



**PACIFIC ADAPTATION TO CLIMATE CHANGE**

**SAMOA**

**REPORT OF IN-COUNTRY CONSULTATIONS**

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# I. INTRODUCTION

## 1.1 The need for adaptation to climate change

1. Small island developing States (SIDS) are highly vulnerable to climate change and sea level rise owing partly to their small land masses surrounded by ocean, and their location in regions prone to natural disasters. SIDS are often characterized by having relatively large populations for the area they occupy with high growth rates and densities; poorly developed infrastructure and limited natural, human and economic resources, and their high dependence on marine resources for their livelihood needs. Most of their economies are reliant on a limited resource base and are vulnerable to external forces, such as changing terms of trade, trade liberalization, and migration flows. Adaptive capacity to climate change is generally low.

2. In the Pacific region where the Samoa (13° 35' S, 172° 20' W) is situated, the climates are influenced by a number of factors such as trade wind regimes, the paired Hadley cells and Walker circulation, seasonally varying convergence zones such as the South Pacific Convergence Zone (SPCZ), semi-permanent subtropical high-pressure belts, and zonal westerlies to the south, with the El Niño Southern Oscillation (ENSO) as the dominant mode of year to year variability (Fitzharris, 2001; Folland *et al.*, 2002; Griffiths *et al.*, 2003). The Madden-Julian Oscillation (MJO) also is a major mode of variability of the tropical atmosphere-ocean system of the Pacific on times scales of 30 to 70 days (Revell, 2004), while the leading mode with decadal time-scale is the Interdecadal Pacific Oscillation (IPO) (Salinger *et al.*, 2001). A number of studies suggest the influence of global warming could be a major factor in accentuating the current climate regimes and the changes from normal that come with ENSO events (Hay *et al.*, 2003; Folland *et al.*, 2003).

3. Recent studies in the southern Pacific region show that the annual and seasonal ocean surface and island air temperatures have increased by 0.6 to 1.0°C since 1910 throughout a large part of the South Pacific, southwest of the South Pacific Convergence Zone (SPCZ) where as decadal increases of 0.3 to 0.5°C in annual temperatures are only widely seen since the 1970, preceded by some cooling after the 1940, which is the beginning of the record, to the northeast of the SPCZ (Salinger, 2001; Folland *et al.*, 2003).

4. Analyses of trends in extreme daily rainfall and temperature across the South Pacific for the period 1961 to 2003 show significant increases were detected in the annual number of hot days and warm nights, with significant decreases in the annual number of cool days and cold nights, particularly in years after the onset of El Nino, with extreme rainfall trends generally less spatially coherent than were those of extreme temperature (Manton *et al.*, 2001; Griffiths *et al.*, 2003). Variations in tropical cyclones, hurricanes, typhoons in all small islands' regions are dominated by ENSO and decadal variability which result in a redistribution of tropical storms and their tracks, so that increases in one basin are often compensated by decreases in other basins. For instance, during an El Niño event, the incidence of tropical storms typically decreases in the far western Pacific and the Australian regions, but increases in the central and eastern Pacific while during La Nina the trend reverses. The numbers and proportion of hurricanes reaching category 4 and 5 globally have increased since 1970, while total number of cyclones and cyclone days decreased slightly in most basins which is consistent with the trends observed in the Pacific islands region. Additionally, in the tropical South Pacific, the distribution of tropical storms and their tracks are dominated by ENSO and decadal variability, with small islands to the east of the dateline highly likely to receive a higher number of tropical storms during an El Nino event compared to a La Niña event and vice versa (Brazdil *et al.*, 2002).

5. Past studies of adaptation options for small islands have been largely focused on adjustments to sea-level rise and storm surges associated with tropical cyclones. There was an early emphasis on protecting land through ‘hard’ shore-protection measures rather than on other measures such as accommodating sea-level rise or retreating from it, although the latter has become increasingly important on continental coasts. Vulnerability studies conducted for selected small islands (IPCC, 2001) show that the costs of overall infrastructure and settlement protection is a significant proportion of GDP, and well beyond the financial means of most small island states. More recent studies since the TAR have identified major areas of adaptation, including water resources and watershed management, reef conservation, agricultural and forest management, conservation of biodiversity, energy security, increased share of renewable energy in the energy supply, and optimized energy consumption. Proposed adaptation strategies have focused on reducing vulnerability and increasing resilience of systems and sectors to climate variability and extremes through mainstreaming adaptation.

6. While small islands must adapt to the consequences of climate change, their adaptive capacity is limited and is being further eroded by external factors such as the internationalisation of economic activity and internal population pressures. People in small islands have historically adapted to variability in climate and sea conditions. It is not clear how valuable this experience will be in dealing with the longer-term mean changes in climate and sea level, especially since traditional mechanisms for coping with environmental hazards are being lost in many islands.

7. The need to implement adaptation measures in small islands with some urgency has been recently reinforced by Nurse and Moore (2005), and was also highlighted in the TAR where it was suggested that risk-reduction strategies together with other sectoral policy initiatives in areas such as sustainable development planning, disaster prevention and management, integrated coastal zone management and health care planning should be employed. Since then a number of projects on adaptation in several small island states and regions have adopted this suggestion. Projects aim to build capacities of individuals, communities and governments so that they are more able to make informed decisions about adaptation to climate change and to enhance their adaptive capacity in the long run.

8. Given the urgency for adaptation in small island states there has been an increase in *ad-hoc* stand alone projects, rather than a programmed or strategic approach to the funding of adaptation options and measures. It can be argued that successful adaptation in small islands will depend on supportive institutions, finance, information and technological support. Thus an adaptation strategy for the Pacific islands and indeed for Samoa should include a strategy for precautionary adaptation since it is difficult to predict far in advance how climate change will affect a particular site, sector or community. Thus adopting a “no regrets” adaptation measures would be justified even in the absence of climate change, as this would more than likely lead to better management of natural resources and sustainable development.

## **1.2 Objective of Pacific Adaptation to Climate Change (PACC)**

9. Given the foregoing urgency for the need for adaptation to climate change in the Pacific island countries, a Pacific Adaptation to Climate Change (PACC) has been developed to assist with the implementation of adaptation measures in 11 countries of the region. Samoa, as one of the participant countries will participate in the PACC implement adaptation measures to enhance its resilience to the adverse impacts of climate change in the longer term.

10. The principal objective of the PACC is to facilitate the implementation of long-term adaptation measures to increase the resilience of a number of key development sectors in the Pacific island countries to the adverse impacts of climate change. A framework for PACC (PACC framework) will be developed through a consultative process involving all relevant stakeholders (including national governments and their respective agencies, institutions, departments and ministries, and non-government organizations, where appropriate, CROP agencies, donor partners, private sector, where appropriate, and others deemed necessary). The PACC framework will guide the implementation of the PACC at the national (including community and/or village) and regional levels.

### **1.3 Scope of the Report**

11. As one of the key outcomes of the in-country consultations is to determine detailed adaptation activities and baselines in each country, this report provides the outcomes of the Samoa in-country consultations on PACC which were held from September 18 to 21 2006. The report is divided into five sections: section 1 outlined the urgency for adaptation to climate change in SIDS, building on the IPCC third assessment report; section 2 provides a general overview of the climate change and development situation (situation analysis) in the Samoa covering issues relating to assessment of impacts of climate change on the biophysical and human systems and stakeholder analysis; section 3 covers sectoral analysis with regard to a methodology and/or a criteria used to select a priority sector for adaptation intervention, institutional and development baselines within the priority sector as well as the analysis of the impacts of climate change within the priority sector; section 4 provides information of the delivery mechanism for full-sized project implementation of the Samoa component of the PACC and section 5 covers the project goals, outcomes, outputs and activities. The letter of endorsement for co-financing and list of individuals/experts and their respective institutions consulted during the in-country consultation are appended as annexes in section 6.

## **II. GENERAL OVERVIEW**

### **2.1. Situation Analysis**

12. Samoa lies between latitude 13° 35' S and longitude 172° 20' W and consists of four main inhabited islands and six small uninhabited islands. It has a total land area of 2,934 km<sup>2</sup> and an exclusive economic zone (EEZ) of 12,000 km<sup>2</sup>. It forms the western part of the 500km long Samoan Archipelago with American Samoa forming the eastern end. It is a South Pacific Island country and lies in the tropical cyclone region. It has the smallest Exclusive Economic Zone in the Pacific region.

13. Main topographical features of Samoa are rugged mountains of volcanic origin, surrounded by flat and rolling coastal plains. All the islands of Samoa were formed by volcanic activity. Savai'i is regarded as still volcanically active with its most recent eruption producing lava flows between 1905 and 1911. A large percentage of Samoan soils are porous, shallow and clay in texture.

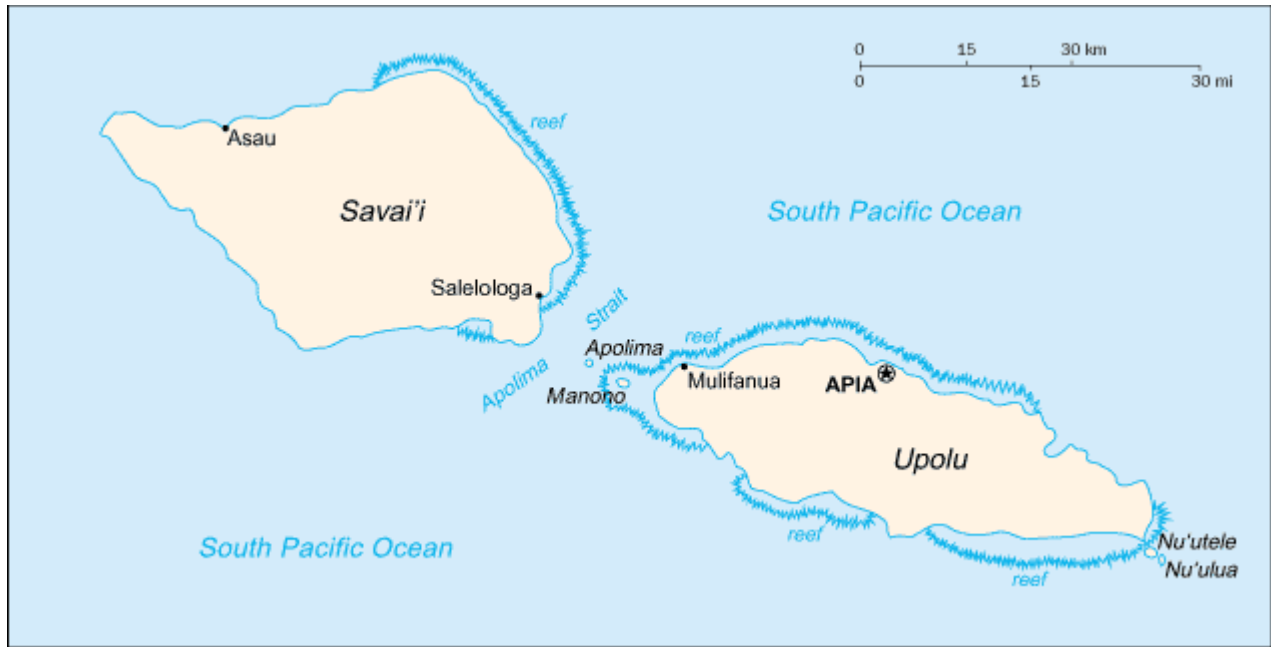


Figure1. Location of Samoa

14. Samoa's climate is typical of small tropical islands. The rainfall and humidity are usually high with distinctive wet and dry seasons on the leeward (north western) sides of the main islands, Savaii and Upolu. Temperatures are high and generally uniform throughout the year. Samoa experiences southeast trade winds almost all times of the year. However severe tropical cyclones occur during the summer months of December to February. Samoa is also vulnerable to anomalously long dry spells that coincide with the El Nino South Oscillation (ENSO) phenomena. These vulnerabilities are particularly exacerbated during extreme events, as evident when tropical cyclones Ofa (1990) and Val (1991) devastated Samoa causing damage estimated to be about three times the GNP (GOS/DLSE, 1999), and the dry spells that followed.

15. Observed trends and variability in climate derived from quality long term climate data from the region show that mean island near-surface air temperature increased by between 0.3-0.8 degrees Celsius during the 20th century, with the largest increase in the zones south west of the South Pacific Convergence Zone (SPCZ) (Salinger 2000). Maximum temperature increased by 0.67°C and minimum temperature by 0.18 °C (mean of 0.59 °C) while precipitation decreased by 49.28 mm.

16. Records of cyclone events in Samoa had been analysed in the past by Kerr (1976), Revell (1981), Pauga and Lefale (1988), Titimaea and Crawley (1991) and Thompson *et al.* (1992). Based on these analyses and recorded events since 1989, there have been approximately 95 Class 1-5 tropical cyclone events recorded in the Samoa region since 1831, thus occurring on average about once every 1.8 years over the last 169 years (1831-2000) (Gibbs 2000). Since the 1831-32 seasons, tropical cyclone occurrences in Samoa have ranged from 0-4 per season thus indicating that the frequency of tropical cyclones has increased between 1831 and 2000 (Gibbs 2000).

17. Kinhill, Riedel & Byrne (1992) provided crude estimates of wave characteristics for Samoa for both cyclone generated seas and the ambient wave climate during mostly trade wind conditions and found that “*there is no reliable information available in Western Samoa on wave statistics or cyclone frequency*”. For ambient wave conditions, they estimated deep-water significant wave heights of 3.5m

and 3.69m for return periods of 50 and 100 years, respectively and for tropical cyclones they estimated deep-water significant wave heights of 6.78-8.96m and 7.42-10.22m for return periods of 50 and 100 years, respectively.

18. For “*Ofa*”, significant wave heights of 7.33m and 6m were recorded at different times over two days where little effect was noted on the South coasts of Savai’i and Upolu, compared to the great effects on the North coasts of the island of Savai’i. “*Val*” on the other hand caused the most devastation from waves. Climate risk profile of Samoa (Hay 2006), showed that systematic changes in the average climate for Samoa by 2050 will have increased by 36cm, rainfall by 1.2%, extreme wind gusts by 7% and maximum temperatures by 0.7°C.

19. The observed long term trend in relative sea level for Apia is 5.2mm year<sup>-1</sup> but maximum hourly sea level is increasing by 8mm year<sup>-1</sup> which is well in excess of observed local and global trends in mean sea level. For Apia an hourly sea level of 1.8m above mean sea level is currently a 100-year event but this is likely to be a four-year event by 2025. Currently an extreme wind gust of 70kt at Apia has a return period of 75 years but will reduce to approximately 40 years by 2050.

20. The 2001 population census in Samoa showed an increase in population to about 174,140 people (up from 168, 027 people in 1998) and the estimated population in 2006 (mid-year) is 176,908 people. Samoa’s urban population is growing and it poses a serious threat to the biophysical, economic, and social environments. Rural-urban migration is stimulated by seemingly greater opportunities and access to better education and health services which is putting a lot of pressure on the limited natural resources as well as the social and economic fabric within the communities.

21. The economy of Samoa has traditionally been dependent on development aid, family remittances from overseas, agriculture, and fishing. The country is vulnerable to devastating storms. Agriculture employs two-thirds of the labor force, and furnishes 90% of exports, featuring coconut cream, coconut oil, and copra. The manufacturing sector mainly processes agricultural products. The decline of fish stocks in the area is a continuing problem. Tourism is an expanding sector, accounting for 25% of GDP; about 88,000 tourists visited the islands in 2001. One factory in the Foreign Trade Zone employs 3,000 people to make automobile electrical harnesses for an assembly plant in Australia. The Samoan Government has called for deregulation of the financial sector, encouragement of investment, and continued fiscal discipline, while at the same time protecting the environment. Observers point to the flexibility of the labor market as a basic strength for future economic advances. Foreign reserves are in a relatively healthy state, the external debt is stable, and inflation is low.

#### Ratification of the UNFCCC

22. Samoa ratified the UN Framework Convention on Climate Change (UNFCCC) on 09 March 1993, and has submitted its Initial National Communication (INC) to the UNFCCC on 30 October 1999. Following the preparation of its INC (under the Pacific Islands Climate Change Assistance Project (PICCAP) and Phase II enabling activities, the country has initiated efforts to create an institutional set-up that seeks to mainstream climate change issues into the national legal frameworks. Moreover, its INC provides compelling evidence that, by global standards, Samoa is one of the nations most vulnerable to climate change and sea-level rise.

23. Samoa has embarked on an ambitious economic growth policy which is focused on improving its economic performance, education, private sector development and creation of employment, agricultural opportunities, social structure, infrastructure and services, tourism and public sector efficiency. These

key areas are outlined in the Strategy for Development of Samoa 2002-2004 (SDS). It has also produced numerous documents as part of its contribution to the 2002 World Summit on Sustainable Development and the Johannesburg Plan of Implementation (JPOI), the ten-year review of the Barbados Programme of Action and the International Meeting (IM) in Mauritius as well as other regional meetings and conferences. Additionally, Samoa has prepared other documents pertaining to its obligations under various multilateral environmental agreements (UNCCD, CBD, Montreal Protocol, Basel, Ramsar, etc).

24. Ratification of the UNFCCC is one step forward in terms of commitment to addressing climate change and related issues. Samoa is also a Party to many other UN conventions, such as those, among others: biological diversity, biosafety, persistent organic pollutants, and combating desertification. The country has also ratified the Kyoto Protocol on 17 July 2001.

25. It completed its national adaptation programme of action which identified its urgent and immediate needs for adaptation to climate change. Some of the priority NAPA needs are currently being developed further for implementation with support from the least developed countries fund. With the support of the GEF, Samoa has also embarked on the identification of its capacity building needs relating to the implementation of the UNFCCC, CBD and the UNCCD through National Capacity Self-Assessment.

#### SUSTAINABLE DEVELOPMENT STRATEGY

26. The Government of Samoa (GOS) has adopted a Strategy for Development of Samoa (SDS) 2005-2007 to pursue improvements in governance and strengthen institutions for delivery of government services. The GOS is promoting the sector-wide approach and whole of government delivery mechanism. The vision for the future is to have macroeconomic stability, a thriving and competitive private sector, adequate employment opportunities, best practices for good governance, quality health and education services, dynamic development of its key agriculture, fisheries and tourism sectors, vibrant socio-cultural values and sustainable management of the environment.

## 2.2 Stakeholder Analysis

### Process and approach used

27. The consultations on Pacific Adaptation to Climate Change (PACC) were conducted by the PDFB team<sup>1</sup> and involved seven stakeholder consultations, workshops and focus group meetings. Three approaches were used to solicit and collect information from various ministries, agencies, institutions of government and non-government organizations:

- a) Gathering of information (including policy documents) relating to the activities, programmes and projects from various government ministries, departments and agencies,
- b) Meetings/consultations and workshop held with representatives of relevant ministries, agencies institutions of government and non-government organizations,
- c) A national consultation workshop on PACC priorities.

28. The consultations were focused on the activities relating to adaptation and other related issues such as institutional arrangements, and opportunities for promoting synergy between the various activities and

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organizations, priorities for PACC activities, consistent with the UNDP and GEF guidelines/criteria for adaptation activities. Specific issues covered in the meetings and consultations included all elements of project implementation including policy/regulatory framework to integrate adaptation within the design and implementation of development activities; institutional framework; information and knowledge; stakeholder involvement and co-financing possibilities.

#### Institutions and individuals involved/consulted

29. Three main government ministries involving 12 experts were consulted during the in-country consultations and workshop. These consultation meetings were focused on identifying adaptation activities that could be funded under the PACC project within the coastal zone management and associated infrastructure thematic area. This thematic area was selected by the national climate change Country Team during their meeting on August 24 2006. A number of compelling reasons for the selection of coastal zone management theme (over the water resources management and food production and food security) as the focus for adaptation intervention under PACC:

- a) In the area of water resources management, several donors are already providing support including the Ninth European Union Development Fund to support water sector support programme (WaSSP) and SOPAC's Integrated Water Resource Management (IWRM) project.
- b) In the case of food production and food security programme, a Technical Cooperation Programme (TCP) of FAO and SPC's DSAP projects are some of the donor-funded programmes addressing the food and food security issues for Samoa.
- c) Many coastal communities, socio-economic infrastructure and activities face serious coastal erosion problems caused by storm surges and coastal flooding relating to tropical cyclones;
- d) A total of 15 district coastal infrastructure management plans have been completed but have not been implemented as yet due to lack of funding support.
- e) There is high potential for co-financing of PACC activities within coastal zone management and associated infrastructure.

30. Given that thematic area for adaptation intervention was identified and selected already by the National Climate Change Country Team, the PACC team concentrated their efforts in identifying additional/adaptation activities within the coastal zone management and associated infrastructure together with the stakeholders. Adaptation activities are outlined in section III of this report.

#### Meetings with stakeholders

31. The PACC Consultation Team (PCT) first met with the Acting Chief Executive Officer (ACEO) of the Department Meteorology and the National Climate Change Coordinator (NCCC). Briefing from the PACC Team emphasized the need for Samoa to firm up very early in the week on the priority thematic area for PACC-Samoa component to focus on. The PCT was advised by the ACEO and the NCCC of the outcomes of the NCCCT meeting which had already endorsed coastal zone management and associated infrastructure as a priority sector for adaptation intervention in Samoa under PACC project. It was agreed that further consultation meetings would focus on this theme with relevant stakeholders. The consultations would ascertain the identification of possible adaptation activities, institutional arrangements, and possibilities for co-financing of project activities within coastal management and infrastructure.

32. Consultations were held with the Planning and Urban Management Agency (PUMA) where PCT informed PUMA about the PACC project and its focus on coastal zone management in Samoa. In response ACEO for PUMA stressed the need to focus on coastal zone management and associated infrastructure because a lot of assessments had been done already on this sector. He reiterated that under the World Bank-supported Samoa Infrastructure and Asset Management Project (SIAM) 15 districts had completed their coastal infrastructure management plans and a further 28 districts are currently developing their plans, and therefore PACC activities should focus on the 15 districts (i.e. those that had completed CIM plans). He also indicated that some infrastructure components of the CIM plans were being currently funded by the government of Samoa (GOS).

33. Under Phase 2 of the SIAM (SIAM-2) a number of activities are being implemented within various components including environment, risk management, emergency management, land services, land registration and titles and small grants scheme. Some of the activities focus on strengthening the resilience of local coastal communities to cope with the impacts of natural and climate-related extremes is being funded by the small grants scheme of the World Bank.

34. Consultations were also held with the Principal Marine Conservation Officer, Department of Environment and Conservation, to find out if there are activities under Coastal Ecosystem Recovery Project (CERP) could be included as adaptation activities under PACC – Samoa component. CERP focuses on mangrove restoration, protection and rehabilitation of sea grass communities and coral reefs. CERP had identified eight coastal villages/communities (not part of SIAM) where a list of recovery activities had also been identified. Some of the pertinent activities relating to adaptation could include:

- a) Coral replanting/gardens on reefs or within lagoons;
- b) Mangrove replanting or new mangrove planting in suitable areas;
- c) Coastal planting with native coastal plants;
- d) Application of regulations on use of marine resources;
- e) Banning of destructive fishing methods, including traditional methods, where necessary
- f) Controlling/managing of development or activities that affect coastal habitats and resources, including sand mining and reclamation;
- g) Creation of village by-laws for the conservation of natural resources under the Fisheries Act 1988;
- h) Creation of MPAs, reserves or “no-take” zones, on reefs, lagoons and mangroves;
- i) Creation of an Environment or Conservation Committee within communities;
- j) Development of local surveillance programme;
- k) Prohibiting the throwing of rubbish into the marine environment including mangroves;
- l) Prohibiting/controlling/managing the removal of material from the marine environment, e.g. coral blocks;
- m) Protecting nesting/spawning areas or aggregations of specific marine species;
- n) Minimizing/solving coastal or beach erosion;
- o) Restocking of marine resources, e.g. giant clams nursery, sea-urchin farming, bivalve/mollusk/echinoderm translocation;
- p) Improving flushing of mangrove areas

35. A meeting was held with the Ministry of Finance (MOF-Aid Coordination) mainly to provide information about the PACC project and its focus on coastal zone management and associated infrastructure and to ascertain the potential and level of co-financing that could be made available for PACC activities within the priority sector.

36. The PCT emphasized the need for PACC project activities to be in line with existing government programmes, prior assessments and the ability to co-finance and to deliver the project implementation. MOF reiterated that coastal zone management and its associated infrastructure is a priority sector based on assessments that had been carried out already under the SIAM project. PACC project thus provides opportunity to implement concrete activities rather than conducting more assessments. With respect to co-financing, the MOF indicated that the GOS can provide co-financing, details and modalities of which can be arranged with relevant key ministries.

37. MOF further informed the PCT that GOS is now in receipt of a contribution \$100,000 from the Government of Australia to fund adaptation activities. However arrangements for the use of these funds are yet to be finalized in line with the sector-wide approach across the while of government delivery.

38. The PCT held further consultations with the Ministry of Works, Transport and Infrastructure (MWTI) who stressed the importance of CIM plans and the Code of Environmental Practice (CEP) which have become part of their operational procedures and/or processes. In operationalising the CIM plans and the CEP, a number of seawalls were constructed with particular design specifications relating to the CIM plans. While such design specifications have increased the resilience of coastal infrastructure in the event of a 50-year storm, it was found that increasing the height of the seawall was not necessarily socially-acceptable, thus creating a problem with such design in the communities. The MWTI indicated the some soft solutions for coastal/beach protection are being considered in some areas of the country although the costs could be prohibitive.

#### Summary workshop

39. The PACC team presented their findings at a luncheon meeting with the NATIONAL Climate Change Country Team. The agenda focused mainly on the proposed thematic area for PACC-SAMOA as well as the proposed institutional arrangements for project delivery. Issues that have been raised and agreed upon included:

- a) The endorsement by NCCCT to focus on Coastal Zone Management and its associated infrastructure thematic area for PACC-SAMOA as well as the proposed pilot locations in 15 Districts.
- b) The expected size for PACC-SAMOA is around USD650,000 including USD100,000 for the sustainable follow-up, effective education and outreach activities;
- c) The expected ratio for co-financing to be applied in this pilot project is 1:4 (i.e. for every dollar of the GEF resources there should be four dollars from other sources).
- d) On institutional arrangements, the NCCCT has endorsed that the Project Management Unit within the Planning and Urban Management Agency (PUMA), with the NCCCT as the advisory body on scientific, technical and management/policy issues. The terms of reference (TOR) for the PMU and management arrangements will be developed and will include a provision for the PMU to be accountable to the NCCCT, UNDP and SPREP for the project.

**STAKEHOLDERS AND INSTITUTIONS CONSULTED**

Institution	Stakeholders interests/responsibilities	Relevance to climate change/reasons for inclusion	Role in the Consultation process
<b>GOVERNMENTAL INSTITUTIONS</b>			
<p>MINISTRY OF NATURAL RESOURCES, ENVIRONMENT AND METEOROLOGY</p>	<p>Operational focal point of the UNFCCC.</p> <p>Responsibilities:                      -sustainable development and management of Samoa’s natural resources and environment,                      - Provide meteorological information – warnings on severe weather or climate conditions,</p>	<p>Climate Change Section, established within MNREM</p> <p>Secretariat to National Climate Change Country Team</p> <p>Responsible for preparation of the INC and SNC and its submission to the CoP</p> <p>Responsible for NAPA preparation in collaboration with other relevant agencies</p>	<p>Consultations with the UNFCCC focal point for discussion of PACC priorities for Samoa in terms of technical issues, opportunities for synergy among various projects and institutional arrangements.</p> <p>Consultation on the provision of climate data and information as well as on the needs for capacity-building, training and research (collection, analysis and archiving) and dissemination of information</p> <p>Consultations on issues relating to adaptation technologies and information for selection of the priority thematic area for adaptation intervention in Samoa.</p> <p>Identification of adaptation activities within the priority sector. CERP and CIM Plans consistent with NAPA project profiles 6 and 7.</p> <p>Consultations on arrangements for stakeholder consultations on</p>

Institution	Stakeholders interests/responsibilities	Relevance to climate change/reasons for inclusion	Role in the Consultation process
			PACC priorities.
		Member and Chair of the National Climate Change Country Team	Consultations on national priorities, mainstreaming of climate change in national environmental strategies, programmes and other documents, as well as on current and planned projects.
MINISTRY OF WORKS, TRANSPORT AND INFRASTRUCTURE	It is in charge of issuing identification documents; performing inspection over the work of the entities in the communal area, issuing building permits, and preparation of regulation related to isolation	In charge of sustainable transport, preparation of new standards for efficient building  Member of NCCCT	Consultation with regard to implementation of Coastal Infrastructure Management Plans for 15 Districts.  Plans for construction of seawalls with 50-year storm design specifications in some coastal areas of Samoa  Discussed possibilities for co-financing from existing or planned projects funded by government and other donors
MINISTRY OF FINANCE	Responsible for AID Coordination	Member of the NCCCT	Discussion on arrangements for co-financing

### **2.3 Climate change programmes, projects and activities**

40. A number of climate change programmes, projects and activities have been carried out in Samoa since the entry into force of the UNFCCC. Samoa was one of ten countries of the Pacific who participated in the Pacific Islands Climate change Assistance Programme (PICCAP) from 1997 to 2001. PICCAP was a multi-country regional enabling activity project funded by the GEF, implemented by UNDP and executed by SPREP to assist participating countries to prepare their initial communications under the UNFCCC. Samoa prepared its initial national communication and submitted it to the COP in November 1999.

41. The second major climate change programme implemented in Samoa was part of a project titled Capacity-building for Development of Adaptation Measures in Pacific Islands Countries (CBDAMPIC), which was also implemented in three other countries: Cook Islands, Fiji, and Samoa. This project, funded by the Canadian International Development Agency through its Climate Change Development Fund, enabled Samoa to implement adaptation measures in the communities relating to their water supply and strengthening of their protective infrastructure (seawall) in the coastal zone affected by sea-level rise and coastal erosion and flooding from storm surges.

42. Samoa has already prepared its national adaptation programme of action and its national capacity needs relating to the implementation of the UNFCCC. NAPA and the NAPA process has helped Samoa identify its urgent and immediate needs for adaptation to climate change in priority areas, some of which are being developed further as projects to be implemented with funding support from the least developed countries fund. The country has recently begun its programme of activities relating to the preparation of its second national communication with funding support through the enabling activities of the Global Environment Facility.

43. Given that the threat of climate change for Samoa is no longer an issue for the future as extreme climate-related events are being faced today in climate sensitive sectors, funding support was provided by the Government of Australia to improve and strengthen capacities and capabilities across various sectors to adapt to the adverse impacts of climate change consistent with sustainable development policies.

#### Vulnerability and adaptation

44. About 70% of Samoa's population and infrastructure are located in the coastal area. This is a serious concern because nearly all the coastal settlements in Samoa are located in low-lying areas, hence are, very vulnerable to CC and SLR. This vulnerability is often exacerbated during extreme events, as illustrated by the Tropical Cyclones Ofa (1990) and Val (1991) which devastated Samoa causing damage estimated to be about three times that of the GNP. The cyclones caused severe damage to agriculture and to bio-diversity. Samoa is also very vulnerable to other extreme climate events, for example, prolonged drought periods associated with the ENSO events and coral bleaching stimulated by extremely low tides.

45. A 'no-regrets' approach to adaptation is necessary, despite high initial costs, to provide effective measures to mitigate adverse impacts caused by CC and SLR. Although, Samoa's vulnerability will increase with future global CC, it is imperative to develop a national policy framework to raise awareness about the need for adaptation and mitigation actions. The initial national communication of Samoa highlighted the following:

- a) The increasingly frequency and intensity of cyclones affecting Samoa are a major threat to its sustainability in the modern world and global economy;
- b) The ‘best guess’ scenario indicates that by the year 2100 temperature will have increased by 2° C, SLR by 49cm, and rainfall increase of 4.1%.
- c) 70% of the population and infrastructure is situated in the coastal zone, thus there is a need for adaptation measures to be focused on those areas;
- d) Implementation of adaptation measures and strategies in Samoa should take a ‘no regrets’ approach. The least cost adaptation options are consistent with this approach.

46. Most of the economic activities, infrastructure and human settlement are located in the coastal areas. These activities have had adverse impacts on the coastal environment, particularly the lagoons, coral reefs, mangrove forests and the shoreline (Bell 1989; Zann 1991a). Experience from tropical cyclone impacts has prompted the GOS to build a seawall to protect Apia, a most densely populated area, which hosts most Government and business infrastructure.

### Adaptation

47. A range of sectoral adaptation measures has been assessed, based on economic and the environmental cost, cultural suitability and practicability in the initial national communication. Some of these are quite pertinent for adaptation in the coastal zones consistent with the activities identified under the CERP (see paragraph 36 above):

- a) Devise a suitable integrated coastal zone management plan.
- b) Plant more trees e.g. coconut on the coastline to prevent soil loss.
- c) Conduct public awareness programmes targeting the general audience on issues of reef and lagoon rehabilitation.
- d) Discourage reclamation practices.

## **III. SECTORAL ANALYSIS**

48. The principal objective of Pacific Adaptation to Climate Change (PACC) is to facilitate the implementation of long-term adaptation measures to increase the resilience of a number of key development sectors in the Pacific island countries to the adverse impacts of climate change. The development sectors are food production and food security, water resources management and coastal zone management and its associated infrastructure. Given limited financial resources the countries have been encouraged to focus only one of the three development sectors where adaptation intervention would be essential. The in-country consultations would also determine detailed adaptation activities and baselines in each country.

### **3.1 Methodology/Criteria for selection of priority sector**

49. Given that PACC would only support adaptation activities in one of the three main development sectors of food production and food security, water resources management and coastal zone management and associated infrastructure it was necessary to select one of these priority areas for adaptation

intervention. In order to facilitate the selection of the priority area the following criteria was used for PACC priority sector. That the selected adaptation project or activities should have:

- a) A strong fit/alignment with the Samoa Government's existing programmes
- b) All necessary baseline assessments have been carried out, and additional activities are ready for implementation, and,
- c) Ability to co-finance and ability to deliver.

50. Based on these three criteria and on the stakeholder consultations (see section 2.2) coastal zone management and its associated infrastructure was selected as a priority sector for adaptation intervention in Samoa under the PACC project. Under this theme, an adaptation project entitled "*Piloting climate change adaptation in the coastal zones in Samoa*" was proposed. This project would focus on enhancing, and where necessary, developing protective measures (hard and soft solutions) in 15 Districts of Samoa who had completed their coastal infrastructure management plans (CIM). The CIM plans contain an assessment and identification of measures that would be necessary to increase the resilience of the socio-economic infrastructure and activities thereby enhancing the adaptive capacity of coastal communities to impacts of climate change and sea level rise in the long term.

### **3.2 Assessment of priority sector for adaptation activities**

51. Human activities in the coastal environment, including sand extraction and mangrove removal has increased the sensitivity of these important coastal buffers to climate and sea level variations. These activities may compound the affects of sea level rise. Vulnerability assessments carried out as part of the preparation of initial national communication has identified

52. Much of early work has focused on vulnerability and adaptation assessments, which identified a number of critical actions, and measures that could contribute to enhancing adaptive capacity and towards achieving adequate adaptation to climate change. The preparation of the INC, the activities of the Phase II enabling activities (top-up) and NAPA have highlighted many of the needs and concerns relating to vulnerability and adaptation, including the need for:

- a) Enhancing networking and information sharing/exchange amongst all stakeholders i.e., NGO's, private sector, Government, communities and the general public to develop appropriate measures to address climate change, climate variability and sea-level rise.
- b) Strengthening the institutional arrangements and enhance capacity to support efforts in addressing issues and concerns relating to climate change, climate variability and sea-level rise. Recommended areas including information dissemination through communication networks and public outreach, training, strategic planning and participatory consultation workshops, the creation of expert panels to provide technical information as well as logistical support, equipment and materials.
- c) Reviewing of existing laws and legislation to assess their appropriateness in accommodating vulnerability and adaptation to climate change and climate variability for key sectors and communities.
- d) Conserving and protecting of breeding grounds and habitats and species that are considered vulnerable to impacts of natural disaster and human induced activities.
- e) Conducting studies on the impacts of ENSO on the fisheries and tourism sectors.
- f) Improving water management efforts with better supply-side and demand-side management. This should also include national campaigns and education on water quality issues and its associated risks posed by climate extremes.



- g) Establishing a Climate Change and Climate Variability Database to collect data on sectors and relevant indicators to monitor and evaluate climate Change and Climate Variability and their impacts.
- h) Promoting integrated planning or zoning to decentralize utilities and operations from being concentrated in Apia and exposed to coastal flooding and erosion and sea level rise as well as the promotion of Integrated Coastal Zone Management in managing its coastal resources.
- i) Improving climate monitoring, research and systematic observation, develop and manage databases necessary for vulnerability and adaptation assessment and to enhance the capabilities and capacities of experts and institutions in the use and applications of analytical, integrated and process-based methods and tools for assessment work.

### **3.3 Current institutional and development baseline for the priority sector**

53. As with many small island developing States, Samoa is concerned about the impacts of future climate change and sea level rise given the exposure of main socio-economic and cultural activities and infrastructure being located on or near the coastline. Given the high priority placed on the coastal infrastructure, socio-economic, cultural activities and communities, the GOS with support from the World Bank initiated an Phase I of Infrastructure and Asset Management Project from 1999 – 2004. The main objective of the project was to enhance the economic, environmental and social sustainability of transport and coastal infrastructure assets, and to manage those assets, natural resources and disaster risks through an effective partnership with private sector stakeholders.

54. The second phase of the project (SIAM-2) started in 2004 and will end in 2008 with the objectives of supporting the GOS, in the management and cost effective maintenance of basic infrastructure; to assist the public sector reform efforts through strengthening the capacities of key public sector agencies; to ensure safe, reliable and efficient operation of key infrastructure such as air and land transport and coastal activities that are vital to Samoa's economy; to improve the physical and financial management of the infrastructure assets so as to make efficient use of scarce resources and to minimize future financial dependence on external support; and to support public sector reform and increased private sector participation in the provision of infrastructure.

55. Additionally, SIAM-2, is focusing on Investing for Sustainable Growth and Resilience, in priority capacity and safety improvements to road infrastructure that were identified by the 2003 Road Sector Plan (71%); strengthening of environment, risk and natural resource management, including the completion of the risk mitigation plans for coastal Districts, strengthening the national approach to emergency management for natural and man-made risks, and improvements to land administration (11%); priority coastal protection works and non-structural measures for mitigation of disaster risks (11%); and completing the current phase of institutional reform in transport and infrastructure, with emphasis on land transport and cost recovery (7%).

56. The SIAM-2 project involves three implementing agencies; the Ministry of Works, Transport and Infrastructure (MWTI), Ministry of Natural Resources, Environment and Meteorology (MNREM) and Samoa Airport Authority (SAA). SIAM-2 is coordinated through a Project Management Unit (PMU) and liaises with the Ministry of Finance (MOF) in the overall monitoring of the project. The project is administered through a Steering Committee comprising of CEOs and Assistant CEOs from several government ministries/department and the private sector. For MWTI and MNREM, a Project Component Manager (PCM) had each been appointed to assist the PMU in the coordination and monitoring of their ministries respective tasks/activities.

57. The MNREM is also implementing the Cyclone Emergency Recovery Project (CERP) as part of the SIAM-2 to strengthen the resilience of coastal communities and groups vulnerable to the impacts of natural hazards by supporting local community groups, NGOs, and other eligible entities to carry out non-structural and practical interventions at the community levels; and to provide opportunities for direct community involvement in coastal hazard management.

### **3.4 Impacts of Climate Change on the Priority Sector**

58. Perhaps the most memorable impacts resulting from climate-related extreme events in Samoa have been related to cyclones Ofa (1990) and Val (1991). The impacts and devastation caused by these two tropical cyclones still reverberate in many communities/villages. Ofa attained hurricane force winds with maximum average winds estimated at 100 knots and gusts to 140 knots close to the centre. At this time the radius of storm force winds was estimated to be about 90 miles and the radius of gales would be no more than 250 miles from the centre. The centre of cyclone Ofa passed about 60 miles west of Savaii Island in Samoa considered to have been unprecedented in 100 years. Initial estimates of damage were over US\$130 million in Samoa.

59. Tropical Cyclone Val was the second cyclone to affect Samoa in the last two years. Fifteen lives were lost. As a result of Tropical Cyclone Val particularly on the island of Savai'i which suffered about 90 percent damage to all buildings. Over Upolu about 80% of all buildings suffered major damage. Some bridges suffered structural damage and preliminary estimates of damage over Samoa was about USD330 million.

60. Evidence from the damage assessment report for Cyclone Val indicated that a number of engineered protection works that formed part of the road reconstruction withstood the force of the storm-generated waves, while non-engineered seawall was totally destroyed and dumped rock foreshore protection around Apia. The estimated cost of the damage was estimated at SAT4.65million.

61. In January 2004, Tropical Cyclone Heta passed within 80 kms of Samoa accompanied by hurricane force winds of up to 100 knots (180 km hr<sup>-1</sup>) and gusting up to 140 knots (250 km hr<sup>-1</sup>). The cyclone caused significant damage to the economy of Samoa at an estimated value of USD35 million (12% of GDP) mainly on in coastal zones, utilities and infrastructure.

## **IV. MECHANISM FOR DELIVERY OF FULL-SIZE PROJECT**

### **4.1 Institutional Arrangements**

62. All climate change programmes, projects and activities are being coordinated by the Climate Change Section of the Division of Meteorology, Ministry of Natural Resources, Environment and Meteorology (MNREM). Climate Change Section currently has three full-time staff that carry out tasks/activities relating to climate change in the country such as the preparation of climate change enabling activities (e.g. second national communication and national adaptation programme of action). The Climate Change section also serves as a secretariat for the National Climate Change Country Team

63. Under the PACC-Samoa project, the Climate Change Section will continue to coordinate climate change activities relating to PACC. However, given that PACC is focused on implementation of adaptation activities, the implementing agency for PACC-SAMOA will be Planning and Urban Management Agency (PUMA) of the Ministry of Natural Resources, Environment and Meteorology. PUMA will also serve as secretariat to the NCCCT on issues relating to the implementation of PACC-SAMOA.

64. In addition to the implementation of PACC-SAMOA, PUMA will host at least two full-time staff that will provide the day-to-day operation of the PACC. These two full-time staff will be part of the PACC Project Management Unit (PMU). The PMU will be directly responsible to the Assistant Chief Executive Officer of PUMA.

65. At the national level, PACC-SAMOA will be implemented by various stakeholders within their respective mandates while scientific, technical and policy oversight will be provided by the national Climate Change Country Team (NCCCT). The NCCCT comprises representatives from various government ministries, agencies and institutions and the private sector.

#### **4.2 Assessment of existing and potential barriers to implementation of adaptation**

66. PACC-SAMOA is underpinned by GOS policy and regulatory framework and its Strategy for the Development of Samoa (SDS) 2005-2007 wherein it identifies “efficient and effective infrastructure provision” as a critical component of its current development strategy. The GOS is currently implementing the SIAM-2 with the aim of enhancing the economic, environmental and social responsibility of transport and coastal infrastructure assets, and to manage those assets, natural resources and disaster risks through an effective partnership with the private sector. This programme is jointly managed and implemented by MNREM, Ministry of Works, Transport and Infrastructure and Samoa Airport Authority, the World Bank and the Ministry of Finance.

67. A number of climate change enabling activities (e.g. national communication and national adaptation programme of action) have also involved numerous organizations, institutions and individuals in carrying out various tasks and activities. These activities have been supported by the NCCCT through the provision of scientific, technical and policy oversight and guidance. Thus many of the roles and responsibilities have been clarified. However some barriers still remain and will have to be overcome in order to improve delivery of the PACC-SAMOA. Some of these barriers include, competing demands on staff time, inadequate staff resources, equipment, and lack of incentives.

68. Lack of capacity (human, systemic, institutional, financial and technical) constrains the sharing of information and knowledge particularly of climate change and adaptation issues which makes the integration of climate change adaptation into sustainable development prohibitive. A project of this kind will more than likely make the integration of climate change into sectoral planning possible.

### **V. EXPECTED GOAL, OUTCOMES, OUTPUTS AND ACTIVITIES**

#### **Goal:**

69. The main goal of this project is to enhance the capacity of Samoa to adapt to climate change, including variability, in selected key development sectors.

### **Specific Objective:**

70. The objective of this project is to “increase the resilience and enhance adaptive capacity of coastal communities, socio-economic activities and infrastructure.

### **Specific Outputs:**

Output 1.1: Relevant plans and programmes incorporate climate risks in the coastal sector in Samoa.

Output 1.1: Integrated climate change risk management policies/plan for coastal community.

Output 1.2: Integrated coastal community defense and erosion control measure taking climate risk into consideration (with co-financing support)

### **Description:**

Output 1.1: Relevant plans and programmes incorporate climate risks in the coastal sector in Samoa.

This will include integrating climate change into key development sectors that are highly vulnerable to climate change which include; agriculture, water, and coastal management. At the national level, work in climate variability and change is still the ‘domain’ of Meteorology Services, Environment Departments and National Disaster Agencies but the impacts are being felt by other agencies e.g. Fisheries, Agriculture, Forestry, Physical Planning, and Public Works. To mainstream key climate change issues into development plans of government sectors, a number of critical steps would be followed, which requires collaborative analytical and policy inputs from a number of different technical experts and domestic partners. Critical components of mainstreaming include: review of the NSDS and its role in national development; the identification of the strengths, weaknesses, gaps, responses to strengthen specific sectoral management (problem tree analysis and objective/ solution identification); the review of the link between sectoral plans and NSDS and the relationship between sectoral medium term budget and the medium term national fiscal expenditure and revenue budget; and strengthening of sector level budgeting that reflects outcome focused priorities and national development goals.

Specific activities to be undertaken would include:

- Promote and support dialogue, exchange of information and coordination amongst early warning, disaster risk reduction, disaster response, development and other relevant agencies and institutions at all levels, with the aim of fostering a holistic and multi-hazard approach towards disaster risk reduction.
- Development or customizing of a mainstreaming methodology that takes into consideration climate change technical and policy frameworks and issues;
- Forming of a Mainstreaming Team to work with key government sectors to mainstream climate change issues into key sectoral plans and policies;
- Countries to form V&A Teams comprising people in various agencies and institutions who can collaborate, integrate their work and be the main contact points in the various agencies to champion adaptation approaches and initiatives. Once the teams are formed a

range of capacity building initiatives to be developed in the next component can be implemented.

- Mainstream climate change risk considerations into planning procedures, especially for major infrastructure projects, including the criteria for design, approval and implementation of such projects and considerations based on social, economic and environmental impact assessments.

Output 1.1: Integrated climate change risk management policies/plan for coastal community.

Output 1.2: Integrated coastal community defense and erosion control measure taking climate risk into consideration (with co-financing support)

71. This output would enable the government of Samoa to develop its capacity to plan and demonstrate a community based integrated coastal protection model for adaptation to climate change. The government of Samoa fully recognizes the vulnerability of its coastal population and infrastructure. In 2003, it requested donor assistance to carry out its coastal infrastructure management (CIM) assessments. In the process, CIM plans were developed for 15 districts of Samoa.<sup>2</sup> The CIM plans contain an assessment and identification of measures necessary to increase the resilience of the socio-economic infrastructure to the impacts of climate change and sea level rise in the long term. For a successful implementation of the CIM plans, decisions systems and innovative community engagement processes would need to be designed and put in place to make the link to the people and communities who are directly affected by coastal erosion and land loss as well as the interventions to be demonstrated. The government had committed USD 2.5 million of national and donor support to the identification and implementation of adaptation support to vulnerable coastal areas and communities. Communities to be engaged in the design and demonstration process are; the district of i) Vaa o Fonoti; ii) Falelatai ma Samatau; iii) Vaimauga Sasae; iv) Falealili; v) Aana Alofi; vi) Lefaga ma Faleseela; vii) Safata; viii) Aiga I le Tai ma Satuimalufilufi; ix) Anoamaa Sisifo; x) Palauli I Sasae; xi) Vaisigano No 1; xii) Faasaleleaga 1; xiii) Gagaemauga 2; xiv) Gagaifomauga; xv) Salega. Pre-and-post adaptation conditions would be carefully assessed to better understand adaptation processes to avoid maladaptation. Specific activities to be undertaken would include:

- Training and implementation of a bottom-up vulnerability/adaptation assessment and community engagement in the pilot site;
- Design of a community engagement model/process in making decisions on key adaptation measures to be undertaken by the community;
- Training in designing and regenerating mangrove areas taking into consideration tidal flows and storm return periods;
- Training in design construction and maintenance of drainage and outflows for a 25-year storm event.
- Community-based participatory design and demonstration of an integrated coastal defense system and erosion control measures and buffer zone protection;

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<sup>2</sup> Coastal Infrastructure Management Plans for Samoa 2001 World Bank,

## **PROJECT LOG FRAMES AND INDICATORS**

Project Log Frame and indicators for Samoa would be finalized during the inception meeting of the PACC project.

## BUDGET

Responsible	ERP/Atlas	Budget Description							
	Budget Code								Total
				<b>Year 1/08</b>	<b>Year 2/09</b>	<b>Year 3/10</b>	<b>Year 4/11</b>	<b>Year 5/12</b>	<b>Budget</b>
Outcome 1	71200	International Consultants ( including national regional staffing)	10,000	10,000	0	0	0	0	10,000
	71300	Local Consultants (including national staffing)	30,000	5,000	5000	10,000	5,000	5,000	30,000
	71400	Contractual Services - Ind	20,000	5,000	5,000	5,000	5,000	0	20,000
	71600	Travel	20,000	0	5,000	5,000	5,000	5,000	20,000
	72100	Contractual Services - Co	40,000	10,000	10,000	10,000	10,000	0	40,000
	72200	Equipment & Furniture	10,000	5,000	1,000	3,000	1,000	0	10,000
	72400	Communication & Audio Visual equipment	4,000	2,000	500	500	500	500	4,000
	72500	Supplies	1,000	500	100	100	200	100	1,000
	72800	Information technology and Outreach	3,000	500	1,000	500	1,000	0	3,000
	74200	Printing, Publishing & Production	2,000	0	500	500	500	500	2,000
Subtotal			<b>140,000</b>	<b>38,000</b>	<b>28,100</b>	<b>34,600</b>	<b>28,200</b>	<b>11,100</b>	<b>140,000</b>
Outcome 2									
	71200	International Consultation	10,000	10,000	0	0	0	0	10,000
	71300	Local Consultants	60,000	10,000	20,000	20,000	5,000	5,000	60,000
	71400	Service Contracts - Ind	100,000	10,000	40,000	30,000	10,000	10,000	100,000
	71600	Travel	20,000	2,000	5,000	5,000	5,000	3,000	20,000
	72100	Contractual services - Co	320,000	55,000	105,000	55,000	55,000	50,000	320,000
	72200	Equipment & Furniture	10,000	0	5,000	5,000	0	0	10,000
	72500	Supplies	50,000	10,000	10,000	10,000	10,000	10,000	50,000
	72400	Audio Visual Equipment and Communication	20,000	5,000	5,000	5,000	2,500	2,500	20,000
	72800	Information Technology Equipment and Outreach	15,000	5,000	4,000	3,000	2,000	1,000	15,000
	74200	Printing and Publications	15000	5,000	4,000	3,000	2,000	1,000	15,000
Subtotal			<b>620,000</b>	<b>112,000</b>	<b>198,000</b>	<b>136,000</b>	<b>91,500</b>	<b>82,500</b>	<b>620,000</b>
Outcome 3									
	71200	International Consultants							
	71300	Local Consultants							0
	71600	Travel	20,000	4000	4000	4000	4000	4000	20,000
	72100	Contractual Services - Co							0
Subtotal			<b>20,000</b>	<b>4000</b>	<b>4000</b>	<b>4000</b>	<b>4000</b>	<b>4000</b>	<b>20,000</b>
Outcome 4	71300	Local Consultants	<b>88,758</b>	17752	17752	17752	17752	17750	<b>88,758</b>
Subtotal			<b>88,758</b>	17752	17752	17752	17752	17750	<b>88,758</b>

<b>Total</b>		<b>868,758</b>	<b>171,752</b>	<b>247,852</b>	<b>192,352</b>	<b>141,452</b>	<b>115,350</b>	<b>868,758</b>
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## **ANNEXES**

**Letter of co-financing (to be attached)**

### Suggested Adaptation Activities and Pilot Sites

Districts	Village	Possible Integrated Activities	Notes	Estimated Costs
1. Vaa o Fonoti	Faleapuna	Replant and improve existing mangrove.		<b>Approx cost:</b> Replanting (ST\$2,000) Board walk (ST\$20,000) Signage & information materials (ST\$15,000) Access Road (ST\$100,000) Monitoring (ST\$ 10,000)
	Taelefaga	Upgrade existing ford in mangrove area		<b>Approx cost:</b> Ford upgrade (ST\$200,000)
	Uafato	Coastal replanting & constructing a seawall at appropriate locations.		<b>Approx cost</b> Replanting (ST\$3,000) Seawall (ST\$81,000 for 200m)
	Samamea	Coastal replanting & upgrading existing seawall		<b>Approx cost</b> Replanting (ST\$3,000) Seawall (ST\$30,000)
2. Falelatai ma Samatau	Siufaga	Regenerate mangrove area, strengthen seawall, road shoulder protection, eco-tourism development and a mangrove management plan.	<b>Establish an eco-tourism operation to increase benefits. Activities to include: physical rehabilitation, monitoring, site maintenance, training and education</b>	<b>Approx cost</b> Replanting (ST\$12,000) Seawall strengthening (ST\$30,000) Board walk (ST\$60,000) Signage & information materials (ST\$10,000) Upgrade Access road (ST\$70,000 for 300m)
	Pata			
	Matautu			
	Falevai / Samai			
3. Vaimauga Sasae	Fagalii	Regeneration, restoration and eco-tourism development of mangrove areas, strengthen seawall and shoulder road protection, river bank mangrove protection works	<b>Establish an eco-tourism operation to increase benefits.</b>	<b>Approx cost</b> Board walk (ST\$25,000) Mangrove forest restoration (ST\$25,000) Educational signs (ST\$5,000) Upgrade seawall (ST\$25,000)
	Vailele	Coastal revegetation		<b>Approx cost:</b> Seedlings (ST\$1,000)
4. Falealili	Vaovai	Regeneration, restoration and eco-tourism development of mangrove areas.		<b>Approx. cost:</b> Eco-tourism including board walk and other amenity (ST\$50,000)
	Saleilua			
	Poutasi			

	<b>Ilili</b>			
	<b>Matautu</b>			
	<b>Tafatafa</b>			
	<b>Matavai</b>			
	<b>Satalo</b>			
	<b>Sapunaoa</b>			
	<b>Malaemalu</b>	<b>Restore access to village spring pool?</b>		<b>Approx cost:</b> redesigning crossing (1 x ST\$20,000)
	<b>Salesatele</b>	<b>Improve access /cause way road design to ensure optimal flushing and tidal flows to mangrove area.</b>		<b>Approx cost:</b> redesigning estuary crossing (1 x ST\$300,000)
	<b>Utulaelae</b>	<b>Improve access /cause way road design to ensure optimal flushing and tidal flows to mangrove area.</b>		<b>Approx cost:</b> redesigning estuary crossing (1 x ST\$300,000)
<b>5. Aana Alofi</b>	<b>Faleasiu / Fasitoouta</b>	<b>Planting the district's shore with mangroves (or coastal flora). A seawall was also suggested to help protect main road</b>		<b>Approx cost:</b> Replanting (ST\$3,000) Seawall (ST\$407,500 for 1000m)
<b>6. Lefaga ma Faleseela</b>	<b>Lefaga</b>	<b>Coastal revegetation, coral gardens, rehabilitation of marshlands, improve drainage and road design at Faleseela.</b>		<b>Approx cost:</b> Marshland rehabilitation (ST\$20,000) Coastal re-vegetation (ST\$3,000) Improve road design & drainage (ST\$200,000)
	<b>Faleseela</b>			
	<b>Safaatoa</b>			
	<b>Gagaifoolevao</b>			
	<b>Matautu</b>			
<b>7. Safata</b>	<b>Saanapu</b>	<b>Improve mangrove forest management, establish board-walk access network, strengthen coastal protection works eg road relocation and seawall.</b>		<b>Approx cost:</b> (ST\$50,000)
	<b>Sataoa</b>			
	<b>Nuusuatia</b>			
	<b>Vaiee</b>			
	<b>Fusi</b>			
	<b>Fausaga</b>			
	<b>Tafitoala</b>			
<b>Mulivai</b>				
<b>8. Aiga I le Tai ma Satuimalufilufi</b>		<b>Coastal revegetation</b>		<b>Approx cost:</b> Replanting (ST\$3,000)
<b>9. Anoamaa Sisifo</b>		<b>N/a</b>		
<b>10. Palauli I Sasae</b>		<b>Coastal revegetation</b>		<b>Replanting (ST\$3,000)</b>

<b>11. Vaisigano No 1</b>	<b>Auala</b>	<b>Turtle Conservation area</b>		(ST\$10,000)
<b>12. Faasaleleaga 1</b>	<b>Salelavalu</b>	<b>Mangrove conservation and associated infrastructures</b>		
	<b>Iva</b>	<b>Coastal revegetation</b>		Replanting (ST\$3,000)
	<b>Vaisaulu</b>	<b>Coastal revegetation</b>		Replanting (ST\$3,000)
	<b>Safua</b>	<b>Coastal revegetation</b>		Replanting (ST\$3,000)
<b>13. Gagaemauga 2</b>	<b>Salamumu</b>	<b>Coastal revegetation</b>		Replanting (ST\$3,000)
	<b>Saleaula</b>	<b>N/a</b>		
<b>14. Gagaifomauga</b>	<b>Manase</b>	<b>Coastal revegetation</b>		Replanting (ST\$3,000)
	<b>Safotu</b>	<b>Coastal revegetation</b>		Replanting (ST\$3,000)
<b>15. Salega</b>		<b>Improve solid waste management and coastal pollution control.</b>		Coastal rehabilitation (ST\$20,000) Public awareness programs (\$10,000)
<b>APPROX. TOTAL</b>				<b>SAT\$2,154,500 (\$2.2m)</b>