealiimalietoa Melepone Isara	Deputy CEO	Ministry of Finance
6	Ms. Emilia Battaglini	Sr. Environment Specialist, PPCR Co-team Leder	World Bank
7	Prof. John Hay	Climate Risk Mgmt Advisor	World Bank
8	Mr. Cameron Darragh	Program Manager	AusAID/Dept of Climate Change
9	Dr. Mahendra Kumar	Climate Change Specialist	ADB
10	Ms. Silia Kilepoa-Ualesi	Energy Coordinator	Ministry of Finance
11	Ms. Heremoni Suapaia-Ah Hoy	Energy Officer	Ministry of Finance
12	Tainau Moefaauro Taputoa Titimaea	Vice President	Association of Engineers
13	Funefea'i Oliva Vaai	Vice President	SAME
14	Eddie Wilson	President	SAME
15	Adi Tafuna'i	President	Women in Business Development Inc
16	Nynette Sass	Chief Executive Officer	Samoa Hotel Association
17	Lemalu Sina Retzlaff	President	Chamber of Commerce
18	Litia Brighthouse	Chief Executive Officer	Chamber of Commerce

Development Partner Roundtable Participants

	Names	Designation	Ministry/Organisation
1	Ms. Misileti Satuala	Activity Manager	AusAID
2	Mr. Xie Yancun	Secretary	Chinese Embassy
3	Mr. Aiba Manabu	RR	JICA
4	Mr. Sealiimalietoa Melepone Isara	Deputy CEO	Ministry of Finance
5	Mr. Meapelo Maiai	Programme Officer	UNDP Samoa
6	Mr. Justin Locke	Project Manager	UNDP
7	Mr. Mehdi Kamyab	Programme Coordinator	UNDP Samoa
8	Mr. Peter Zwart	NZAID Manager	NZ High Commission
9	Mr. Peniamina Leavai	CC- Mitigation & Adaptation Officer	UNDP Samoa
10	Mr. Cameron Darragh	Program Manager	Australia-Dept of Climate Change
11	Mr. Nick Roberts	Budget Support Adviser	MOF/AID
12	Ms. Lita Iamafana	Principal Officer- Aid	Ministry of Finance
13	Ms. Noelani Tapu	Principal Officer - Aid	Ministry of Finance

14	Ms. Emilia (Milina) Battaglini	Sr. Environment Specialist, PPCR Co-team Leder	World Bank
15	Dr. Mahendra Kumar	Climte Change Specialist	Asian Development Bank
16	Ms. Litara Taulealo	Principial Officer- Projects and Sector	Ministry of Finance
17	Ms. Silia Kilepoa-Ualesi	Energy Coordinator	Ministry of Finance
18	Ms. Heremoni Suapaia-Ah Hoy	Energy Officer	Ministry of Finance

Climate risks, Vulnerabilities and Adaptation Priorities⁷

Samoa's Second National Communication to the United Nations Framework Convention on Climate Change (2010) reports best estimates of long term, systematic changes in the average climate for Samoa. They indicate that by 2050 sea level is likely to have increased by 36 cm, rainfall by 1.2%, extreme wind gusts by 7% and maximum temperatures by 0.7 C. The observed long term trend in relative sea level for Apia is 5.2 mm/yr. But maximum hourly sea level is increasing by approximately 8 mm/yr, a rate far in excess of the observed local and global trends in mean sea level. For Apia an hourly sea level of 1.8 m above mean sea level is currently a 100-year event. It will likely be at least a four-year event by 2025.

No significant long term trends are evident in the observed daily, monthly, annual or maximum daily rainfall. Currently a daily rainfall of at least 300 mm is a relatively rare event at Apia, with a return period of 14 yr. There is large uncertainty in the rainfall projections, with two models suggesting substantial increases in rainfall, one model suggesting only small increases, and one model indicating a large decrease in rainfall into the future. An extreme daily rainfall of 400 mm is currently a 60-year event. It will likely be a 40-year event by 2050. An extreme six-hourly rainfall of 200 mm is currently a 30-year event. It will likely become a 20-year event by around 2050.

A monthly rainfall below the ten percentile is used as an indicator of drought. Drought frequency is strongly linked to the occurrence of El Niño events. Six global climate models that were best out of 19 at simulating present day ENSO conditions show no significant changes toward El Niño-like conditions in the latter part of the current century. Therefore it is not yet possible to make any predictions about the future nature of El Niño events and the implications for the frequency, duration and intensity of droughts in Samoa.

Currently an extreme wind gust of 70 kt at Apia has a return period of 75 years. This will reduce to approximately 40 years by 2050. There is relatively high confidence in projections of maximum air temperature. A maximum air temperature of 34 C is currently well in excess of a 100-year event. By 2050 it will likely have a return period of 40 years.

Samoa's Second National Communication also includes an updated vulnerability and adaptation assessment for Samoa. The assessment was undertaken on a sectoral basis, covering water resources, health, agriculture, fisheries, biodiversity and infrastructure.

Samoa's National Adaptation Programme of Action (NAPA) reviewed 13 sectors: agriculture and food security; forestry; water; health; communities; biological diversity; fisheries; trade and industry; works transport and infrastructure; tourism; urban planning and development; coastal environments and energy. The NAPA Synthesis Report identified that around three quarters of these sectors are highly vulnerable to the adverse impacts of climate change and climate variability, including extreme events. The nine sectors considered highly vulnerable from the highest to lowest were the water sector, agriculture & food security sector; forestry sector; health

⁷ Based largely on the Second National Communication and the NAPA.

sector; urban settlements; coastal environments; communities; trade and industry sector; and works transport & infrastructure sector. Climate change and climate-induced disasters will cause instability in food production and affect income generating activities for communities and the country at large.

Water. Samoa's water resources and water supply systems are extremely vulnerable to current climatic patterns. In 1997–1998 and 2001, periodic droughts associated with El Niño-Southern Oscillation events meant that Samoa's water supply was rationed and water reservoirs were depleted. In 2006, low flows resulting from a 57% below average rainfall (associated with a weak-moderate El Niño) resulted in water shortages despite rains for August and September being 32% and 41% above average respectively. Flooding, which is associated with cyclones and periods of heavy rainfall, has adversely affected water quality and quantity, due in part to erosion and sedimentation associated with flash flooding. The effect of flooding upon water quality and quantity in the urban areas is exacerbated by extensive forest clearance within the uplands of the watersheds to the south of Apia. Extreme heavy rainfall causes immediate flooding, which in turns causes extensive erosion, loss of terrestrial habitats, damage to agro-forestry and destruction to vital infrastructure, for instance hydrological monitoring equipment and reticulation systems.

The influx of flood-mobilized sediments into reservoirs and hydropower schemes damages the water supply as it compromises the generation of electricity. An increase in diesel power generation is recognized as a result of faltering or unsuitable supplies for hydropower. In recent years, increasing instances of flooding and extreme rain serve only to demonstrate the water sector's vulnerability to climate change and variability. In the early 1990s, Cyclones Ofa and Val caused major disruptions to Samoa's water supply by damaging water storages and reticulation networks as well as forests that act as natural water storage and flood control systems. As water infrastructure was effectively destroyed, during and immediately after the cyclones people harvested water by whatever means they could. The destruction of vital hydrological infrastructure also made it impossible to monitor water resources. Incidents of underground water becoming saline have been reported in parts of northern and eastern Savai'i.

Samoa's NAPA prioritizes the water sector and recognizes that immediate action must be taken to mitigate the adverse effects of climate change. The vulnerability and adaptation assessment conducted as part of the Second National Communication confirmed this view, and identified a number of priority adaptation measures, including:

- upgrading and climate-proofing water storage systems to secure supply of high-quality drinking water for the entire population throughout the year;
- improved water quality monitoring to address contamination issues;
- ensuring all future developments undergo proper Environmental Impact Assessments (EIA) to ensure they will not exacerbate pre-existing climate risks; and
- enforcing sustainable management and water-related legislation to ensure ongoing availability of high-quality water.

Health. The effect of climate change upon the health sector is evidenced in the growth of vector- and water-borne diseases. Other projected health issues are the result of changes in ecological

and social systems, namely changes in local food production, potential malnutrition from successive agricultural under-production, population displacement and stresses caused by economic disruption. Some adverse health effects relate directly to weather and climatic events, for example potential fatalities in times of flooding or cyclonic activity. Others are more indirectly related to these events, for example water and vector-borne diseases in the wake of flood or cyclonic activity. Non-physical health problems – i.e. psychological or emotional stress – can frequently result from extreme weather events, particularly in instances where there is bereavement and damage to property and livelihood. Those most directly affected by extreme weather events are the poor, who tend to reside in flood-prone areas.

Samoa is susceptible to extreme climate events such as cyclones, flooding and droughts and water and food-borne diseases such as typhoid, diarrhoea and gastroenteritis remain highly prevalent. Vector-borne diseases including dengue and filariasis continue to receive highest priority in terms of control and prevention programs. The first major outbreak of typhoid in Samoa was recorded in 1994, following the two major cyclones Ofa and Val. Heavy rainfall and inadequate drainage mean that flooding is a frequent problem, compounded by land filling and the blocking of drains. Intense flooding causes foul water to be released to the surface, which poses a public health risk as septage and latrine runoff contaminate supplies.

Increased settlements along coastal areas also put additional pressure on already diminishing agricultural and fishery resources in the urban areas. Those who live in coastal areas amongst tropical vegetation, tidal mudflats and mangroves are at increased risk from vector-borne diseases and complications from wounds and tropical ulcers. The resettlement of rural villagers in urban areas is also creating sub-standard conditions in some areas, with poor sanitation and overcrowded housing contributing to the spread of communicable diseases.

The most important adaptation measures involve improving surveillance systems, early response systems and developing sustainable prevention and control programs. An initiative by MNRE under the National Adaptation Programme of Action (NAPA), the National Health Service (NHS) and the United Nations Development Program (UNDP) will develop an integrated adaptation approach to develop an early warning system that can improve climate reporting to the health sector. Raising public awareness will also be particularly important.

Agriculture. This sector's contribution to Samoa's GDP dropped from 12% in 1998 to 8% in 2003 and stayed at 7% during 2004–2007. Increasingly, agricultural production competes with other growing sectors such as tourism and manufacturing. Remittances and more attractive salary opportunities in Apia and overseas have likewise caused a shift away from agricultural production. Notwithstanding these socioeconomic changes, the Ministry of Agriculture and Fisheries has claimed that one of the factors contributing to the diminution of agricultural production in Samoa is climate change.

The numerous effects of climate change and variability: cyclones, flash floods, high rainfall, high temperature and long dry periods have made agricultural production increasingly challenging. Climatic changes have meant greater incidence of pests and pestilence, which meant a loss of quality and quantity in production.

Unstable and inconsistent food production caused by climate change has affected farmers' capacity for self-sufficiency, not to mention their ability to generate income from their crops. Perhaps the most devastating effect of natural disasters in Samoa is the damage wrought on agricultural production, and consequently the sector's capacity to supply domestic demand. Samoa's geographic location presents difficulties in terms of reducing the vulnerability of the agriculture sector, particularly as cyclones, droughts and floods become increasingly common.

Three intense cyclones have occurred in Samoa in the past twenty years, with major consequences on agricultural production. In particular, cyclones Ofa and Val caused significant damage to food and water sources. In island states like Samoa, forests and trees serve a vital role in managing watersheds, providing wood and non-timber resources and protecting biodiversity. Unfortunately, Samoa's forest cover has declined significantly in the past sixty years, as trees have been cleared for agriculture and, particularly in the 1970s and 1980s, for commercial logging. Cyclones have also contributed to forest degradation and fragmentation.

Samoaan agriculture is dominated by small-scale, semi-subsistence farming concerns. Generally, there are four broad categories of agricultural production: root crops, plantation crops, livestock, and fruit and vegetables. Agricultural development is one of the National Development Strategy's key focal areas, as over 70% of Samoan households are considered to be agriculturally active. Furthermore, the agriculture sector offers some of the best opportunities for economic development.

Like most small island countries, Samoan exports are confined largely to agricultural produce and marine resources. Samoa continues to face major barriers in terms of realizing its export potential in this sector. Key challenges for the agriculture sector include its susceptibility to climate variability and change, limited arable land and vast distances from the main world markets.

Irregular or inconsistent rainfall is especially problematic in Samoa because there is limited irrigation to provide steady supplies. Samoa has experienced drier-than-normal weather conditions over the past few years, most recently in 2004 and 2005, when average rainfall reached a thirty-year low.

The drier-than-normal conditions for 2005 brought regular dry bouts during the dry season, interspersed with short spells of torrential rain that caused flash flooding in Apia's low-lying coastal areas. From September onwards, heavy rains severely affected fruit and vegetable production. Damp conditions supported the spread of fungal disease, which in turn affected supply. In the first quarter of 2006, fruit and vegetable supply to the Fugalei market declined markedly in light of the unfavorably wet conditions of the last quarter of 2005.

Adaptation in the agriculture sector will depend on national policies, planning for projected climatic changes and developing appropriate response measures. At the village level, the emphasis should be on implementing practical adaptation measures that enhance local people's resilience to climate change. Combined, these activities will facilitate adaptation in commercial and subsistence agriculture and promote food security.

Fisheries. In recent years, the fisheries sector has concentrated much of its efforts on reviving coastal marine resources significantly damaged or indeed destroyed by cyclones and destructive fishing. All components of fisheries (oceanic fisheries, coastal fisheries and aquaculture) show very high vulnerability to levels of CO₂ concentration. Whilst emissions may have no immediate impact on the sector, by virtue of the connection between CO₂ emissions and climate change, over time the effects on this sector are likely to be significant.

Because it can alter environmental conditions relevant to productivity and habitats for pelagic species, sea surface temperature (SST) is critical to both the coastal and oceanic sectors in the immediate to long-term. For aquaculture, rising SST threatens broad stock like giant clams, as water temperatures exceed normal tolerance levels.

Extreme winds affect all components of fisheries. For oceanic and aquaculture fisheries, infrastructure becomes more vulnerable as fishing vessels smash into each other at berth and alongside the wharf and the hatchery required for spawning is damaged or destroyed by flying objects and fallen trees.

The Coastal and Aquaculture component of Fisheries is also vulnerable to extreme rainfall as run-off from land affects the coastal marine environment. Extreme wave action is projected to have a devastating effect on coastal fishery and aquaculture. Wave action is also important for the oceanic component of fishery, as it can significantly reduce catches.

Rising temperatures can have a disastrous effect on the marine ecosystem. Dinoflagellates, which coral polyps rely upon for survival, are highly sensitive to fluctuations in temperature. Extreme rises in temperature can force these micro-organisms to vacate coral polyps, thus leading to the demise of reefs. This process is commonly known as coral bleaching. Coral reefs support a variety of marine organisms, and when reefs die the ecosystems they support rapidly collapse. So far, however, no major cases of coral bleaching have been reported to Fisheries.

Molluscs are highly sensitive to fluctuations in temperature, light and salinity. High rainfall and flooding can disturb the composition of salinity and sediment in water, which can distress or kill molluscs. Changes in temperature have various effects on spawning. The optimum growth and spawning temperature for tilapia (*O. niloticus*) is between 27 and 32 °C. Giant clams are more likely to spawn at the higher ranges of their optimal temperatures (28 to 32 °C). Beyond this optimal range, however, symbiotic algae are often expelled (Shokita et al. 1991). Sea urchins are especially sensitive to changes in salinity. After periods of heavy rain, sea urchins are often found dead or dying in shallower waters.

The only measurable variable with respect to oceanographic conditions that we can freely obtain is the SST of Samoan waters. High CPUE levels coincide with low SST and low CPUE levels coincide with high SST. Albacore inhabit depths where colder temperatures occur, below the thermocline layer. Although SST measurements do not extend below the thermocline layer, low SST is linked with relatively high levels of CPUE and vice versa.

Practically, this means that low levels of SST are associated with higher catch rates for albacore tuna. Other species, including the yellowfin and skipjack tuna (*Katsuwonus pelamis*), are found

to prefer warmer temperatures. With sufficient reliable data, we would expect, for these species at least, a correlation with SST opposite to that of albacore tuna.

Adaptation measures include managing fisheries resources, establishing marine protected areas and reserves, restoring vital habitats like mangroves and coral reefs, improving public education and devising and implementing sound policy and regulation.

Current fisheries policies and systems fail to provide a coherent plan-of-action to address the effects of climate change. The current Fisheries Act 1988, which provides the scope of fisheries, must be updated to include a system capable of addressing climate-change risks. Such a system must focus on a thorough analysis of risks and develop strategies for the sector, based on climate-change projections.

Biodiversity. Many changes are anticipated for the biodiversity sector as a result of climate change, not only in terms of species population but also in terms of the health of entire ecosystems. The health of the biodiversity sector has direct consequences for inter-related sectors, namely fisheries, forestry, agriculture, tourism, infrastructure, health and water. The biodiversity sector will need to implement sound adaptation activities to combat both the detrimental consequences of human activity and the effects of climate change. Sectoral efforts to assess vulnerabilities and generate future climate-change scenarios face numerous difficulties and uncertainties. Most animals depend on more than one habitat for survival, thus, if only one of these habitats is damaged or destroyed a great deal of uncertainty surrounds their capacity to adapt and survive. To identify potential damage to habitat and ecosystems will therefore provide an idea of how different species may be affected.

Increasing temperatures can affect species in quite profound ways. A change in SST may for instance affect the timing of biological events (phenology) for certain species. Many species may also show changes in morphology, physiology and behavior associated with changes in climatic variables, for example accelerated attainment of sexual maturity.

Furthermore, there is some concern that particular species may become endangered or extinct, particularly species that are currently vulnerable, for instance the endemic Manumea and certain species of turtle. Changes in species distribution and density from climatic stress could also affect the availability of food and increase the frequency and intensity of pestilential outbreaks, which would again have some bearing on species' capacity to survive.

At the ecosystems level climate change is expected not only to affect the diversity of native fauna and flora, but also the ecosystems that provide goods and services for human welfare and development. Extreme climatic conditions relevant for the marine biodiversity sector include:

- sea-level rise;
- higher SST;
- increasingly frequent and intense tropical storms;
- frequent flooding;
- extreme high and low tides; and
- increases in ocean acidification.

These climatic changes will have potentially disastrous consequences for marine biodiversity and ecosystems, including:

- habitat mortality: coral bleaching, erosion, and sedimentation;
- accelerated coastal erosion that will remove beaches and mangroves important to certain marine species;
- extensive coastal inundation and higher levels of sea flooding;
- waves and storm surges into coastal land areas, causing salinity in coastal wetlands and coastal springs;
- mangroves and wetlands pushed further inland by frequent king tides and sea-level rise;
- eutrophication, sedimentation and siltation of water resources, leading to invasive species proliferation;
- increased habitat and nursery areas destruction, ensuing in species decline;
- decline in inshore fisheries; and loss of natural reefs that protect the islands and coastal communities.

Priority adaptation measures identified in this study include:

- replanting mangroves and restoring habitats;
- re-introducing native and endemic plants within established national reserves and parks;
- improving the way protection regimes for marine and terrestrial biodiversity are managed; and
- reviewing the way different laws, policies, and strategies are implemented.

Although Samoa has developed a stronger understanding of the vulnerabilities and adaptation potentials of its biodiversity, critical information gaps still exist. More must be done to understand the role each species plays in the ecosystem. This would also improve general knowledge of the risks posed by degradation of the ecosystem and species loss.

Infrastructure. Samoa's coastline is highly susceptible to erosion and flooding (BECA, 2000). More than three quarters of Samoa's population resides along the coastal planes, which indicates to some degree Samoans' strong reliance upon marine resources for subsistence and commerce. Infrastructure and utility services are also located in these coastal zones and are thus extremely vulnerable to extreme climate events.

The Second Infrastructure Asset Management Project (SIAM) and Cyclone Emergency Recovery Programme (CERP) have helped develop Coastal Infrastructure Management (CIM) plans, as well as promote design standards and COEPs for road works and coastal protection structures. Through the CIM Plans, the Government and communities have agreed on various solutions to manage coastal infrastructure in times of coastal erosion, flooding and landslides induced by cyclonic activity. These initiatives must be extended to accommodate inland flooding and watershed management, particularly in light of their affect on coastal infrastructure and works.

Climate stresses such as cyclones, prolonged droughts, extreme flooding, storm surges and sea-level rise are likely to increase over the coming decades. Samoa must therefore urgently consider suitable technologies that will aid its adaptation efforts in safeguarding vital infrastructure.

Tourism is a major economic sector in Samoa, and most tourism spots are located within coastal areas. The effects of climate change and climate variability have been widely acknowledged as both direct and indirect. Direct effects include the loss of beaches, inundation and degradation of coastal ecosystems, saline intrusion and damage to critical infrastructures. Indirect consequences include the diminished beauty of natural resources, for example bleached coral or destroyed forests.

The damage that Cyclones Ofa and Val caused Samoa is estimated to be about three times the Gross National Product (GNP). High winds, storm surges and heavy rains caused severe damage to ninety per cent of infrastructure including the coast of Apia. In 2004, cyclone Heta also caused damage to infrastructure, although on a smaller scale.

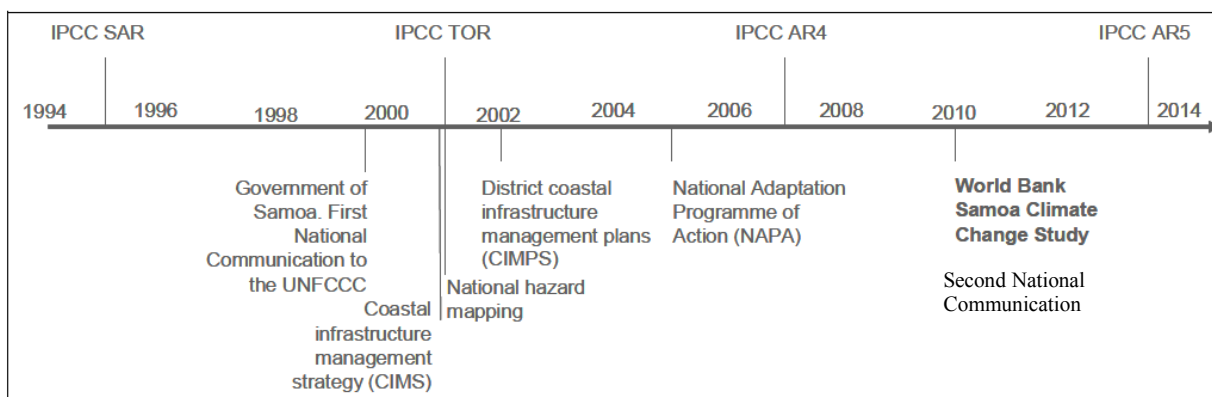
The vulnerability of the sector is high because of sea level rise, cyclones, flooding and wave actions. Drought is less of an issue except with respect to hydroelectric dams, which obviously depend on a steady stream of rainwater to generate electricity. The droughts of 2002 and 2003 led to rationing of electricity. Frequency in climate-change-related drought will make Samoa increasingly dependent on diesel, although generation costs from diesel are significantly higher.

Extreme flooding also has strong implications for the health of national infrastructure as it erodes roads, damages and fells telegraph poles and compromises utilities like water and electricity. Samoa was hit by flooding twice in 2006, once in February and again in November. This is quite rare for Samoa, and may prove that return periods for extreme weather events are becoming shorter over time.

High-priority adaptation measures include creating a CIMP that will improve the resilience of coastal infrastructure against erosion and flooding. New developments must also be managed sustainably to ensure that infrastructure is efficient, environmentally friendly and supports Samoa's economic growth.

Stocktake of Current and Planned Adaptation and Related Interventions

A. Timeline of Key IPCC and Government of Samoa Reports⁸



B. Relevant Policies⁹

Samoa has been proactive in its assessment of climate change impacts, vulnerabilities and identification of current and possible future adaptation measures. There are a number of policies and directives which are seeking to understand the implications of climate change upon the country, and the integration and co-ordination of efforts to mitigate and respond to it. Examples of relevant legislation and policies that are relevant in this regard are:

National Adaptation Plan of Action (2005) (NAPA)

The NAPA provides an overview of climate change impacts and vulnerabilities, identifies adaptation strategies and outlines the process used to select and prioritise specific adaptation projects for priority sectors.

Planning and Urban Management Act (2004)

This Act is administered by the Ministry of Natural Resources and Environment (MNRE). The Act broadly defines development and considers its impacts on the 'total' environment (social, economic and bio-physical). The objectives are to provide for the fair, orderly, economic and sustainable use, development and management of land including the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity; to enable land use and development planning and policy to be integrated with environmental, social, economic, conservation and resource management policies at national, regional, district, village

⁸ Samoa Climate Change Adaptation Study - Desk Top Review. Prepared for The World Bank by Beca International Consultants Ltd, 18 March 2010.

⁹ Adapted from Samoa Climate Change Adaptation Study - Desk Top Review. Prepared for The World Bank by Beca International Consultants Ltd, 18 March 2010.

and site specific levels; to create an appropriate urban structure and form for the development of Apia and other centres so as to provide equitable and orderly access to transportation, recreational, employment and other opportunities; to secure a pleasant, efficient and safe working, living and recreational environment for all Samoans and visitors to Samoa; to protect public utilities and other assets and enable the orderly provision and co-ordination of public utilities and other facilities for the benefit of the community; and to balance the present and future interests of all Samoans.

To meet these objectives, the Act provides, amongst other mechanisms, a process for the development of sustainable management plans and various co-ordination, education and promotional roles. In respect of the plans, a hierarchy of national, regional, district and village sustainable management plans is in place. The Act does not make any specific references to the effects of climate change or climate change adaptation, its wording may however be, in the main, specifically broad as to encompass those matters in its enactment.

National Policy to Combat Climate Change (2007)

The National Policy Statement on Climate Change is administered by the Ministry of Natural Resources and Environment. The policy outlines Samoa's response to climate change. It provides a national framework to help reduce the rate of global climate change as well as the adverse effects of climate change on Samoa by adapting to its impacts.

Disaster and Emergency Management Act (2007) and National Disaster Management Plan (2007)

The act is administered by MNRE. It requires the development of a National Disaster Management Plan (NDMP). The NDMP must include a comprehensive risk profile for all parts of Samoa and the arrangements to be implemented to reduce risk as well as preparedness, response and recovery arrangements. The definition of Disaster includes "(i) any naturally occurring event affecting the whole or any part of Samoa". The plan recognises climate change, sea-level rise, environmental degradation, pollution, coastal erosion, water quality and resource management as important environmental issues being managed by Samoa.

The emphasis of the disaster management plan are on those hazards that have the potential to create a significant disaster in Samoa, and would most likely require some degree of government coordination to manage. The framework of the plan includes identification and ranking of risks, risk reduction and contingency planning, and recovery. Whilst 'climate change' per se is not identified as a discrete risk, key components of it are identified: cyclone, environmental crisis (evasive species), flood, landslide (e.g. as might be caused through extreme rainfall events), single asset failure – dam (e.g. as might be caused through exceedance of spillway design capacity), drought. A schedule of disaster risk reduction activities is maintained, and the agency responsibilities and relevant tools (e.g. legislation) identified. The Plan has been prepared with a maximum review timeframe of three years, and for identification and management of foreseeable threats and events of significant magnitude.

Whilst the Plan considers risks around climatic events (e.g. cyclones, heavy rain, storm surges), it appears that consideration of long term incremental risks falls outside of the plan’s coverage – intentionally or otherwise. National contingency plans to address risks of more immediate concern (e.g. tsunami, flooding and fires) are noted as “not yet drafted” (the Invasive Species national contingency plan is complete), and this does suggest the long term incremental issues may not yet have received increased attention.

Coastal Infrastructure Management Strategy (2007) and Plans

The first Coastal Infrastructure Management Strategy (2001) provided a series of national and local principles for coastal management. The strategy developed objectives, policies and implementation methods for hazard and environmental information gathering and monitoring, education and awareness raising, use and management of resources and for undertaking intervention actions. The CIM Strategy also set out the need for Coastal Infrastructure Management Plans (CIM Plans), and defined goals, objectives, policies and implementation methods across a broad range of coastal considerations.

C. Current and Planned Adaptation Interventions

All projects but NAPA 5 through 7 are under implementation. Implementation of NAPA 1 and 2 started first.

Project	Sectors	Priorities	New Proposals	Additional Funding needed (USD)
NAPA1	Climate Health Agriculture	<ul style="list-style-type: none"> • Early Warning System • Climate Health Programme • Agriculture Sustainability & Food Security 	<ul style="list-style-type: none"> • EWS (data recovery) • Agriculture pilot - all farmers • NHS pilots – all villages 	1 2 (SAP) 2
NAPA2	Climate Coastal	<ul style="list-style-type: none"> • Early Warning System • Coastal Protection 	<ul style="list-style-type: none"> • EWS (storm surges, cyclone, tsunami) • Community-based Small Grants Scheme – hard & soft solutions 	1 3
NAPA3	Climate Agriculture Forestry Environment	<ul style="list-style-type: none"> • Early Warning System • Agroforestry development – lowland areas • Terrestrial biodiversity conservation – upland 	<ul style="list-style-type: none"> • EWS (reportings to farmers) • AusAID-funded Agroforestry • Conservation of PAs on public 	1 10 2

		customary lands	lands (Savaii) • CDM, REDD and LULUCF Options	0.5
NAPA4	Climate Landuse Planning Water Forestry Tourism	<ul style="list-style-type: none"> • Early Warning System • Zoning & Strategic Planning - surface flood Adaptation • Forest Fire Prevention • Sustainable Tourism adaptation 	<ul style="list-style-type: none"> • EWS (Tourism Stakeholders and Urban residents) • Sustainable Tourism (LDC Fund) • CDM, REDD and LULUCF Options 	1 3 (LDC) 0.5
NAPA5	Climate Coastal Environment	<ul style="list-style-type: none"> • DRR - DMO • Coastal Wetlands Rehabilitation • Marine Biodiversity Conservation - MPAs 	<ul style="list-style-type: none"> • EWS • Marine Biodiversity conservation • CDM, REDD and LULUCF Options 	2 2.5 (GEF 5) 0.5
NAPA 6	Tourism	<ul style="list-style-type: none"> • Building adaptive capacity 	<ul style="list-style-type: none"> • EWS • Private Sector capacity building 	3 (LDC)
NAPA 7	Health, DRR, Water	<ul style="list-style-type: none"> • CRD Survey nationally 	<ul style="list-style-type: none"> • Health Sector CRD Baseline - 2010 	15 (SGF)
SIAM II	Infrastructure	<ul style="list-style-type: none"> • Climate proofing 	<ul style="list-style-type: none"> • CIM Plan pilots 	2
EE	Transport	<ul style="list-style-type: none"> • Biodiesel production from coconuts planted on degraded lands to prevent soil erosion • Private sector pilots within agroforestry sector 	<ul style="list-style-type: none"> • Alternative fuels • CDM, REDD and LULUCF Options 	1.5 0.5
Biomass	Forestry Electricity	<ul style="list-style-type: none"> • Waste biomass sourcing and biomass tree planting on degraded lands to prevent soil erosion, boosting socio-economic returns from value-adding agric products • Private sector pilots within agroforestry sector 	<ul style="list-style-type: none"> • Gasification • Incentivisations • Dual Fuel • CDM options 	0.5 1 0.5 0.5
Research and Governance	All	<ul style="list-style-type: none"> • CCA and DRR Policy Analysis • Aid Coordination (CC) 	<ul style="list-style-type: none"> • Update Framework & SDS (MOF) • Sustainable Financing 	1.5 1

		<ul style="list-style-type: none"> • NCCCT Governance • Capacity Building (Tourism) 	Mechanism, DNA, NIE <ul style="list-style-type: none"> • Secretariat • Tourism CC Working Group (STA) 	 1 0.5
PPCR	TBD	TBD	TBD	TBD

D. PROPOSAL FOR PARTICIPATION FROM THE MINISTRY OF AGRICULTURE AND FISHERIES (MAF)

Objective

Improved farmer resilience by accessing climate change resilient technologies.

Background

Some climate change resilient technologies are now available but at very limited amounts. They need to be multiplied to get the numbers for distribution to farmers before their adaptive potentials are realized.

The initial members are extremely small as they were introduced or developed from breeding programmes.

These materials are in high demand from farmers, especially in terms of their economic value as well as their adaptive capacity to adverse environmental conditions.

Specific gaps in climate resilient programmes:

1 Multiplication capacity of climate resilient technologies in crops:

Crop	Property	Strategy
Taro (5 varieties)	resistance to taro leaf slight	4 million per cultivation for 1,000 acres
Cassava (2 varieties)	drought and advance	100,000 cuttings per vans for 1,000 farmers
Sweet potatoes (2 varieties)	drought tolerance	10,000 cuttings for 1000 farmers
Breadfruit (Sagosago+ maafala)	wind tolerant and good market potential	1000 plant materials for 500 families

2 Multiplication capacity of climate resilient technologies in Livestock:

Breed	Property	Strategy
Sheep (Fiji Fantastic)	Heat tolerant – fitting for the tropics	Introduced in 2004; need introduced male stock (20) to

		avoid inbreeding.
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3 Multiplication capacity of climate resilient technologies in Fisheries:

Area	Property	Strategy
Hatchery	Germplasm and multiplication for restocking	No facility at present; need for aquaculture and inshore rehabilitation work

4 Awareness on PPCR activities in MAF

Area	Property	Strategy
Development of tool	dissemination	Wide public awareness

E. Priorities Of the Electric Power Corporation (EPC)

Climate Change adaptation projects (Priority for PPCR shown in yellow)

Proposed project	Details	Approximate Cost (\$SAT)
Augmentation of Afulilo Reservoir	Increasing capacity of Dam/reservoir at Afulilo to ensure maximum water is retained to make the corporation more resilient to the impacts of climate change namely change in rainfall patterns, annual rainfall and frequency and severity of El Niño/ La Niña events.	\$12 million
Relocation of transmission lines away from the coastal areas	Relocation of some of the transmission lines inland away from the vulnerable coastal areas. This was	\$10million
Other Climate Resilience projects		
Alternatives to hydro power as the rainfall patterns change / Energy Security.	Renewables such as solar ; local biofuels.	

Undergrounding of transmission lines		
Climate modeling for hydro / wind / solar etc		
Climate proofing equipment used for power transmission e.g transmission lines etc		

F. Land Transport Authority

A priority is re-assessment of Samoa’s Road, Bridge, Seawalls, Drainage, Urban Facilities and Traffic Management Design and Construction Standards under this program. A specialist is needed in each of these areas to assist in reviewing and putting these standards together.

G. Ministry of Natural Resources and Environment

MNRE priority is on:

- Reviewing (done) and utilizing the national CC policy analysis framework (prepared by Dr. Emma Wong/Min Chiang - Vic Uni) – Emma to provide updated version to us all
- Ongoing Project Implementation – urgent actions/pilots on the ground, sector by sector
- Building on exciting adaptation activities (e.g. National Climate Related Disease [CRD] baseline – 2010) as health sector still needs this baseline – top priority
- More capacity building built into implementation activities – top priority
- Early Warning Systems expanded nationally with MD, DMO, FESA, UN Agencies with CC reportings to all sectors – top priority
- More engagement of GEF IAs and EAs to review emerging regional programmes (e.g. \$30M CC Mitigation GEF 5 programme as \$2M earmarked for each PIC) – top priority (SPREP or SPC to be invited to prepare regional thrust, with country specific activities piloted)
- Designing ‘Ministry of CC, DMO, MD, FESA, etc.’ to help streamline CC coordination
- Leveraging capital investment, especially for renewable energy technologies, but if there was an opportunity to plant agricultural crops/biomass crops on degraded lands to prevent soil erosion, etc, then possibly this concessional component could be used here because of the synergies between mitigation and adaptation – top priority
- Review of CIM Plans for infrastructure sector (SIAM I Project initially), and
- CC Trust Fund established, also attracting carbon credits.

H. Ministry of Health

Climate Change is projected to exacerbate many existing health problems and requires urgent strategic planning and coordination to ensure policies, sector and institutional plans reflect necessary prioritisation and interventions.

Adverse human conditions due to extreme weather events, vector-borne diseases and gastro-intestinal diseases due to inadequate access to safe water and good sanitation are of primary concern. Current high disease burdens due to typhoid, dengue, diarrhoeal diseases and

filariasis may increase due to changing climate, as may the incidence of flooding, other natural disasters and associated impact on human lives.

Health was prioritised as the third ranking sector within the Samoa NAPA (2005), behind the Agriculture/Food Security and Forestry sectors.

A four-year project to integrate Climate Change into the Health and Agriculture Sectors (ICCHAS) is currently underway (2009-2013) funded by the Global Environment Facility. The implementing agency is the UNDP with the Ministry of Natural Resources and Environment coordinating implementation with the National Health Service as the main health service provider in collaboration with the Ministry of Health.

The overall goal of the health specific component within the ICCHAS project is to strengthen the capacity of Samoa's health planners and public health protection and population health workers to reduce the impact of climate change on population health.

The specific outputs of the project are:

- (1) Strengthened information systems for climate-related disease data collection, storage and analysis
- (2) Public health planners and public health workers trained in climate related health risk monitoring and management
- (3) Revised public health plans and strategies to incorporate climate risk projections and adaptive planning
- (4) Pilot rapid testing for climate related diseases in 3 high risk districts

Health Sector proposal for the PPCR project

An assessment of the initiation and consultation process of the current ICCHAS project including emerging challenges in implementation has shown the need for an overarching national strategy for addressing climate change within the health sector.

Just as the PPCR provides an opportunity for an overall national strategic program for climate resilience, to guide and prioritise different sectors' climate change adaptation needs, so too is the need to ensure an overarching strategy within the health sector.

The ICCHAS project health component is institution based with its activities limited to the mandates of the National Health Service as a provider. The Ministry of Health on the other hand with its mandate for overall sector planning, policy development and monitoring, by necessity has to ensure climate change and health issues are addressed in a strategic manner that maximizes use of all resources and stakeholders within the sector. Having an overarching national strategy for addressing climate change within the health sector would also address the important issue of sustainability of developments.

In deference and acknowledgment of the PPCRs own budget limitations and intention to prioritise funding to various sectors, the Ministry of Health proposes the above initiative as a most appropriate and apt activity that complements the intentions of the PPCR initiative.

I. Samoa Umbrella for Non-governmental Organizations (SUNGO)

SUNGO is conducting an EU Non State Actors (NSA) and NZAID funded Capacity Building Programmers for Civil Society Organisations for the Management of Organisations and Projects

that will be awarded to Community Based Organisations. These programmes are progressing back to back over the next 2 years.

In view of the PPCR, gaps have been identified in the Capacity Building of Community in Good Governance relating to climate resilience, community based adaptation and climate change are as follows:

That we propose to tailor a 5 day training programme on Climate Change Adaptations informing on:

- The goal of the workshops will be to increase the adaptive capacity of communities and individuals to the effects of climate change .
- Prior to 5 day meeting, conduct a RRA to prepare background information for the community consultation using the CIM plans and the aerial photography over a period of years.
- What is the science of climate change;
- What are options for adapting to Climate Change;
-
- Develop climate change strategies and projects in a participatory manner;
- Budgeting, project management and sustainability;

Some Example projects could be:

1. Human activities that have caused problems of severe flooding within community habitations.

Elevated road construction preventing storm-water drainage from low land areas typical of village abodes and also result in aggravated static unhealthy swampy conditions over longer periods in the low land areas which are commonly observed in areas behind villages.

The construction of roads into communities or to inland farming areas—these roads reflect the element of false economy as a result of poor planning when no roadside drainage is provided to allow for proper disposal of storm-water which causes extensive damages to these expensive infrastructure (roads).

2. The need for community leaders and the grassroots people to understand and comply with the proper Building Code of a Septic tank Construction as per specifications which is designed to breakdown solid waste and eliminate harmful bacteria endangering health and environment.

3. The need for community leaders and the grassroots people to understand the required safe distance of locating pit-toilets and septic tanks from water springs from which communities rely on for drinking and washing as water resources become more scarce in the face of climate change.

4. The need for community leaders and the grassroots people to understand that pit-toilets and septic tanks located on low lying areas prone to flooding will eventually be inundated with flood waters and its contents spread throughout the community—which is an unhealthy situation. Part of the consultation can identify these areas in a community.

5. The need for community leaders and the grassroots people to understand, that the current, legislated 30 meters buffer zone of trees along river embankments is insufficient and

should be extended to 100 meters, eg: Togitogina River being dried-up as well as other rivers along the South-coast.

6. The need for community leaders and the grassroots people to understand, that the current practice of clearing our tropical forests for cattle farming and taro plantations present an irreversible situation where our rivers and coastal streams have dried-up and effect siltation of the coral reef which is a natural defence to sea-level rise.

7. The need for community leaders and the grassroots people to understand, that the current practice of constructing homes that come with toilets etc over artesian water veins contribute to contamination of community coastal water pools.

8. The need for community leaders and the grassroots people to understand, that the current practice of sand-mining causes lengthy damaging results to beaches and coastline areas which are susceptible to climate change induced sea-level rise, wind direction change and changes in wave patterns.

9. The need for community leaders and the grassroots people to understand, that communities located along low-lying areas should progressively move to high elevation as the ultimate adaptation to climate change.

J. Samoa Tourism Authority (STA)

STA's proposal on projects which may coincide with PPCR's objectives:

Infrastructural Developments:

- Tree Propagation – 100,000 trees on an annual basis
 - o Financial support in supplying trees for planting
 - o Marketing Campaigns for promoting tourist 'carbon – off sets'
- Administrative costs for setting up 'volunteer task force' for tree planting

- Eco-Tourism:
 - o Implementation costs for promotion of project 'Green Tourism'
 - Beautification & Tree Planting within Conservational Areas, Attraction sites, Canopy Walk, etc.

- Climate Change Adaptation Awareness within Tourism Industry
 - Training and awareness campaigns

- Tourism Climate Change Project Work Group
 - o Implementation and Set up
 - o Capacity Building
 - 'Agency Response Plan' report, etc.

- National Tourism Adaptation Strategy 2010 – 2015
 - o Consultation

Possible PPCR Investment Opportunities¹⁰

- Further implementation of NAPA priorities
- Replicate and scale up the climate change mainstreaming process currently being implemented by MNRE for its planning, work programming and budgetary processes
- Scale up existing, successful pilot adaptation projects, including community-based adaptation
- Implementing CIM Plans (after updating if necessary)
- Addressing sector needs identified in the stocktake
- National trust fund for climate change grants
- Budget assistance to cover incremental costs of ensuring government development projects are climate proofed
- Contribution to a pooled donor fund for climate change adaptation initiatives
- Cross-cutting, multi-sectoral adaptation investments
- Joint adaptation and mitigation investment projects in forest, agriculture and energy sectors, to exploit synergies

¹⁰ Phase 1 of PPCR would assess these and other options, prioritize them and reflect them in both the PPCR Strategic Program for Climate Resilience and in the proposed medium- and longer-term climate change strategy for Samoa.