NATIONAL ADAPTATION PROGRAMME OF ACTION

SAMOA

MINISTRY OF NATURAL RESOURCES, ENVIRONMENT & METEOROLOGY

Compiled by:
National Adaptation Programme of Action Task Team (NTT), 2005
Under the auspices of the Samoa National Climate Change Country Team (NCCCT), 2005
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I. Foreword

The necessity to communicate Least Developed Countries' (LDC) most urgent and immediate adaptation needs from the adverse impacts of climate change was formalized at the 7th Conference of the Parties in 2001. Samoa was one of the first countries to receive funding from the Global Environment Facility (GEF) under the LDC Fund to develop its National Adaptation Programme of Action (NAPA). After two years of comprehensive information and data collection, as well as countrywide consultations, Samoa's NAPA preparation project has achieved its objectives.

The 'Samoa Climate Change Synthesis Report: National Adaptation Programme of Action 2004' (The Synthesis Report, 2004) has been completed and this report has created opportunities for synergies with other multilateral agreements particularly the Convention on Biological Diversity (CBD), and the United Nations Convention to Combat Desertification (UNCCD) for collaborative and integrated actions in adaptation responses. A nationally driven set of criteria for prioritization has also been developed and utilized to prioritize the adaptation actions in the national programme. The development of Samoa's NAPA has been an exceptional learning experience for all those involved, particularly the National Climate Change Country Team (NCCCT) and National Task Team (NTT). By adopting an integrated approach, all the relevant stakeholders (both in government and non-government organizations) have been able to work hand in hand to ensure that those whose livelihoods are most vulnerable to adverse impacts of climate change impart the urgency and immediacy of the adaptation needs.

The purpose of this report is to examine Samoa's main environmental pressures within each highly vulnerable national sector, including the livelihoods of communities. These sectors have been developed into project profiles which include issue statements and provide a summary of the profile's objectives, activities, inputs, outputs and outcomes (see Annex I-1 – I-9) that have been set and agreed to by government, the private sector and most importantly the village communities, using nationally driven criteria.

It is intended that the contents of this document will provide the GEF with indications of Samoa's most urgent and immediate climatic adaptation needs. Moreover, it is envisaged that partnerships which Samoa has established with its other development partners will be strengthened to explore additional opportunities and support for implementation of the NAPA.

The Government of Samoa gratefully acknowledges the assistance of GEF and the United Nations Development Programme (UNDP) in extending the financial assistance towards the development of its NAPA.

This report is the final outcome of hard work by the Task Team for the development of NAPA under the expert direction of the National Climate Change Country Team (NCCCT). The NCCCT is chaired by Taulealeausumai Laavasa Malua, and includes the following individuals: Kuinimeri Finau (Samoa Water Authority), Leilani Vaa (Attorney General's Office), Dean Solofa (Ministry of Natural Resources, Environment & Meteorology Division, MNREM), Mulipola Ausetalia Titimaea (MNREM), Shaun Williams (MNREM), Riki Faatonu (Ministry of Agriculture, MOA), Silia Kilepoa (Ministry of Finance, MOF), Desna Solofa (Ministry of Foreign Affairs & Trade, MFAT), Kisa Kupa (Ministry of Communications & Information Technology, MCIT), Pouvave Fainuulelei (MOA), Tepa Suaesi (MNREM), Lui Bell (MNREM), Lapa Tofilau (Red Cross Society), Livigisitone Nuusila (Ministry of Health, MOH), Sinei Fili (MOH), Faletolu Lofipo (Ministry of Women, Community & Social Development, MWCSD), Faainoino Laulala (MNREM), Supervisor Auvele (Samoa Umbrella for Non Governmental Organizations, SUNGO), Fiauu Tumamao (SUNGO), Siosina Lui (MNREM), Mutaaga Isara (MNREM), Tila Imo (MNREM), Melepone Isara (Samoa Tourism Authority, STA), Shinn Ete (STA), Matamua M (SUNGO), Misa Andriamihaja (UNDP), Easter Galuvao (UNDP), Reima

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In embracing the concept of sustainable development, the Government of Samoa is only too aware of the difficulties inherent in its implementation. Nevertheless, Samoa remains committed to the implementation of this programme and has classified it as high priority in its upcoming initiatives under the United Nations Framework Convention on Climate Change (UNFCCC). Samoa welcomes the continuing support of its development partners in the international community as it pursues the enhancement of its adaptation capacity to climate change.

Hon. Tuisugaletaua Aliimalemanu Sofara Aveau
Minister of Natural Resources, Environment & Meteorology

II. Acronyms

CBD:	Convention on Biological Diversity
CIMP:	Coastal Infrastructure Management Plans
CIMS:	Coastal Infrastructure Management Strategy
COEP:	Codes of Environmental Practice
DLSE:	Department of Lands Survey & Environment
EA:	Environmental Assessments
EIA:	Environmental Impact Assessment
FAO:	Food & Agriculture Organization
GEF:	Global Environment Facility
GOS:	Government of Samoa
GDP:	Gross Domestic Product
IAM:	Infrastructure Asset Management
LDC:	Least Developed Country
MOA:	Ministry of Agriculture
MFAT:	Ministry of Foreign Affairs and Trade
MCIL:	Ministry of Commerce, Industry and Labor
MOH:	Ministry of Health
MESC:	Ministry of Education, Sports and Culture
MNREM:	Ministry of Natural Resources, Environment & Meteorology
MPA:	Marine Protected Areas
MPPFS:	Ministry of Police, Prisons and Fire Services
MWTI:	Ministry of Works, Transport and Infrastructure
NAPA:	National Adaptation Programme of Action
NAP:	National Action Plans
NBSAP:	National Biodiversity Strategy & Action Plan
NEMS:	National Environment Management Strategies
NGO:	Non-Government Organizations
PICTA:	Pacific Island Countries Trade Agreement
PUMA	Planning and Urban Management Agency
RAMS:	Roads & Assets Management Systems
RET:	Renewable Energy Technology
SDS:	Strategy for the Development of Samoa
SES:	Statement of Economic Strategy
SLR:	Sea Level Rise
SMPs:	Sustainable Management Plan
SST:	Sea Surface Temperature
SWA:	Samoa Water Authority
TC:	Tropical Cyclones
TEP:	Tourism Environmental Policy
UNCCD:	United Nations Convention to Combat Desertification
UNFCCC:	United Nations Framework Convention on Climate Change
UNDP:	United Nations Development Programme
WSSD:	World Summit on Sustainable Development

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A **Introduction & Setting**

Samoa, like other Least Developed Countries (LDCs) inherits high vulnerability to natural disasters and to external economic and trade developments for which it has no control. These natural disasters include tropical cyclones, prolonged periods of drought, extreme flooding, pests and sudden outbreak of diseases, storm surges and sea level rise.

Climate change and sea level rise are serious concerns given that 70% of Samoa's population and infrastructure are located on low-lying coastal areas. Samoa's economy largely depends on its natural resources, which must rely on favorable climatic conditions for growth and sustenance.

Samoa's First National Communication Report to the UNFCCC reported on the known and predicted vulnerabilities of the social and biophysical environment due to the impacts of climate change and variability. The Climate Synthesis Report has been completed and this report has assessed the current vulnerability and potential increase in climate hazards and associated risks of the critical sectors including the livelihood of the communities. The inherent fragility and or vulnerabilities of the critical sectors of Samoa to the adverse impacts of climate change and variability include:

- Instability of food production levels to meet higher demands from climate induced disasters, affecting income generating activities for communities and country at large;
- The water sector's disastrous and difficult situations relating to quality (a major problem), accessibility and availability of water, impact directly on the livelihoods of the communities. Drought is the most obvious and hard felt impact. There are no hard solutions or a common strategy for adapting to the adverse effects of flooding. Sea level rise increases the possibilities of seawater intrusion into underground water aquifers as already experienced by many coastal communities;
- Samoa's biodiversity is highly prone to tropical cyclones and drought temperature fluctuation and changes in precipitation patterns lead to changes in the habitats of endangered and endemic species. The 'status of wildlife' in Samoa shows that many forest birds have declined in numbers even to the extent that some bird species populations have been 'decimated'. The intense wave activity of storms overturned much of the coral near shore and severely damaged corals to depth of up to 10 meters (30ft);
- There is anecdotal evidence of growth in vector borne and water borne diseases that reconfirms the already changing climate and the impact it has on the health sector. The conditions for the occurrence and spread of these diseases are favored by the changes in climate;
- The role of forests in watershed management, environmental protection, provision of wood and non-timber resources as a reserve of biodiversity are highly vulnerable to the drought season, facing increasing risks of forest fires. Samoa experienced four major forest fires from the drought/dry periods of 1982-83, 1997-98, 2001-02 and 2002-03;
- Infrastructure assets will be the most vulnerable given the cost incurred for construction and maintenance. Coastal Infrastructure Management (CIM) Plans already exist but the coastal infrastructure assets remain highly vulnerable without critical management of the CIM plans, as well as extension of the plans to accommodate inland flooding and watershed management in light of the impacts on infrastructure and works;

- The droughts in 2002 and 2003 led to rationing of electric power. Frequency in drought due to climate change will leave Samoa with diesel as the only option but then operation cost will be high and it will affect usage rate. Investment in other forms of renewable energy and promotion of renewable energy technology is crucial; and
- The impacts of climate change on the tourism sector widely include loss of beaches, inundation, and degradation of the coastal ecosystems, saline intrusion and damage to critical infrastructure. The loss of attractiveness of coral due to bleaching and heat stress that is triggered by high humidity is often referred to by the communities as a result of climate change.

National Circumstances

Figure 1 Samoa Islands (insert: Location Map). (Source: GOS, 2002)

Samoa, a small island country in the South West Pacific was the first in the region to become independent in 1962. The 2001 Population Census showed a total population of 174,140 with an economy based on tourism and exports including agriculture, fisheries and forestry products.

The islands of Samoa lie between latitudes 13°-15°S and longitudes 168°-173°W. Samoa consists of four main inhabited islands and six smaller uninhabited islands (Figure 1). The capital, Apia, is located on the second largest island Upolu and has a population of approximately 40,000 people. Samoa has a total land area of 2,935 km^2. The islands are of volcanic origin clearly visible in the form of several dormant volcanoes and lava fields.

Approximately 70% of Samoa's population and infrastructure are located in low-lying coastal areas. Projected sea level rise could exacerbate coastal erosion, loss of land and property and dislocation of the island inhabitants. The extreme events of tropical cyclones Ofa (1990) and Val (1991) caused damage with costs estimates of approximately four times the gross domestic product (GDP) of Samoa. The high winds, storm surges and heavy rains severely damaged agricultural

plantations, infrastructure and the country's socio-economic base. Changes in tropical cyclone systems increase the risk to life, property and ecosystems. As a semi-subsistence nation, Samoa is sensitive to threats on water supplies, food production and natural resources associated with climate change and climate variability.

Climate

Samoa's climate is typical of small tropical islands, geographically isolated from big landmasses. The climate is tropical and marked by a distinct wet and warm (November –April) and dry and cool (May – October) seasons. Temperatures are typically tropical (ranging from 24 – 32°C daily) and generally uniform throughout the year with little seasonal variation due to Samoa's near-equatorial location. The rainfall and humidity are usually high with the average annual rainfall about 3,000mm with approximately 66% of the precipitation occurring during the wet season.

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.

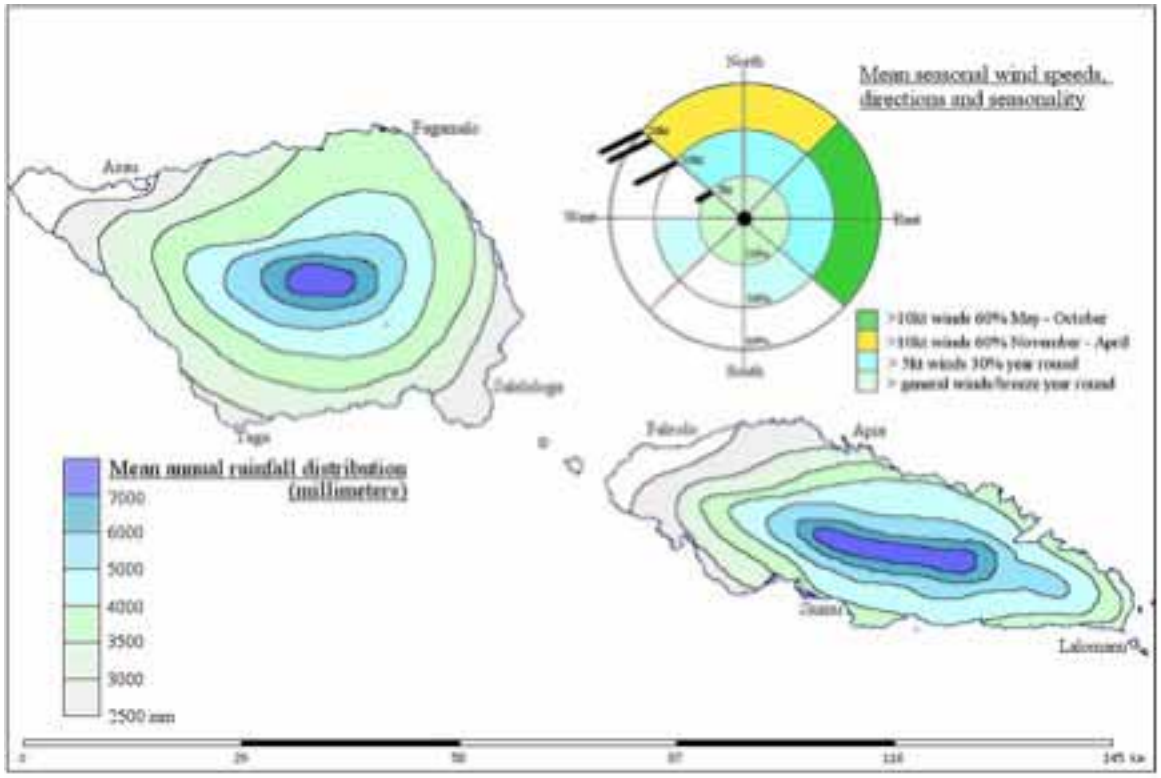


Figure 2 Illustration of 30-year climatic normals (1961 – 1990) of rainfall and wind distribution in Samoa (Source: Meteorology Division)

Projected Climate Change in Samoa

Samoa and other Pacific Island Countries observed trends and variability in climate derived from long term climate data from the region. This data shows that mean island near-surface air temperature increased by between 0.3-0.8°C during the 20th century, with the largest increase in the zones south west of the South Pacific Convergence Zone (SPCZ). Samoa is often located south and or near this zone during the wet and cyclone season.

Temperature Trends

The globally averaged temperature is projected to increase by 1.4-5.8°C over the period 1990 to 2100. Recent trends project surface temperature to become more El Nino like in the tropical Pacific, with the eastern tropical Pacific warming more than the western tropical Pacific, with a corresponding eastward shift of precipitation (IPCC Scientific Basis, 2001).

Table 1 shows findings of Samoa's study of its meteorological data that was collected over 101 years and has found that the mean temperature during this period showed a 0.59°C increase. The maximum and minimum temperature has also increased by 0.67°C and 0.18°C respectively. An interesting trend is the decrease in precipitation levels by 49.28mm over the same period. It is projected that Samoa will continue to experience the increases in temperature as well as drought periods (Meteorology Division).

Climate Element:	Trend
Maximum Temperature	0.67 °C increase
Minimum Temperature	0.18 °C increase
Mean Temperature	0.59 °C increase
Precipitation	49.28 mm decrease

Table 1 Climate Parameters in Apia (Source: Meteorology Division)

Precipitation Trends

Based on global model simulations for a wide range of scenarios, global average water vapor concentration and precipitation are projected to increase during the 21st century. In the second half of the 21st century, it is likely that precipitation at low latitudes will increase and decrease over land areas. Analyses carried out on local rainfall data and interannual variability projections linked more firmly to ENSO and interdecadal variability indicate that drier conditions in the near future are likely. Improvement of downscaling regional efforts is ongoing for reporting in the anticipated 2007 IPCC Fourth Assessment Report.

Tropical Cyclones

Recent studies and tracking of cyclones in and around the Samoa region has found that there has been an increase in the frequency of tropical depressions, gale wind forces, and tropical cyclones during the cyclone season from December to February. Cyclone Heta struck Samoa in February 2004. During 2005, there were 5 tropical cyclones that developed around the Samoa region and moved in the general south direction. These included Lola, Meena, Nancy, Olaf and Percy with the 2 latter tropical cyclones, classified as Class 5 (Major Hurricanes), the closest near misses for Samoa. The worst cyclones to seriously hit Samoa in recent times were Ofa in 1990 and Val in 1991.

Sea Level Rise

The rise in sea level is said to be due primarily to thermal expansion and the melting of glaciers and ice caps (IPCC Scientific Basis 2001).

Samoa's new projected sea levels based on analysis of a 10-year data indicate that the local change in sea level is higher than the global projections of 0.9 and 0.88m between the years 1990 and 2100 (IPCC Climate Change Synthesis Report, 2001). The South Pacific Sea Level & Climate Monitoring project shows a projected rise of 3.8mm per year for Samoa. [PENI, ARE THESE FIGURES CORRECT?]

El Niño Trends

It is projected that for Samoa, the variations in the amplitude of El Nino events will often dictate the climate for Samoa. In recent experience, a weak El Nino event in the Samoa region often spells periods of below average rainfall for over a month. A sustained weak El Nino event over Samoa will mean extended periods of dry weather that can trigger drought.

In summary, the projected climate change for Samoa will mean:

- Reduced overall annual rainfall,
- Higher occurrences of high intensity rainfall,
- Increased average temperature,
- Rising sea-levels, and
- Increased tropical cyclone frequency and intensity.

Vulnerability of Samoa to Climate Change

Vulnerability Assessment to Climate Change

Vulnerability of Key Sectors

The sector vulnerability assessment findings are shown in Table 4. These findings were gathered from the pre-synthesis sector report recommendations that were synergized into the national climate synthesis report. Out of the 13 sectors that were analyzed for their vulnerability, the NCCCT identified 9 of the sectors as highly vulnerable. The net effect for the fisheries sector remains unknown, however, it is considered here on a 'no-regrets' approach.

Table 2 gives a brief summary of the vulnerabilities of the nine sectors selected as critical. The Climate Change Synthesis Report (Annex II) provides a detailed assessment of the vulnerabilities of all thirteen sectors.

Sector	Major Vulnerabilities
1. Agriculture & Food Security	Instability of food production levels to meet higher demands from climate induced disasters, affecting income generating activities for communities and the country at large.
2. Water	The water sector's disastrous and difficult situations facing quality (a major problem), accessibility and availability of water impact directly on the livelihoods of the communities. Drought is the most obvious and hard felt impact. There is no strategy for adapting to the adverse effects of flooding. Sea level rise increases the possibilities of seawater intrusion into underground water aquifers as already experienced by many coastal communities.
3. Biological Diversity	Samoa's biodiversity is highly prone to tropical cyclones, drought, temperature fluctuation and changes in precipitation patterns leading to changes in habitat. The 'status of wildlife' in Samoa shows that many forest birds have declined in numbers even to the extent that some bird species populations have been 'decimated'. The intense wave activity of storms overturned much of the coral near shore and severely damaged corals to depth of up to 10 meters (30ft).
4. Health	Evidence of growth in vector borne and water borne diseases reconfirms the already changing climate and the impact it has on the health sector. The conditions for the occurrence and spread of these diseases are favored by the changes in climate.
5. Forestry	Forest and trees and their role in watershed management, environmental protection, provision of wood and non-timber resources, and as a reserve of biodiversity are highly vulnerable to the drought season, facing increasing risks of forest fires. Samoa experienced four major forest fires from the drought/dry periods of 1982-83, 1997-98, 2001-02 and 2002-03.
6. Coastal infrastructure and environment	Infrastructure assets will be the most vulnerable sector given the costs for construction and maintenance. CIM Plans already exist but the coastal infrastructure assets remain highly vulnerable without critical management and implementation of the CIM plans, as well as extension of the plans to accommodate inland flooding and watershed management in light of the impacts on infrastructure and works.
7. Tourism	Tourism is a major economic sector in Samoa and the impacts of climate change and climate variability include loss of beaches, inundation, and degradation of the coastal ecosystems, saline intrusion and damage to critical infrastructure and the loss of attractiveness of coral due to bleaching. In addition, higher temperatures and humidity can contribute to heat stress.
8. Urban Settlement	Climate change will have a significant impact on urban settlements, especially in the face of increasing population and continual urban migration. Poor drainage systems, no strategic planning, and an increasing urban population will only exacerbate the impacts of climate change on urban settlements.
9. Village Communities	The livelihood of village communities is threatened by the impacts of climate change, including damage to homes and properties; unreliable water supply and quality; damage to plantations for subsistence and commercial purposes; coastal erosion; flooding of low-lying areas; and damage to cultural and heritage assets.

Table 2 Summary of the vulnerabilities of the nine highly vulnerable sectors

Figure 3 Coastal erosion, Saoluafata village, Upolu Island

Vulnerability of Village Community Livelihoods

Village communities are dependent on the environment and natural resources for their survival and livelihood. For instance, coastal springs and rivers are heavily depended upon for water supply and sanitation. The adverse impacts of climate change on these resources hold vast potential for changes in social, cultural and economic circumstances.

Figure 4 Coastal erosion at Lano village, Savaii Island

Samoa has experienced frequent floods from extreme rainfall events causing unreliable supply and poor quality of water that impact greatly on the health of the people. There is an increasing trend of health hazards relating to the impacts of climate change affecting the population. The evidence and information regarding outbreaks of diseases and pests before and after an extreme climate event are considered anecdotal and the correlations between climate and health information is an issue itself that needs to be raised at the community and government levels.

Figure 5: Coastal erosion at Lano Village, Savaii Island

The occurrences of tropical cyclones, long period of droughts and flooding events have affected the source of income of most of the Samoan population. People are losing land to exacerbated erosion from destructive wave activities, frequent storm surges and landslips, causing social problems among families and communities. Some people are facing hardship due to destruction of their plantations by flooding, cyclones, pests and diseases, all of which threaten food security.

Table 3 identifies the village community vulnerabilities and its associated causes. These are significant considerations for the basis of the framework and to formulate adaptation activities with equal prominence of sector vulnerabilities.

COMMUNITY VULNERABILITIES	CAUSES OF VULNERABILTIES (SLR – sea level rise; SSC – Storm surges and cyclones; DRT – drought; FLD – flooding; CVY – climate variations; DFN – deforestation; OHA – other human activities; FFS – forest fires; TCS – tropical cyclones)								
	SLR	SSC	DRT	FLD	CVY	DFN	OHA	FFS	TCS
Loss of land due to erosion from the sea	✓	✓					✓		✓
Flooding, inundation of land and sedimentation	✓	✓		✓		✓	✓		✓
Lack of water supply (quantity) and poor water quality	✓	✓	✓	✓		✓	✓	✓	✓
Increased health hazards			✓	✓	✓				
Destruction of crops		✓	✓	✓	✓			✓	✓
Loss of biodiversity, and loss of heritage and land values	✓	✓	✓	✓	✓	✓	✓	✓	✓
Damage to community assets	✓	✓		✓					✓

Table 3 Vulnerabilities of Communities

Drawing on table 3, seven major vulnerabilities that threaten the livelihood of the communities in Samoa include:

1. Loss of land due to erosion from the sea (figures 4 and 5). Approximately 70% of the population resides in the coastal areas and coastal erosion is a problem that is not taken lightly

by village communities. Sea level rise, storm surges, cyclones (tropical depressions, gale force winds, storms, hurricanes) and tropical cyclones (major hurricanes) are the main causes. At the same time, other human activities exacerbate the problem such as sand mining and development near or on the sea.

2. Flooding inundation of land and sedimentation. An increasing number of village communities are experiencing flooding inundation in new areas of their land. The village of Lano for example suffers mainly from coastal flooding and is a major concern that is considered under the Canadian-funded climate adaptation pilot project. These problems are worsened by other human activities such as deforestation in the areas located uphill and inland. Again, tropical cyclones and storm surges contribute to the problem.

3. Lack of water supply (quantity) and poor water quality. The causes highlighted in Table 3 contribute mainly to water shortages. Water quality is caused by poor sanitation, stagnant and sedimentation. Poor water quality is known to trigger water-borne diseases that affect public health. Accessibility to healthy water sources is a common problem in all communities, in both coastal and inland areas.

4. Increased health hazards. Communities are experiencing health problems related to extreme climatic events, especially with the onset of droughts where water is scarce often triggering outbreak of diseases such as vector-borne diseases like malaria. Flooding is another major cause of health problems, including water-borne diseases such as typhoid and diarrhea.

5. Destruction of crops. Plantations and livestock continue to be a major source of subsistence living for all communities. The increasing threats from new diseases and pests for both livestock and plantations are linked to flooding and drought and other variations in climate. Extreme events such as tropical cyclones and storm surges affect coastal plantations. The increasing incidence of forest fires has led to the destruction of crops as evident in the past forest fires in rural communities.

6. Loss of biodiversity, loss of heritage and land values. All causes listed in table 3 pose a direct impact on biodiversity and natural resources. Since the environment is closely and intricately linked to the cultural and heritage values of the *faa Samoa (the Samoan way of life)*, it impacts directly on the social development of communities. Historical lands and *malae* (cultural grounds) of traditional villages are being eroded away and threatened by increases in population not only in the fringing urban areas but the coastal communities.

7. Damage to community assets. The coastal infrastructure vital to the village communities such as school buildings, church buildings, halls, *malae*, bridges, roads, homes and properties are mainly threatened by extreme events, such as storm surges and tropical cyclones including severe flooding. These are reflected in past tropical cyclone experiences of Ofa (1990), Val (1991), Heta (2004) and recently, two near miss experiences of tropical cyclones Olaf (2005) and Percy (2005).

B. Framework for Adaptation Programme

The framework for Samoa's programme of action builds upon the national development goals, strategies and action plans implemented by the government. The 2005-2007 Strategy for the Development of Samoa (SDS) with it's theme of *'enhancing people's choices'* clearly articulates six priority strategic areas that will guide Samoa's development for the next three years continuing from past SDS periods. These include private sector development, agricultural development,

tourism, community, education, and health development. The four National Environmental Management Strategies (NEMS) have a common interest of promoting sustainable development with regards to any type of development in Samoa. These include the national waste management policy, national land use policy, the water resource policy and the national policy on population and sustainable development.

In synergy with action plans such as the National Biodiversity Strategy & Action Plans (NBSAPs), the Coastal Infrastructure Management Plans (CIMP), the Planning & Urban Management Act (2004), the MNREM Corporate Plan (2003-2005), the DLSE Institutional Reform Policy (2000), the draft EIA regulations (1998), the COEPs, and the implementation of conventions and agreements such as the UNFCCC, CBD and UNCCD, the SDS is expected to realize the National Vision which is:

"For every Samoan to achieve a better quality of life"

In support of this vision, the NCCCT has developed a vision for Samoa's NAPA that is instilled in this framework and is based on a country-driven and complementary approach. This vision for the future builds on improving the national welfare of the country that is characterized by macroeconomic stability, best practices for good governance, a thriving and competitive private sector, an efficient public sector, quality health and education services, vibrant socio-cultural values and sustainable management of the environment.

Vision

The Samoa NAPA Vision is:

To achieve a high level of community capacity for adaptation to adverse impacts of climate change

Mission

The NAPA aims to communicate urgent and immediate adaptation needs and the activities to address these needs to deal with the adverse impacts of climate change; and to develop the strategies for capacity building amongst stakeholders and village communities.

Objectives

The main objectives of Samoa's NAPA are:

1. To develop and implement immediate and urgent project based activities to adapt to climate change and climate variability;
2. To protect life and livelihoods of the people, infrastructure and environment;
3. To incorporate adaptation measures and goals into national and sectoral policies, and development goals; and
4. To increase awareness of climate change impacts and adaptation activities in communities, civil society and government.

C. Identification of Key Adaptation Needs

According to the annotated guidelines, the identification of key adaptation needs is crucial in the process as it enables the establishment of priority adaptation activities against the vulnerabilities of the key sectors including the communities.

Summary List of Existing and Potential Adaptation Activities

Table 4 shows a list of *existing* adaptation activities and the *potential* adaptation activities or needs of the key sectors including the village communities in which *key adaptation needs* are identified and selected in Table 5.

Sector	Existing Adaptation Activities	Potential Adaptation Activities
Agriculture & Food Security	• Existing regulations and policies that improve food production • Maintain research and development of new plant varieties • Introducing new animal species suited to local climate like tropical sheep • Maintain nurseries that provide cultivars and other planting materials • Promote partnerships with external institutions for expertise and knowledge sharing	• Marketing and trading • Alternative crop research • Early warning systems • Traditional Planting scheduling
Forestry	• Establishing Forest Fire Attack Unit • Drought warnings and advisories media announcements • Establishing “forest risk meter” • Regenerating damaged areas with different species of trees (e.g. *Albizza revive*, resilient to cyclones and high winds) • Information gathering and research • Quotas for logging to promote reforestation • Promotion of “Tree Planting Day”	• Fire prevention • Reforestation • Early warning system • Conservation areas • Sustainable forest management
Water	• Rationing programs (e.g. water delivery by truck) • Demand management & leak detection programs • Extending coverage to affected areas of nearby borehole supply and look for new source • Active involvement in environment programs and projects • Extending treatment and disinfectant • Enforcing public notice to consumers of affected areas not to consume the contaminated water • Encourage communities to protect and conserve natural springs • Immediate repairs of damaged structures • Support reforestation programmes in communities • Water purification programs • Water tank programs • Drilling bores further inland	• Water purification programs • Alternative water supply and storage programs • Watershed management plans • Emergency management plans

	• Reduce pumping hours • Relocate water infrastructure	
Village Community	• Reclamation of land • Revegetating the coast • Temporarily protect the coast • Relocate families • Enforce government laws for sustainable management • Ban sand mining in some communities • Enforcing community by-laws, e.g. regulations where fine is imposed if a person uses banned fishing methods • Do nothing, response by recovering • Revegetate along water springs • Building stone walls around the pool to protect from storm surges • Women and youth groups responsible for maintaining water source area by cleaning and keeping it on a safe hygiene level. • Have water tanks to store rain water • Support and monitor marine reserves in communities • Conduct village community reforestation programs • Develop capacity building programs • Establish conservation areas and reserves • Developing education and awareness programs where possible • Practicing reactive responses • Financial support from churches to rebuild community assets • Government restoration and recovery programs • Overseas remittance dependence to rebuild homes & properties	• Disaster planning framework • Coastal infrastructure protection (e.g. seawall) • Assistance for relocation of communities inland • Water tanks support program • Health programs in communities • Trainings and workshops on agroforestry • Management program for mangroves and marine resources • Reforestation program & establishment of nursery for forest and coastal trees • Need to improve drainage systems • Restoration of coastal springs in communities • Manage sand mining in village • Establish marine protected areas • Establish village laws for conservation of marine areas • Improved building codes resilient to cyclones • Mandatory village inspections • Capacity building for village social groups, and assistance to improve existing coping capacity • Community awareness programs to raise awareness on climate change and projected climate change
Health	• Existing regulations and policies • Water monitoring program • Awareness programs advising public to boil water and clean environment free from mosquito habitat • Promote safe sanitation • Immunization programs • Promotion of healthy lifestyle programs	• Climate-adaptive health programs • Awareness activities and training • Early warning system and emergency measures • Climate-health cooperation program
Biological Diversity	• National Biodiversity Strategy & Action Plan • National Biodiversity Policy • National Invasive Species Strategy • Watershed management strategy • National Biosafety Fframework • Coastal Infrastructure Management Strategy • Biodiversity management systems • Biodiversity enabling programs • Biodiversity information system and database • Related projects implemented • Marine Protected Areas (MPAs)	• Marine and terrestrial conservation areas • Legislation to ban hunting and enforce laws on use of illegal and destructive practices • MPAs • Biodiversity Bill • Biosafety Policy • National Invasive Alien Species

	• Bioprospecting	
Fisheries	• Community-based marine resources management program • MPAs • Management strategies • Research and monitoring programs • Restocking depleted species	• Monitoring and management • Establishment of MPAs
Trade & Industry	• No direct coping strategy for climate change • Pacific Island Countries Trade Agreement (PICTA) • Technical Assistance under Integrated Framework for Technical Assistance for LDC's • Macroeconomic reforms • Promotion of produce in Samoa • FAO programme to support food security	• Investment in annual crops and home garden vegetables • Training for farmers on trade facilitation and standards • Contingency plan
Works, Transport & infrastructure	• Road Asset Management Systems (RAMS) • Coastal Infrastructure Management Plans • Proposed works to upgrade infrastructure • Codes of Environmental Practice (COEPS) • Building code and manual	• Relocation of roads further inland • Compliance with Code of Environmental Practices on impact studies and design • Construction of sea walls with standards and specification where appropriate • Training for private sectors on standards and COEP's
Tourism	• Awareness and training activities for operators on issues such as cyclones and flood prone areas	• Training for operator and tourism management • Sustainable tourism – developing a Tourism Environmental Policy (TEP)
Urban Planning & Development	• PUM Act (2004) • Establishment of Planning and Urban Management Agency (PUMA) • Environmental Impact Assessments	• Zoning disaster planning • Strategic management plans
Coastal Zones	• Coastal Infrastructure Management Strategy • Coastal Implementation Plans • Consultations with communities • Awareness	• Coastal Management Plans • Integrated Coastal Zone Management • Coastal Infrastructure Protection measures
Energy	• Power development plan, Identifying barriers for RET • Renewable energy projects, renewable energy policies	• PIREP • PREGA • RE Policies • National Energy Policy

Table 4 Summary list of the adaptation activities of all sectors including communities

Summary List of Key Adaptation Needs

Table 4 was subjected to the criteria selection and prioritization process to yield the 'key adaptation needs' as shown in Table 5. The NTT identified and agreed that the energy sector be omitted from the list as it rests more towards the mitigation side of climate change.

Sector	Key Adaptation Needs / Activities
Agriculture & Food	• Develop alternative community farming systems

Security	
Forestry	• Develop community forest fire prevention plans and programs • Reforestation & rehabilitation programs for coastal communities • Establish conservation areas in highly vulnerable communities
Water	• Develop water purification programs for communities • Develop watershed management programme for communities • Alternative water storage programmes and technology for communities
Fisheries	• Establish well protected marine reserves (e.g. MPAs)
Health	• Establish health & climate collaboration & synthesis programs • Develop early warning system and emergency measures
Urban Settlements	• Zoning • Disaster planning • Urban planning
Coastal Environment	• Implement Coastal Infrastructure Management Plans and Strategies
Biodiversity	• Marine & Terrestrial Conservation Areas (e.g. MPAs) • Regulate and enforce monitoring systems for marine & terrestrial areas
Tourism	• Implement sustainable tourism activities (develop Tourism Environmental Policy)
Communities	• Coastal infrastructure protection (seawall) • Assistance for relocation of communities inland • Restoration of coastal springs in communities • Strengthening building codes resilient to cyclones
Trade & Industry	• Investment in annual crops and home vegetable farming
Works Transport & Infrastructure	• Relocation of roads further inland • Construction of seawalls (subject to existing plans and codes)

Table 5 Selected Key Adaptation Activities

Criteria for Prioritization

The criteria agreed by Samoa reflect the four objectives of this document and are guided by the principles developed and agreed by the NCCCT (see section E: Preparation Process). The criteria development report (Annex IV) describes in detail how the NCCCT developed the criteria to select and prioritize the activities that are displayed in Table 5.

Tier-1 Criteria: Country-driven

The first order of criteria was kept at a minimum of three criterions as it was found to suit Samoa in this regard. This tier-1 set of criteria is the *'country-driven criteria'* for *selection* of key adaptation needs from Table 4. The criterions are:

- *Complementary approach with existing projects and multilateral environmental agreements*

  The activities are examined on existing plans and projects including MEAs that are ongoing at the moment. Capacity building, awareness, research & training and institutional arrangements are the four key areas that NAPA focuses on to complement existing projects and MEAs, as they promote synergy with MEAs and issues in sectors that are cross-cutting.

- *Hardship reduction to enhance the adaptive capacity of community livelihoods*

  The activities are selected based on the effectiveness to reduce hardship of the communities. For instance, allowing lifeline services such as health, water, agriculture (for food security),

including education to be strengthened and made available and easily accessible that would improve the livelihood of the communities in their effort to build their capacity to adapt.

- *Synergy with national development efforts that achieve sustainable development goals*

  The activities that are considered appropriate immediate and urgent goals (rather than priorities) that serve as part of Samoa's generic national development efforts that contribute to sustainable development. For instance, the Coastal Infrastructure Management Strateg (CIMS) with its central vision *'to be resilient, is to be adaptive, responsive and quick to recover so that communities are environmentally, socially and economically sustainable'* (CIM Strategy, January 2001). Along with other important plans, the synergy efforts to help achieve these developments are considered in the context of sustainable development.

Tier-2 Criteria: Local & Community-based

The resultant adaptation needs screened by the above criteria were immediately subjected to a second order of criteria known as the *'local & community-based criteria'* for *prioritization*. This second set of criteria was developed from three sets of criteria that range from 10 to 15 criterions per set. The first set was drawn from the findings of the country-wide consultation workshops and the second set from the annotated guidelines for the preparation of the NAPA (LEG, 2002: 09). The third, was an NCCCT-driven set of prioritized criteria, based on the findings of the Climate Synthesis Report. The final result led to the following five (5) criteria being selected:

1. *Livelihood & wellbeing*.

   Safeguarding and protecting the livelihood and wellbeing of the communities.

2. *Equity*.

   This criteria examines issues such as gender equality, equal distribution of income related activities and projects within the communities; equal opportunities for all sectors, organizations and businesses; empowerment amongst the community, reducing risks and hazards associated with climate change and reducing 'hardships' in communities. Furthermore equity identifies preservation of natural and cultural heritages from the activities identified.

3. *Integrated Approach*.

   This criterion assesses the integration of project-based activities amongst government ministries, organizations and communities to foster a collaborative effort to achieve sustainability in implementing adaptation activities to strengthen the adaptive capacities of the community, civil society and government.

4. *Increase resilience to climate change and climate variability.*

   This criterion examines the effort by the activities to enhance and build the resilience of communities, civil society and government to climate change and climate variability.

5. *Cost-effectiveness and feasibility*.

   This criterion assesses the extent to which the activities are cost-effective and realistic to produce, feasible and sustainable in the long term. This should reduce long-term costs without jeopardizing the economic benefits of the country.

Again, the final list after subjecting Table 4 to the above sets of criteria provide a much refined selection of priority adaptation activities in Table 5.

Ranking of Activities

The ranking of the projects in Table 5 was decided in account of a *consensus approach* rather than using the multi-criteria analysis (MCA) method or any of the methods outlined in the annotated guidelines for the preparation of the NAPA. This approach was most relevant for Samoa for the following reasons:

- Lack of good information, economic and scientific research nationally that could be utilized to monitor and evaluate past, current and future efforts. Hence, there is a high risk of representing results that may or may not address the immediacy and urgency for Samoa to adapt. This can have counter measures on 'synergizing efforts to protect life and livelihoods of the people, infrastructure and environment';
- The overall approach of NAPA is focused on the 'livelihood of the communities' who are first and foremost vulnerable to the impacts of climate change and variability. The 'consensus approach' is therefore seen as the best avenue for Samoa to utilize and prioritize its selected key adaptation needs, as not only it is very much a country-driven initiative but is widely commendable and accepted in the Samoan context of realism, working cohesively together to adapt.

The consensus approach involved major stakeholders and community representatives gaining maximum support from the communities through a series of country-wide consultation workshops. Review, debate and consensus discussions relating to adaptation activities enabled strengthening of community and government partnerships as well as public and private sector partnerships. The *faa Samoa* (the Samoan way) formal decision making procedure was utilized to attain effective agreement on their adaptive capacity experiences and resulted in ranking of community-based needs (see Table 6).

Immediate & Urgent Community Needs	Percentage (%)	Ranking
Water Resources	17.6	1
Reforestation Programs & Activities	15.2	2
Education & Awareness Programmes	12.8	3
Health Warning Programs	9.9	4
Agriculture & Food Security Activities	9.6	5
Seawalls	9.1	6
Essential Infrastructure & Works	7.8	7
Others (waste management, POPs, ozone protection)	7.8	8
Village Development Inspections	6.8	9
Capacity Building for Social Groups	3.4	10

Table 6 Results of community prioritization session – Country-wide public consultation workshop

The NCCCT identified and agreed that some of the 'immediate and urgent community needs' were cross-cutting and activity-specific needs, and were exempted and considered further under project-based activities. These activities include education and awareness programmes, village development inspections, capacity building for social groups and others. As a result, the 'immediate and urgent community needs' in the same ranking order are as follows;

a. Water resources;

b. Reforestation programs and activities;
c. Health warning programs;
d. Agriculture and food security activities;
e. Transport and coastal infrastructural development; and
f. Others.

D. List of Priority Activities

The key sectors and the twenty four (24) adaptation needs / activities in Table 5 were exposed to the ranking process by the NCCCT and yielded nine activities or plans of actions and in particular twenty one (21) adaptation needs / activities.

As a result of the ranking process, Table 7 lists the nine immediate and urgent project-based priority activities in order from 1 to 9 in assigned project profile names.

Rank	Project Profile Name	Activities
1	Securing Community Water Resource	• Develop water purification programs for communities • Develop watershed management programme for (other) communities • Alternative water storage programs • Restoration of coastal springs in communities
2	Reforestation, Rehabilitation & Community Forestry Fire Prevention	• Reforestation & Rehabilitation (sustainable forest management) • Forest Fire Prevention Program
3	Climate Health Cooperation Program	• Establish Climate-Health Cooperation Program
4	Climate Early Warning System	• Develop Climate Early Warning System and Emergency Measures
5	Agriculture & Food Security Sustainability	• Investment on annual crops and home vegetable farming • Alternative Farming Systems
6	Zoning & Strategic Management Planning	• Zoning, Disaster Planning & Urban Planning • Strengthening building codes resilient to cyclones
7	Implement Coastal Infrastructure Management Plans for Highly Vulnerable District	• Implement Coastal Zone Management • Coastal infrastructure protection (seawall) • Construction of seawalls (subject to existing plans and code) • Assistance for relocation of roads further inland • Assistance for relocation of communities inland
8	Establishing Conservation Programs in Highly Vulnerable Marine & Terrestrial Areas of Communities	• Conservation Areas • Establish Marine Reserves • Marine & Terrestrial Conservation Areas (e.g. MPAs)

9	Sustainable Tourism Adaptation	• Sustainable Tourism – to develop Tourism Environmental Policy

Table 7 Immediate & Urgent Adaptation Activities in Ranking Order

The set of project profiles for each of the selected priority activities described in order in Table 7 are described in Annexes D-1 to D-9. The outline of the profiles follows the format suggested in the annotated guidelines for preparation of NAPA (LEG, 2002:9)

Annex D-1

Project Profile 1: Securing Community Water Resources Project

Action: To improve water quality, accessibility and availability (quantity) of communities

The water resources of Samoa have encountered many disastrous and difficult situations as a direct result of climate change. Dry and drought periods result in water shortages while heavy rains bring flooding. Furthermore, sea level rise increases the possibilities of seawater intrusion into underground water aquifers. Extreme events such as cyclones and flash flooding have become prominent events, which have had major effects on the Samoa Water Authority's service. All these events tend to disrupt the service and result in major problems of deteriorating water quality.

The findings from the community consultations conducted by the MNREM and the NCCCT during the preparation processes concluded that developing a set of adaptive activities in response to the vulnerability of water resource is of high importance to communities. Such activities would improve daily access and improve water quality and availability and help to minimize the impacts of climate change.

Rationale

Impacts of climate change and climate variability on Samoa causes unreliability of water resources. Samoa would be better adapted to respond to these impacts if improvements are made to water supply and accessibility.

Communities should not continue to rely on unpredictable and untreated river supply as there is not always alternative storage services provided (example, water tanks). Alternative sustainable methods need to be sought to enable Samoa to sustain the resource and ensure safe consumption whilst minimizing the spread of water borne diseases.

Key Objectives

1. Ensure good and optimal water quality;
2. Ensure easily accessible water supply for all citizens; and
3. Ensure sustainable water supply in all communities especially those most in need and facing hardship due to water problems.

Expected Outcomes

- Availability and accessibility to good quality water in communities;
- Improved quality of water in communities;
- Sustainable supply of water in communities;
- Sustain water resources;
- Village community coastal springs well maintained and highly protected;
- Sustainability of water for at least 3 to 6 months of drought periods; and
- Ability of communities to store enough supply of good quality water.

Suggested Actions Required	Indicators / Expected Outputs	Potential Long Term Outcomes
Develop water purification programs for communities	Community-based Water Purification Management Plans; and Water Purification Technology Transfer	Availability and accessibility to good quality water in communities; and Improved quality of water in communities
Develop integrated watershed management programme with communities	District-based Watershed Management Plan & Strategies; Integrated Water Shed Management; Plans and Strategies for communities; and Sustain and protected water resources	Sustainable supply of water Improved quality of water Sustained water resources
Restore and protect coastal springs in the most vulnerable coastal communities	Community-based Coastal Spring Protection Program Plans.	Coastal springs well maintained and highly protected; Accessibility to clean and good quality water; and Continuous supply of water in the communities.
Develop alternative water storage and water-use efficiency technology and programs in the communities	Existence of alternative water storage equipment and technology at end of project ; and Accessibility of alternative water storage equipment and technology transfer programs.	Sustainability of water for at least 3 to 6 months of drought periods; and Ability of communities to store enough supply of good quality water

Institutional Arrangement

Implementing Agency: Samoa Water Authority (SWA)

Coordinating Agency: Ministry of Natural Resources, Environment & Meteorology

The Samoa Water Authority (SWA), a government corporation, is the most suitable national agency to implement this project profile. It is proposed that SWA will undertake the identified activities in close collaboration with the communities that require urgent and immediate attention of their water resources.

The project will be coordinated by MNREM and evaluated and monitored by the National Climate Change Country Team Project Steering Committee. This Steering committee consists of executive level officers of each government ministry and private stakeholders who will oversee the articulation of funding received to implement these activities as well as other technical related matters.

Risks & Barriers

1. The SWA lacks the financial capacity to implement most of the future strategies which would otherwise assist in minimizing the effects of climate change.
2. Less recognition of water management and disaster in the National Disaster Management Plan
3. Lack of enforcement for existing regional and national plans & policies.
4. Lack of coordination and collaboration between various stakeholders who have a vested interest in proper water resource management.
5. No regulations that can control private extraction of groundwater either in customary land or privately owned lands.
6. Poor quality information on the availability and quantity of surface water and ground water.

Monitoring & Evaluation

- Evaluation and monitoring should be carried out on a regular basis particularly during the dry season (May to October)
- Village monitoring committees (VMC) working in close collaboration with Samoa Water Authority, the Ministry of Agriculture and Ministry of Natural Resources, Environment & Meteorology
- An independent evaluation assessment team is to be selected by the NCCCT steering committee

Financial Resources

Indicative Budget

Proposed Funding (Technical Assistance): $505,000.00 (USD$)

Activity	*Costs (USD$)*
Develop water purification programs for communities	120,500
Integrated watershed management programs	114,500
Restore coastal springs	120,000
Develop alternative storage programs & technology	150,000
TOTAL	505,000

The government will commit in-kind contributions in support of development projects that contribute to Samoa's development strategies, overall sustainable development goals and Millennium Development Goals.

Annex D-2

Project Profile 2: Reforestation, Rehabilitation & Community Forestry Fire Prevention Project

Action: To protect, rehabilitate, and increase resilience of coastal lowland and inland forest resources

The forestry sector is highly vulnerable to droughts, as it is during these periods that the risk of forest fires increases markedly, particularly in the northwest region of Savaii (Asau and Aopo areas). Droughts are more common in Samoa during the dry season from May to October, and are more pronounced in the north- west region of Savaii. On record, the Asau area has experienced two forest fires in the last two decades that caused considerable damage to the forest ecosystem. These occurred in 1983 and 1998 with the one in 1983 being the more devastating. The onset of these droughts was most likely associated with the El Nino phenomena experienced during these years.

The Aopo area recently experienced a forest fire in October 2003, with an estimated area of damage exceeding 100km^2. A minor forest fire was observed in the same area in August, 2004. This confirms that the extent of areas vulnerable to drought and related forest fires further east from Asau. The risk of forest fires in northwest Savaii is expected to increase markedly in association to the increase in drought frequencies, due to climate chnage. It is likely that the vulnerability of northwest Upolu may also increase with the projected increase in El Nino frequencies.

Studies in the growth increments of species common in drought prone areas have been carried out and are monitored by the Forestry Division on an annual basis. It has been found that the growth rates of these species are slower compared to those common in the wetter areas.

The *Omalanthus nutans* (*mamala* in Samoan) forest species, an important indigenous medicinal plant and the focus of foreign scientific research for possessing qualities that may cure some forms of cancer as well as HIV/AIDS. As it lies in the drought prone region of Savaii, it becomes highly vulnerable to forest fires, and may face possible extinction if drought frequencies are to increase.

The vulnerability of the forestry sector to tropical cyclones will increase with the projected increases in frequency relative to rising global temperatures.

Rationale

The impacts of coastal erosion from sea level rise and climate change and climate variability is causing the destruction of lowland coastal forest areas. The protection and sustainability of both coastal and inland forests resources is of utmost importance to the livelihood of the communities especially when more than 70% of Samoa's population settles on coastal areas. The coastal and inland forests offers protection during extreme climate variations but more importantly prevents further coastal erosion and loss of land. The land and cultural value of many of the vulnerable communities will be maintained and will sustain the social welfare of many of the coastal

communities over a longer period, and in turn contribute to normalizing the naturally and human-affected environment.

Forest fires associated with droughts induced by climate change and exacerbated by human activity are more common in Samoa in its dry season from May to October particularly the north-west part of Savaii. This hazard is identified as major barrier to forest growth (as it slows down rejuvenation and reforestation processes) and possibly extirpates vital indigenous plants (particularly the *Omalanthus nutans*) that are useful for medicinal purposes.

The current fire fighting system has limited resources (e.g., number of fire trucks and stations, water supply, appropriate equipment, and manpower). One way of preventing the occurrence and mitigating the adverse impacts of forest fires is to develop a community-based forest fire plan and implement its deliverables. The plan must be developed by the identified vulnerable communities with the assistance and guidance of the Fire Services, Ministry of Agriculture, Samoa Water Authority and Ministry of Natural Resources Environment & Meteorology. The plan should provide for prevention, mitigation, preparedness, response and recovery including Standard Operational Procedures.

Key Objectives

1. Strengthen and increase resilience of forest fire-prone areas;
2. Development and strengthening of the operational response capabilities of the surrounding communities in preventing, mitigating, preparedness for, responding to and recovering from forest fire emergencies;
3. Development of community-based forest fire plans that encompass all necessary actions and resources for implementation of preventative measures, mitigation, preparedness, response and recovery activities;
4. Strengthening early warning and advisory monitoring systems in the communities;
5. Community participation, coordination and resource mobilization; and
6. Enhancement of community awareness of protecting and reforesting coastal lowland areas and inland forest areas of communities.

Expected Outcomes

- Strengthened and enhanced operational response capabilities of vulnerable local communities;
- Minimized probability of forest fires;
- Increased rehabilitation time span of species (after a forest fire) without immediate disturbance/disruption; and
- Sustainable forest growth to ensure continuous availability of carbon dioxide sinks and supply of forest resources for community as well as nation-wide livelihood

Suggested Actions Required	Indicators / Expected Outputs	Potential Long Term Outcomes
Develop a community-based forest fire plan Develop a community-based forest fire implementation Strategy Encourage and promote fire-tolerant plant species	Community-based Forest Fire Plan; Community-based Forest Fire Implementation Strategy exists in communities; Increased growth rate of forest species; Increased rehabilitation time span of species (after a forest fire) without immediate disturbance/disruption; and Community-based educational and awareness programmes of forest fires and reforesting; and Protection of the different types of forest areas and resources	Strengthened and enhanced operational response capabilities of vulnerable communities; Minimized probability of forest fires; Sustainable forest growth to ensure continuous availability of CO_2 sinks and supply of forest resources for community as well as nation-wide livelihood; and Increased knowledge of combating drought-related forest fires and awareness of reforesting, protecting both coastal lowland forest and inland forest resources in community.

Institutional Arrangement

- Implementing Agencies – Ministry of Agriculture, Fire Services, Samoa Water Authority
- Coordinating Agency – Ministry of Natural Resources, Environment & Meteorology in close collaboration with identified vulnerable communities

Risks and Barriers

- Willingness of the communities to accept, adopt and adapt;
- Availability of local experts to conduct the programme;
- High costs associated with programme;
- Availability of necessary resources (equipments); and
- Availability of data on historical forest fires (assists in developing the programme and also the operational response plans).

Monitoring & Evaluation

- Evaluation and monitoring should be carried out on a regular basis particularly during the dry season (May to October);
- Monitoring – Identified Vulnerable Communities (these communities need to setup monitoring committees) in collaboration with Ministry of Agriculture and Ministry of Natural Resources, Environment & Meteorology; and
- It should be carried out by the relevant institutions or agencies identified under institutional arrangements.

Financial Resources

Indicative Budget
Proposed Funding (Technical Assistance): $417,500.00 (USD$)

Activity	*Costs (USD$)*
Community-based forest fire plan	137,500
Community-based Forest Fire implementation strategy	140,000
Awareness & Promotion program for reforesting fire-tolerant plant species	140,000
TOTAL	417,500

The government will commit in-kind contributions in support of development projects that contribute to Samoa's development strategies, overall sustainable development goals and Millennium Development Goals.

Annex D-3

Project Profile 3: Climate Health Cooperation Program Project

Action: To institute coordination of climate-health partnership programs and emergency measures to respond to climate change and extreme events

Key health concerns for Samoa include vector-borne diseases, diarrhea and other water-borne diseases, acute respiratory infections, malnutrition and loss of life to extreme climatic events such as tropical cyclones, floods and drought.

Samoa's health sector is vulnerable to hazards like tropical cyclones, floods and droughts. Impacts of these hazards to health are evident in water borne, food borne, air borne, and vector borne diseases. Its vulnerability is a product of the water resources, particularly the poor water quality and stressed water quantity in the event of floods and drought. These climate vulnerabilities affect agriculture and food security issues, fisheries and forest degradations. These hazards also cause injuries, illness, and loss of lives.

Climate-related diseases including food and water borne diseases, vector borne diseases and airborne diseases remain in the top ten causes of morbidity in Samoa. There have been several outbreaks of typhoid fever and dengue fever in recent years.

Many vector-borne diseases are weather sensitive and small changes in the weather can dramatically trigger disease transmission. For example, dengue fever and filariasis are carried by the domesticated mosquito *Aedes aegypti.* This mosquito thrives in urban environments and breed in areas that hold water. This explains some of the indirect effects climate change can have on disease as disruption of regular supplies of water lead to changes in water storage practices. This was the case with the outbreak of dengue fever in 2001 in Samoa. Cholera is not endemic in Samoa as only between 1 and 13 cases reported per year. However, there is some evidence that rising sea surface temperatures may increase the risk of cholera spreading (refer to SR, 2004).

Water borne diseases such as typhoid become more problematic with flooding and contamination of surface water in sewage and it remains very high in Samoa with up to 693 cases reported per year. The last major outbreak of this disease was in the early 1990's.

Drought conditions (as evident in Samoa in the past years) has been linked to increased concentrations of pathogens in surface water and increased morbidity and mortality from a combination of diarrhea and dehydration cases with symptoms ranging from acute dehydrating diarrhea (cholera), prolonged febrile illness with abdominal symptoms (typhoid fever), acute bloody diarrhea (dysentery – 5 to 15 cases per year) to chronic diarrhea. Droughts and increasing heat waves also cause flu, eye and skin infections (such as skin cancer) and also diseases of the respiratory system.

Rationale

The establishment of 'climate & health' awareness, training, database and research programs amongst the wider community through health and medical specialists will enable Samoa to strengthen its early response rate to any outbreak of diseases relating to changes in climate.

The establishment of partnerships between meteorology and health specialists will in turn improve the well-being and livelihood of communities by setting up an early-warning surveillance system program that will enable communities to adapt to potential outbreaks of diseases. This partnership will improve the awareness and capacity building of health and medical specialists on global environmental issues and the use of climate-forecast information through a networked database sharing of information mainly between the two stakeholders with access by all stakeholders as well.

Samoa will improve the quality of health care services by providing affordable and sustainable health technology that will enable early response and treatment of the communities and public at large to injuries and or illnesses sustained due to relative impacts of climate change and climate variability.

Key Objectives:

1. Strengthen partnerships between climate/meteorology specialists and health/medical specialists;
2. Development of a user friendly Climate and Health application database to be fused into the Health Information System (HIS), and the Community Health Nursing Information System (CHNIS); and
3. Establish a Climate & Health Institute for training and research to develop staff awareness, understanding and application of climate information and climate related technology.

Expected Outcomes

- Climate and health prioritized in national policies and existing frameworks;
- Increased institutional capacity for climate and health cooperation program;
- Increased individual capacities such as climate-epidemiologists for health and climate services;
- Increased knowledge and skill of climatologists on analysis of early warning on climate & health related diseases;
- Establish, update, and as accurate as possible, comprehensive database for analyzing climate and health information and application across sectors especially village communities;
- Improved ability of health and medical specialists to implement early health and immune services to community in relation to climate forecasts and predictions;
- Improved ability to predict or establish early warning systems and services to public and village communities on any outbreaks in relation to climate changes; and
- Advanced health care services for community at large.

Suggested Actions Required	Indicators / Expected Outputs	Potential Long-Term Outcomes
Develop an institute for housing research & training for public health medical staff on application of climate information and climate related technology	A Climate & Health Institute exists at the MOH for training and research of climate and health science in Samoa	Increased institutional capacity for climate and health cooperation program; Increase individual capacities such as climate-epidemiologists for health
Strengthen awareness of health and medical specialists on climate sensitive information relating to health	Trained and sensitized climatologists and climate scientists to the health effects of climate variability and climate change	Increase knowledge and skill of climatologists on analysis of early warning on climate & health related diseases
Training and sensitizing climate and meteorology specialists to the health effects of climate variability and climate change		Increase knowledge base of medical specialists on climate and public health relations for Samoa
Collect better health, meteorological, environmental, and socio-economic data at appropriate local, regional, and temporal scales for research, program planning, and advocacy	Established and improve data standards and quality criteria to facilitate the better integration of data sets across sectors;	Well established, updated and accurate as possible, database for analyzing climate and health information and their application across sectors especially village communities
Develop early response health services to outbreak of water-borne and vector-borne diseases and other climate related health problems	Health services early response incorporated into national early warning system	Ability of health and medical specialists to implement early health and immune services to community in relation to climate forecasts and predictions
Develop basic entomological research that contemplates climate change impacts and effective prevention measures	Improved health, meteorological, environmental, and socio-economic data at appropriate local, regional, and temporal scales for research, program planning, and advocacy.	Ability to predict or establish early warning systems and services to public and village communities on any outbreaks in relation to climate changes
Develop health surveillance systems to allow assessment of the impact of climate variability and climate change on health		
Improve the quality of public health care services and availability of affordable health technology	Improved services and available health technology	Advanced health care services on public and community at large
Assess costs and benefits of intervention options	Costs and benefits monitoring and evaluation	Accountability and transparency

Institutional Arrangements

Implementing Agencies: Ministry of Health (MOH) & Ministry of Natural Resources, Environment & Meteorology (MNREM)

Coordinating Agency: Ministry of Natural Resources, Environment & Meteorology (MNREM)

The Ministries of Health and Natural Resources, Environment & Meteorology are the most suitable national agencies to implement this project profile. It is proposed that MOH and MNREM will undertake the above mentioned activities in close collaboration with the communities that require urgent and immediate attention of their health services.

The project will be coordinated by MNREM and evaluated and monitored by the National Climate Change Country Team. This Steering committee consists of executive level officers of each

government ministry and private stakeholders who will oversee the articulation of funding received to implement these activities as well as other technical related matters (refer to figure 2)

Risks and Barriers

- High costs to sustain and accomplish the planned activities;
- Level of capacity of the local communities with regards to the importance of the project to their lives;
- Limited human and capital resources to carry out the planned activities;
- Lack of baseline information on climate change to accurately notify the public of diseases for public health planning and monitoring; and
- Lack of baseline information on climate change to support strategic and operational planning and policy development to early health response

Evaluation and Monitoring

- Monitor and evaluate the effectiveness of the training and research activities;
- Improved health database to establish correlation of health & climate related issues; and
- Improved early warning surveillance system response to potential disease outbreaks.

Financial Resources

Indicative Budget

Proposed Funding (Technical Assistance): $620,000.00 (USD$)

Activity	*Costs (USD$)*
Develop national policy on climate & health	25,000
Develop research & training unit (institution)	85,000
Collection of data and information on climate & health	65,000
Develop climate health application database	110,000
Develop early response health services program to outbreaks of diseases, etc	150,000
Develop entomological research	32,500
Develop health surveillance systems	100,000
Improve quality of public health care services and implement health care technology	52,500
TOTAL	620,000

The government will commit in-kind contributions in support of development projects that contribute to Samoa's development strategies, overall sustainable development goals and Millennium Development Goals.

Annex D-4

Project Profile 4: Climate Early Warning System Project

Action: To implement effective early warning systems and emergency response measures to climate and extreme events

Projections on future climatic patterns for tropical regions are unclear due to their high correlation with natural hazards. A future warm climate will likely have implications for future populations if the intensity and frequency of such natural disasters (including tropical cyclones, droughts, and flash-floods) increases as well.

Tropical cyclones Ofa (1990) and Val (1991) were 50- and 100-year events and caused a total of $440 million of damages our times the GDP and 23 fatalities. Prior to this, El Nino related droughts in 1983-84 and 1997-98 resulted in water shortages and widespread fires in dry native forest areas. Early warning systems can help relevant sectors and the community as a whole to take steps to minimize damage caused by extreme climatic events.

Rationale

Without the appropriate systems in place, the impacts of climate change on vulnerable sectors and communities are to a large extent unforeseen, and the frequency and intensity of climate related hazards unpredictable. Therefore, an effective early-warning system must be put in place immediately, to respond to the threat of each hazard and to ensure vulnerable sectors and communities have the information they require.

The implementation of effective early warning systems would significantly assist Samoa to carry out appropriate and sustainable sectoral and community activities to adapt to and hence minimize adverse impacts of climate change.

Key Objectives

1. To upgrade technical early warning systems and associated technical capabilities to monitor and warn against climate and extreme events; and
2. To build sectoral and public capabilities to understand and use climate and early warning hazard information.

Expected Outcomes

- Improved local position forecasting and capability;
- Improved warning relay to remote communities, more accurate real time feedback and relevant local forecasts;
- Improved 3 month lead outlooks on drought probabilities, improved input into resource management systems (water, forestry, agriculture, energy); and
- Improved timely warnings, monitoring and identification of flood prone areas

Suggested Actions Required	Indicators / Expected Outputs	Potential Long-Term Outcomes
Increase resilience of village communities from tropical cyclones	Improved local position forecasting and capabilities; Improved early warning relay to remote communities; and More accurate real time feedback and relevant local forecasts.	Advanced early warning relay for remote village communities; and Improved accuracy of feedback and local forecasting
Increase Resilience of village communities from drought	Improved 3 month lead outlooks on drought probabilities; Improved input into resource management systems (water, forestry, agriculture, energy)	Advanced early warning on drought probabilities by three months; Ample preparation for water shortages by communities; Ample preparation for operational users such as the resource management systems
Increase resilience of village communities from flooding associated with heavy rainfall, TCs and storm surges	Improved timely warnings; and Monitoring and identification of flood prone areas.	Early and timely warnings on flooding; Ability to identify flood prone areas with emphasis on highly vulnerable communities; and Continuous monitoring and evaluation.

Institutional Arrangements

- Implementing Agency: MNREM
- Coordinating Agency: MNREM, Steering Committee
- Associated Agencies: MNREM, MWTI, SPA, SSC, SWA, EPC, SamoaTel, PUMA, MOH, NDMO, communities, NGOs, Red Cross Society

Risks & Barriers

- Long term maintenance of equipment or technical tools procured through external assistance is difficult and expensive and there might not be a budget allocation for this purpose;
- Limited access to information relating to inputs for use in the early warning systems such as expensive satellite and GIS products;
- High training costs;
- Availability of the required skilled human resources; and
- Existence of institutional arrangements for incorporation of new activities and operational expenses.

Evaluation and Monitoring

- Key Indicators:
    - Early warning system(s) with self-testing capabilities
    - Reduced cost of damage to life-line infrastructure and other properties
    - Reduced number of fatalities
    - Evaluation and monitoring will be done through a project steering committee which will be chaired by Ministry of Agriculture

Financial Resources

Early warning systems require sophisticated technology and tools, which are expensive to implement (e.g. Doppler radar that improves flash flood and tropical cyclone position forecasts). It is envisioned that for most early warning systems, a large portion of the cost will be sought through bilateral and multilateral aid projects.

Indicative Budget

Proposed Funding (Technical Assistance): $4.5 million (USD$)

The government will commit in-kind contributions in support of development projects that contribute to Samoa's development strategies, overall sustainable development goals and Millennium Development Goals.

Activity	*Costs (USD$)*
TROPICAL CYCLONES: Establish and install infra-red weather radar, real time high-resolution satellite imagery, weather radio frequencies for pubic and mariners, meteorological research	4.0 million
DROUGHT: Strengthen high-resolution GIS climate layers for Map Server, automated climate stations, applied climate research	250,000
FLOODING: Develop research and installation of infra-red weather radar, high-resolution satellite imagery, telemetric rainfall and river gauges	250,000
TOTAL	4.5M

Annex D-5

Project Profile 5: Agriculture & Food Security Sustainability Project

Action: To maintain economically subsistent agriculture and sustain food security in communities

The main agricultural and food security objectives in the PICs including Samoa are to increase domestic production and productivity, through modern technologies, and reduce dependence on food imports. In particular, emphasis is on diversification, including fruits and vegetables, to develop high value export markets and, domestically, to improve the diet and nutritional status of the population. Accordingly, improving efficient production, strengthening technology transfer and developing capacity in trade and policy, especially in a changing global environment, are seen as crucial areas in enhancing food security, market development and economic growth (FAO RPFS 2003).

Agriculture, forestry and fishing generated about 20% of GDP in 2002. The principal cash crops are coconut and taro (the country's primary staple food). Breadfruit, yams, maize, passion fruit and mangoes are cultivated as food crops. Pigs, cattle, poultry and goats are raised, mainly for local consumption. The livestock sector appears to have a less direct vulnerability to tropical cyclones with larger animals (cattle and horses) tending to find shelter unaided in windbreaks and laying to ground to minimize exposure. Direct impacts on poultry depend upon the shelter provided by the farmer. Seasonal variation will impact on pastures with a long-term possibility of altering quality and growth of the feed exposing farmers to expensive substitutes.

Rationale

Agriculture and hence food security are identified as highly vulnerable sectors for Samoa. Widespread agriculture damage caused great losses for both subsistence and commercial agriculture. Crops with low tolerance levels to climate hazards were the most threatened, including banana one of Samoa's staple crops. Pest diseases were spread by strong winds, for example, the spread of taro crop disaster of the 1990s linked to higher frequency of wind distributed disease (taro leaf blight spores). Sales of taro provided 58% of all domestic earnings in 1993, but an outbreak of the taro leaf blight devastated crop in 1994 and reduced exports to almost nil in that year and subsequent years.

By investing in stable all year round crops and vegetable farming programs instigated at the community level, Samoa will be better able to adapt and afford crops in times of extreme climatic events. Furthermore by developing alternative farming systems that improve productivity and simultaneously protect soil and water resources, of the ability to survive prolonged periods of drought and famine is substantially increased. Thus, the further development of community plantation programs and inspection management for staple and resistant crops will strengthen food security. Introducing such methods would enable the implementation team to build the local capacity of farmers in communities and provide opportunities to share and increase knowledge of agricultural and climate change issues. The availability of alternative farming methods and systems in communities will help support this management program across all communities.

Key Objectives

1. Develop an economically sustainable agricultural sector that is community-based;
2. Ensure an inspection management plan and program for community-based plantations are strengthened to maintain and secure food supply and food nutrition;
3. Ensure availability and accessibility of alternative farming systems; and
4. Improve productivity of farms and plantations and at the same time reduce soil erosion and protect water resources.

Expected Outcomes

- Sustained security of food regardless of weather conditions
- Improved management of village plantations
- Improved variety of resistant crops available across community plantations
- Variety of vegetable farming in communities / households

Suggested Actions Required	Indicators / Expected Outputs	Potential Long-Term Outcomes
Initiate investment program on annual crops and home vegetable farming at a community level	Established community plantations of stable and resistant all year round crops across vulnerable communities; Improved management committee for inspection management program for plantations; and Existence and availability of alternative farming methods and systems in communities.	Sustained security of food regardless of weather conditions; Improved management of village plantations; Improved variety of resistant crops available across community plantations; and Variety of vegetable farming in communities / households MOA, communities, business communities, NGOS.
Further develop an inspection management program for the plantation program		
Develop alternative farming systems that improves productivity and protects soil and water resources		
Promote cultivation and consumption of crops less affected by and immune to extreme events such as TCs, flooding, etc. (example: Umala survives cyclone impacts well)		
Promote sustainable aquaculture of native species		

<u>Institutional Arrangements</u>

Implementing Agency: Ministry of Agriculture in close collaboration with communities

Coordinating Agencies: Ministry of Natural Resources, Environment & Meteorology (MNREM)

The Ministry of Agriculture is the most suitable national agency to implement this project profile. It is proposed that MOA will undertake the above mentioned activities in close collaboration with the communities.

<u>Risks & Barriers</u>

- High costs are a potential barrier for the sustainability of some of the existing coping activities identified, particularly if transferred to the rural farmer. An example is the safeguarding of some cash crop trees from pests using tree covering and other current netting techniques. These are expensive coping strategies for rural farmers to implement without assistance.

- Lack of technical knowledge of climate change impacts on the agricultural sector and food security.
- The lack of technical knowledge at the sectoral level with regards to climate change and its future implications is a possible barrier to the formulation of relevant and effective policies, strategies and activities.
- Possible overlapping jurisdictions regarding natural resource management and use in policies between the Ministry of Agriculture and the Ministry of Natural Resources, Environment & Meteorology.
- Lack of key information to support action, strategy and policy formulation.

Evaluation and Monitoring

The Project Steering Committee to evaluate and monitor climate change and adaptation strategies for the sector with focus on the following areas:

- Community based agriculture
- Alternative farming methods

Financial Resources

Indicative Budget

Proposed Funding (Technical Assistance): $320,000 (USD$)

Activity	*Costs (USD$)*
Initiate investment program on annual crops and home vegetable farming at community levels	120,000
Develop an inspection management program for the plantation program	80,000
Develop alternative farming systems	70,000
Promote cultivation and consumption of crops	25,000
Promote sustainable aquaculture of native species	25,000
TOTAL	320,000

The government will commit in-kind contributions in support of development projects that contribute to Samoa's development strategies, overall sustainable development goals and Millennium Development Goals.

Annex D-6

Project Profile 6: Zoning & Strategic Management Planning Project

Action: Implement Zoning and Strategic Management Planning

Apia, the capital of Samoa centers all utility services and operations. The 2001 Population census claimed that 22% of the total population resides in the Apia Urban Area. Its coastal location makes infrastructure and government assets vulnerable to storm tides and strong northerly winds which are dominant in the event of tropical cyclones.

The implications of urban growth in Apia and its adjoining areas will continue to rise without an integrated strategic response, and its growth corridor to North West Upolu will be pressured to accommodate such growth. These patterns of growth will lead to continued pressure on resources of Apia as well as continued economic, social and environmental change within the wider regions of the country. In this context, the unplanned expansion of Apia cannot be ignored as urban environmental problems continue to rise. The range of issues predominant includes:

- domestic and industrial waste disposal;
- overcrowding and privacy issues associated with sitting new houses;
- flooding caused by building on flood prone and poorly drained lands;
- dead animals such as cattle and dogs;
- reclamation of coastal lands and destruction of mangroves;
- septic tank effluent flowing into the groundwater and coastal ecosystems; and
- Urban catchments impacts on water quality and land resources.

The *Planning and Urban Management Act 2004* (the "PUM Act") has provided legal grounds to implement an integrated system of urban management and planning for sustainable development and environmental management. It considers a holistic approach to achieving the planning and

The Apia urban area is rapidly growing, dominating the settlement pattern in Samoa with over 350 smaller rural villages supporting it (ADB/GoS, 2001). The more prevalent type of urban development occurs along coastal areas that can be serviced by existing infrastructures (roads). Villages are growing rapidly in the hinterland, stretching to the extent of their village boundaries. As a result, villages now form one linear strip of urban development between Apia and Faleolo. The same pattern is also evident in Salelologa on the south-eastern Savai'i but on a considerably smaller scale. The benefits of being closest to national infrastructure that provide urban services or transportation, electricity, telecommunications, has led to a shift in village set-ups in the urban area. The disadvantage of this centralization of services in Apia and the preference to be along the coast for services and food security placed these infrastructure and communities in a very vulnerable situation to sea level and extreme weather events like Tropical cyclones.

Rationale

Apia urban area is where the greatest stresses on the environment are generated and pronounciated. The changing context in which Apia and Samoa is evolving, places new pressures on all sectors engaged in urban management and regional development and the built and natural environments. The complexity and interrelationships of issues facing Samoa today lie far beyond

the simple planning frameworks, but in recognizing the potential complex and interrelated impacts of climate change cross-sectoral planners need to address.

When the effects of land use practices are considered, the human impact on climate change may be greater than previously thought. If land use is a major factor in global warming, this raises difficulties for anyone attempting to deal with the issue, most land use questions are raised and resolved at the local level, while climate issues are often discussed at both national and international institutions.

Current land use practices are altering the climate in ways comparable to the greenhouse effect produced by carbon dioxide gas released into the atmosphere. One major component is the construction of concrete urban buildings, which store heat during the day and release it at night the well-known "urban-heat-island" effect. Retained heat from concrete buildings and streets increases night time temperatures, though it results in a slight decrease in maximum temperatures.

The implications for local land use planning, is an important aspect that must be considered to understanding climate variability and change at the local scale. It would be useful to examine specific locations to observe if they are being influenced by local land use changes (e.g. buildings, parking lots). Hence the need for clear delineation between land use activities and the use of performance standards is required to ensure that activities have minor impacts on the urban and rural environments.

GOALS	*DEVELOPMENT MANAGEMENT TOOLS*					
	Urban Growth Boundary (UGB)	Zoning	Sustainable Management Plans	National Building Code 1992	Draft EIA Regulations 1998	Coastal Hazard Zone
Environment To increase and strengthen adaptive capacity		✓	✓		✓	✓
Urban Intensification Improved urban center, promoting attractive design and heritage	✓	✓	✓	✓	✓	✓
Strong and Healthy Communities Community and villages that meets its needs		✓	✓	✓		✓

Table 6: Planning and Development Management Tools

The importance of development tools identified as zoning in Table 1, is a way the government can control the physical development of land and identifies the permissible use(s) for each individual property.

Zoning typically specifies the areas in which residential, industrial, recreational or commercial activities may develop. For example, a residential zone might allow only single-family homes as opposed to apartment complexes. On the other hand, a commercial zone might be zoned to permit only certain commercial or industrial uses in one area, but permit a mix of housing and businesses in another location. Zoning will be more appropriately addressed in the Sustainable Management Plan which may have a combination of statutory and non-statutory guidance that determine what development standards and terms for land use activities are permitted in an area.

PUMA will have to consider developments (eg structures) which are:

- Adaptable, flexible and movable;
- Performance criteria may have to demonstrate ability to respond to changing sea levels;
- The availability of water; and
- Resilience to extreme storm events and elevated extreme temperatures for extended periods

Key Objectives

To implement a phased and flexible approach to the adaptation of development tools to address the impacts of climate change;

1. To integrate climate change policies and methods into all Sustainable Management Plans (SMPs) at national, regional, district and site specific levels; and
2. To mainstream climate change policy into the planning and urban management agency's plans, policies and development assessment reports.

Expected Outcomes

- National or regional SMPs that advocate improved built and natural environment via the implementation of development management tools identified;
- Achieve sustainable development;
- Increased resilience of built and natural environment to expected climate change and sea level rise;
- Strengthen and increase awareness amongst planners, communities, service providers, politicians and division and policy makers; and
- Integration of climate change factors into development consent processes and environmental impacts assessments

Suggested Actions Required	Indicators / Expected Outputs	Potential Long-term Outcomes
Develop a detailed sustainable management plan and implementation of action plan	National, District and Local Sustainable Management Plan Buffering mechanisms; Reviewed and updated existing regulation and policies	National or Regional Sustainable Management Plans that advocate improved built and natural environment via the implementation of development management tools identified; Adaptation to climate change are mainstreamed into development management tools of PUMA; Help achieve sustainable development goals
Develop priorities for plan and policy development		
Identify priority for urban improvement and urban development		
Review existing regulation and policies to allow integration of adaptation to climate change into development management tools		

Institutional Arrangement

Implementing Agency: MNREM
Coordinating Agency: MNREM, Project Steering Committee (Advisory Committee)

An Advisory Committee shall be responsible for discussing and making decisions and recommendations on issues and subjects including, but not necessarily limited to:

(a) Inputs on the best ways to improve on Sustainable Management Plans;
(b) Advise on the possible ways to engage broad-based consultation and awareness;
(c) Assist with consultations of project profile; and
(d) Review of project profile as circumstances changes.

The reporting relationship is seen as the Advisory Committee is a sub-committee of the Planning and Urban Management Board ("the Board") and the Chairperson shall report to the Board.

Risks & Barriers

- Customary land tenure system;
- Land market adaptation;
- Costs to consultation and preparation;
- Property rights are controlled;
- Fear of compensation;
- High land values;
- Lack of key stakeholder support;
- The data used is accurate and reliable;
- Government commitment;
- Resources are available;
- PUMA commits to implement and monitor SMPs; and
- Improved SMPs will reduce the impacts on climate change.

Monitoring & Evaluation

Baseline data need to be gathered on the elements listed below in which may become land use indicators. These are as follows:

- Land use patterns;
- Urban population growth ;
- Open space in urban areas;
- Agricultural land loss;
- Impervious surfaces;
- Number of trees on public property;
- Trees lost or gained from residential or commercial development;
- Percentage of natural forest;
- Percent of new residential, commercial and industrial lots;
- Open land lost to development in square km;
- Acres of cropland that have been converted to developed land;
- Size and distribution of significant wetlands;
- New septic tank; and
- Noise complaints received by PUMA.

Financial Resources

Indicative Budget

Proposed Funding (Technical Assistance): $400,000 (USD$)
The government will commit in-kind contributions in support of development projects that contribute to Samoa's development strategies, overall sustainable development goals and Millennium Development Goals.

Activity	*Costs (USD$)*
Develop a detailed sustainable management plan and implementation of action plan	200,000
Develop priorities for plan and policy development	100,000
Identify priority for urban improvement and urban development	50,000
Review existing regulation and policies to allow integration of adaptation to climate change into development management tools	50,000
TOTAL	400,000

Annex D-7

Project Profile 7: Implement Coastal Infrastructure Management Plans for Highly Vulnerable Districts Project

Action: To implement Coastal Infrastructure Management Plans for highly vulnerable districts

Infrastructure development is critical for private sector development. More importantly, the provision of services such as water, electricity, road transport, shipping services and telephone communication, is considered an effective vehicle for redistribution of national wealth. Consistent with the theme of ensuring that the community shares the benefits of development, infrastructure development will be rigorously pursued to ensure that it will benefit all Samoans. Currently, a high proportion of Samoa is serviced by tar-sealed road systems; a well developed shipping service linking both islands; 80% of country has access to potable water; and telephone systems that extend to the rural areas (refer to Annex II, Synthesis Report 2004).

Samoa is prone to frequent cyclones, and Cyclones Ofa and Val in 1990 and 1991 respectively, which were 50- and 100-year events, caused a total of $440 million of damages (four times the GDP) and 23 fatalities. Most of the damage affected infrastructure, communication and electricity. Coastal and waterway erosion also pose risks to communities and infrastructure in the coastal zone. Activities such as land reclamation and wall construction, sand-mining, discharge of water disturb natural currents and deposition processes, potentially exposing parts of the coast to greater risk. Risk exposure will continue to rise if economic and social activities are allowed to expand uncontrolled into areas subject to natural hazards (IDA IAM PAD 1999).

MNREM in collaboration with other government ministries has developed plans (Infrastructure Asset Management Project, IAMP) for Samoa that identify location of key infrastructure and asset and aim to maximize protection of government assets. The information collected during the IAMP focused on preparing CIM Plans for 15 districts of Samoa. The remaining 28 districts is to be implemented under the Second Infrastructure Asset Management Project (SIAM-2) beginning early 2005. [1] Of the 15 districts each has a detailed CIM Plan and implementation guideline.

Under the auspices of the Infrastructure Asset Management Project, an assessment of Coastal Hazard Zones for Samoa was conducted by the MNREM through consultancy services in 2000. This activity produced Coastal Hazard Zone (CHZ) maps, along with creating a Coastal Hazard Database (CHDB) and Coastal Sensitivity Indices (CSI) for the entire 573km coastline of Samoa. The project identified strategic and planned actions required for creating sustainable coastal communities. A key fact found during this assessment was that a 0.49 rise in global sea-level above 1900 levels by 2100 is likely to result in an enhancement of existing beach erosion rates by about 3-22m for sheltered lagoon beaches and 10-23m for open-exposed beaches. This is

[1] For more information see http://www.MNREM.gov.ws/projects/siam-2/info.htm under the sub-heading "Coastal Infrastructure Management (CIM) Plans".

indicative of how climate change will affect Samoa in the immediate future particularly during the months of November to March typically coined the "cyclone season".

Rationale

This project profile is consistent with Samoa's national Coastal Infrastructure Management Strategy (CIM Strategy, January 2001). The strategy has as its central vision "Resilience – Coastal Infrastructure and Communities Resilient to Natural Hazards".

> *"To be resilient is to be adaptive, responsive and quick to recover so that communities are environmentally, socially and economically sustainable"* (CIM Strategy, January 2001).

As there are 15 CIM Plans for 15 Districts, this project profile focuses on implementing CIM Plans for districts that have been identified as 'highly vulnerable' as measured by a high Coastal Sensitivity Index (CSI).

Key Objectives

1. To review the best solutions identified in the CIM strategy implementation guidelines for action improving resilience in highly vulnerable districts;
2. To implement urgent CIM plan activities in highly vulnerable areas;
3. To use educational programs to improve the districts awareness of coastal hazard risks; and
4. To enable the community and infrastructure providers to reduce coastal risks in the district.

Expected Outcomes

- An improved coastal environment
- Established lifeline services outside the Coastal Hazard Zones (CHZs)
- Residential developments raised and mitigating flooding hazards
- Availability of sand sources for domestic use
- Improve condition of roads
- Incremental relocation of community and government assets outside the CHZs
- Strong sense of community responsibility and ownership for coastal processes and coastal management

Suggested Actions Required	Indicators / Expected Outputs	Potential Long-term Outcomes
To undertake all appropriate actions identified in the CIM plans for highly vulnerable districts; To inspect current status of culverts and where necessary an upgrading of culverts and drains; To implement education programme; To identify road maintenance, investigate constructing new inland road with	Effective management of coastal zones in vulnerable areas in the District with the use of planning solutions and hard-structural solutions Protected coastal infrastructure A trend of inland retreat or relocation	An improved coastal environment Established District clinic outside the CHZ Residential developments are raised and mitigated from flooding hazards Sustainable source of sand is available for domestic use

consultation with villages on final route; To prepare an EIA for the propose road; To develop wetland monument plans To work collaboratively with telecommunication providers for provisions of underground telephone services and expansion of mobile telephone network; To work collaboratively with EPC for provision of underground electrical lines and expansion of electric power service; To identify a new site for relocation of districts hospitals and or clinics outside of the hazard zones; To ensure control of commercial sand mining and enforcement of permit infringements;	New individual and community development build foundations are at a level that takes into account the Coastal Flooding Hazard Zone in the area of buildings Training and skills transfer to counterparts and the community	Better condition of local roads Incremental relocation of community and Government assets outside the CHZs Strong sense of community responsibility for coastal processes and to coastal management

Institutional Arrangement

Implementing Agency: MNREM, MWTI
Coordinating Agency: MNREM

The Ministry of Natural Resources, Environment & Meteorology to be the implementing agency with cross-sectoral collaborative involvement with Ministry of Works, Transportation, and Infrastructure and other Government corporations. The District CIM Plan Committee (consisting of village representatives) and Government shall be responsible for making decisions and recommendations on issues and subjects including, but not necessarily limited to:

- Inputs on the best ways to improve coastal resilience;
- Advise on the possible ways to engage broad-based awareness;
- Assist with consultations of project profile; and
- Review of project profile as circumstances changes.

Risks & Barriers

- Lack of District ownership of the project;
- Isolation of the District;
- Political will and commitment;
- Tropical cyclones or extreme climatic events;
- Lack of Engineers within the Ministry to supervise and manage contracts;
- Lack technical skills on contract management for works and services;
- Rock seawalls tend to be preferred by communities for their perceived protection, but they have high physical and visual impact on the beach environment and can be counter-productive;
- Rock Seawalls build by villagers lack design standards and were easily affected by waves during the cyclone.;
- Land ownership and tenure issues;
- Communities preference for coastal location to access marine resources; and
- Lack of collaboration between sectors involved.

Evaluation & monitoring

- Work undertaken must reflect a balance between community needs / outcomes and strengthened resilience of the coastal environment;
- Five yearly CIM Plan review;
- Project status review monthly; and
- Established CIM committee in highly vulnerable communities and districts.

Financial Resources

Indicative Budget

Proposed Funding (Technical Assistance): $450,000 (USD$)

The government will commit in-kind contributions in support of development projects that contribute to Samoa's development strategies, overall sustainable development goals and Millennium Development Goals.

Activity	*Costs (USD$)*
To undertake all appropriate actions identified in the CIM plans for highly vulnerable districts;	150,000
To implement education programme;	100,000
To work collaboratively with telecommunication providers for provisions of underground telephone services and expansion of mobile telephone network;	50,000
To work collaboratively with EPC for provision of underground electrical lines and expansion of electric power service;	50,000
To identify a new site for relocation of districts hospitals and or clinics outside of the hazard zones;	100,000
TOTAL	450,000

Annex D-8

Project Profile 8: Establishing Conservation Programs in Highly Vulnerable Marine & Terrestrial Areas of Communities Project

Action: To establish and or strengthen community-based conservation programs for the protection of highly vulnerable terrestrial and marine biodiversity

The islands are defenseless against the devastating natural disasters, including cyclones, tidal waves, sea level rise and volcanic eruptions. A significant cyclone can wipe out an entire ecosystem in a short time by generating catastrophic waves, torrential rains, and winds up to 240 kilometers an hour. Biodiversity habitats are prone to tropical cyclones, forest fires in the situation of drought and human induced deforestation activities.

In general as stated in Samoa's Biodiversity Strategy and Action Plan (NBSAP, 2001) the 'status of wildlife' in Samoa after severe cyclones like Ofa and Val was 'quite critical', most likely many of the species were predicted to 'survive albeit in very reduced numbers' (ibid., 2001) with some being severely 'threatened in the long-term should additional pressures such as hunting be at unsustainable levels' (ibid., 2001). It was generally then recommended from the assessments of the NBSAP report that the 'best solution is to ensure there is sufficient habitat which will provide some surviving refuges' (ibid., 2001) for wildlife fauna in particular the birds and fruit-eating bats.

Recent studies shows that most of the coast line of Samoa's major islands are of gradual sloping low-lying areas settled by more than 70% of the country's population are highly vulnerable to tropical cyclone induced waves causing coastal flooding, erosion and landslides (First National Communication Report, 1999).

The impact on marine resources has been great. The intense wave activity of storms overturned much of the coral near shore and severely damaged corals to depth of up to 10 meters (30ft). More recently a mass of coral bleaching event affected most of the coral in the Samoan archipelago and scientist's now associate coral bleaching with global warming. Corals, as the main habitat for marine fish life, live at or between 18 – 28 degrees Celsius therefore a slight increase in temperature of the water causes bleaching. There had been evidence of coral bleaching in Samoa during strong La Nina episodes.

Rationale

The identification of conservation areas in highly vulnerable marine and terrestrial areas of communities is urgent and must be addressed immediately. Compounding biodiversity, the pockets of vulnerable marine and terrestrial areas of communities must be protected in order to treasure its biodiversity, safeguard the sustainability of natural resources and environment of the communities. This will ensure an increasing adaptation capacity of the communities, mainly the livelihood resources.

A collaborative effort between the communities and the implementing and coordinating agencies will improve sustainable biodiversity management considering climate change and climate variability. Furthermore, conservation will be given to priority conservation sites for priority species protection. A continued commitment by the communities along with the implementing agency to establish a biodiversity inventory assessment of the ecological status of key priority sites key fauna and flora species for conservation as well as the pressures affecting the sustainability of the site and its biodiversity content will ensure the project impacts can be measured and further adaptation initiatives can be formulated to better adapt at the community level.

Key Objectives:

1. Strengthen sustainable biodiversity management plan of action in the communities;
2. Strengthen high priority conservation areas in communities;
3. Develop and update data base inventory for assessment, monitoring and evaluation works; and
4. Develop a systemic awareness programme to advance and maintain traditional and modern biodiversity management plans and practices...

Expected Outcomes:

- Existence of a sustainable biodiversity management plan in the communities at end of the project
- Existence of high priority conservation areas identified and marked in communities
- An inventory database located and accessible for assessment, monitor8ing and evaluation works
- A systematic programme of educational and practical learning in which communities engage in improving their knowledge, skills and commitment to better biodiversity management practices

Suggested Actions Required	Indicators / Expected Outputs	Potential Long-term Outcomes
Develop community-based sustainable biodiversity management plans Identify and establish priority conservation areas for priority species protection (both marine and terrestrial) Develop a community-based biodiversity inventory Develop effective capacity building programmes for communities with conservation area programmes	A community-based sustainable biodiversity management plan that allows the community to better manage its biodiversity resources of priority concern Display of priority Conservation Areas identified for each community An inventory of the communities biodiversity allowing assessment to identify priority areas for further conservation and protection	Existence of a sustainable biodiversity management plan in the communities at end of project Existence of high priority conservation areas identified marked in communities for public notice ongoing after project A database inventory located and accessible within the community for assessment and monitoring and evaluation works

Institutional Arrangements

Implementing Agencies: MNREM and MOA in close collaboration with communities
Coordinating Agency: Project Steering Committee (acting advisory committee)

MNREM is the most suitable national agency to implement this project profile. It is proposed that MNREM will undertake the above mentioned activities in close collaboration with the communities that require urgent and immediate attention of conserving their biodiversity.

The project will be coordinated by the Climate Change Unit of MNREM with close collaboration with the project steering committee. This Steering committee consists of executive level officers of each government ministry and private stakeholders who will oversee the articulation of funding received to implement these activities as well as other technical related matters

Monitoring & Evaluation

The Project Steering Committee will oversee the vulnerable and adaptation strategies executed by the implementing agency and monitor the results of the project in terms of:

- A sustainable biodiversity management plan of the communities exists and is practiced continually before and after seasons
- High priority conservation areas are well identified marked and displayed on public notice boards within critical areas of the community environment.
- 6 monthly update of village or community-based biodiversity inventory.

Risks & Barriers

- Inadequate Level of Available Resources. There is at present a great need for effective holistic approach towards education, awareness, and training to the capacity of villagers to commit to this work in integration with their other social and economic needs. In particularly, the majority of the biodiversity related conservation work required should be carried out at the local community level. An extensive outlay of financial and human resources is therefore required.

- Legislative Framework. There is no legal basis provided for village communities establishment of protected or conservation areas.

- Lack of Effective Information Management System. Whilst numerous surveys have been undertaken in different fields, the results have not been able to be integrated. An integrative information management system would give people and communities much broader outlines of issues and problems in biodiversity conservation and in other areas of development.

- Absence of Effective Institutional Arrangements in Local Communities. This refers to both the quality and quantity of the governors, the governed and the governing structures at the village level. There are various resources needed to increase the capacity and scope of action of these elements of institutional arrangements or governance at the local levels in order to effectively incorporate in their decision- making processes biodiversity and other issues at the level of urgency now required from them.

Financial Resources

Indicative Budget

Proposed Funding (Technical Assistance): $350,000 (USD$)

The government will commit in-kind contributions in support of development projects that contribute to Samoa's development strategies, overall sustainable development goals and Millennium Development Goals.

Activity	*Costs (USD$)*
Develop community-based sustainable biodiversity management plans	125,000
Identify and establish priority conservation areas for priority species protection (both marine and terrestrial)	75,000
Develop a community-based biodiversity inventory	100,000
Develop effective capacity building programmes for communities with conservation area programmes	50,000
TOTAL	350,000

Annex D-9

Project Profile 9: Sustainable Tourism Adaptation Project

Action: Implement Sustainable Tourism Adaptation Programs

This Sustainable Tourism Adaptation Profile aims to establish a National Sustainable Tourism Policy (NSTP) so that other sectors involved and communities have a constructive knowledge on procedures and protocols relative to the industry taking into account climate change and climate variability.

Rationale

The Samoa Tourism Development Plan 2002 – 2006 does not identify any strategy to cope with the climate issues despite tourism being an integral player in Samoa's economy. The survival and the success of the Tourism industry depend on other sectors such as water, health and electricity. The issue of Climate Change is affecting the Tourism Industry (for instance, the frequency of drought periods forces tourism businesses to close down because of poor and no water supply, running the risk of disease outbreaks that can seriously impair the industry); yet there are no strategies in place for the tourism industry to adapt to the adverse impacts of climate change and.

The establishment of NSTP would benefit Samoa by:

- Initiating the establishment of regulatory compliancy procedures that prevents and protects the industry from un-environmentally friendly business practices that can be exacerbated by extreme climatic events;
- Developing and promoting climate adapting business strategies that will protect the industry from adverse impacts of climate change and climate variability;
- Establishing environmentally responsible practices to protect the natural environment including terrestrial and marine biodiversity;
- Developing awareness raising programs for staff on climate change issues and application of best environmental procedures that protect the marine environment;
- Developing eco tourism protocols as a mandatory requirement for all tourism business ventures; and
- Increasing the capacity building of the industry in terms of sustainable development practices, climate-proof practices.

Key Objectives:

1. Increase capacity building and knowledge of local tourism business operators in communities on climate change and related impacts;
2. Put in place tourist environment policies in community-based tourist businesses;
3. Provide funding to implement counter-measures for climate change in the Tourism industry;
4. Promote and strengthen awareness on ecotourism and climate
5. Set clear protocols and procedures to involve other sectors and communities in promoting environment protection and adaptation to climate extreme events within the local tourism industry

Expected Outcomes:

- Existence of national sustainable tourism policy
- Awareness of community operators and tourists on climate change issues at all levels (locally and nationally)
- Proactive approach in tourist operations future plans, policies and actions
- Ecological and ecotourism education program exists and strengthened
- A sustained tourism industry

Suggested Actions Required	Indicators / Expected Outputs	Potential Long-Term Outcomes
Develop a National Sustainable Tourism Policy (NSTP)	The establishment of a NSTP to increase capacity of community operators in the tourism industry and tourists for a robust understanding on CC and actions for way forward. Proactive measures on adaptation to impacts of climate change in business plans, development plans and activities Promotion Program on ecological education or ecoliteracy in the tourist industry and national school curricula	The industry and tourists act upon (compliant) and are aware of impacts of climate change and climate related issues relative to the industry Tourism industry implement proactive adaptation measures to impacts of climate change Communities are aware of ecological importance to reduce vulnerability in tourism industry Samoa's Tourism Industry is Sustained
Assess the impacts of coastal protection measures to the industry		
Translation of NSTP for community programmes and awareness activities		
Promote eco-literacy to strengthen awareness programmes of impacts of climate change to the tourism industry via a pilot project		
Carry out site inspections on tourist businesses on compliancy to policies and regulations		

Institutional Arrangements

Implementing Agencies – STA, MNREM
Coordinating Agency – MNREM
Support Agencies – MOA, NGOs, Communities, Resorts, Hotels, Beach Fales etc

Risks and Barriers

The following highlight existing barriers to the development of the sector:

- Limited knowledge on climate change and related impacts;
- Lack of awareness activities on climate change;
- Lack of policies in other sector that promotes the tourism industry;
- Lack of funding available to implement counter-measures for climate change in the tourism industry;
- Uncertainty on projected trends of climate changes; and
- Absence of clear protocols and procedures to involve other sectors and communities in promoting the industry.

Monitor & Evaluation

An advisory committee oversees the progress of the project and checks that:

- a Policy on environmental tourism is in place at all tourist operating businesses (including hotels, rental, tours and guides);

- an ongoing awareness programmes within the tourist business that encourage eco-literacy amongst tourist operators, employees and tourists;
- coastal protection measures exist in tourist businesses located on coastal areas ;
- five yearly CIM Plan review; and
- Project status review monthly.

Financial Resources

Indicative Budget

Proposed Funding (Technical Assistance): $250,000 (USD$)

The government will commit in-kind contributions in support of development projects that contribute to Samoa's development strategies, overall sustainable development goals and Millennium Development Goals.

Activity	*Costs (USD$)*
Setting up of a tourism environmental policy for Samoa	100,000
Carry out a study on impacts of coastal protection measure to the tourism industry	50,000
Translation of NAPA document in the Samoa language for community programmes and awareness activities	50,000
Setting up of a pilot project in a secondary and or primary school to promote an ecological curriculum (eco-literacy), strengthening awareness programmes to the tourism sector about climate change and its consequences.	25,000
Making funds available for the tourism sector to implement site inspections on tourist businesses on compliancy to policies and regulations	25,000
TOTAL	250,000

E. NAPA Preparation Process

The NAPA preparation process was based on the annotated guidelines for the preparation of the NAPA (LDC Expert Group UNFCCC, 2002) (see Annex V). Samoa adopted the steps of the process as follows:

1. Build the NAPA Team and the Multidisciplinary Team. The latter being the Napa Task Team (NTT);
2. Carry out participatory rapid assessments to identify the vulnerability and potential increase in climate hazards and associated risks of the critical sectors including the village communities;
3. Synthesize the available vulnerability assessments, coping strategies and existing development frameworks of the critical sectors including the communities and combine the information into one national climate synthesis report;
4. Conduct countrywide public consultation workshops aimed at identifying the potential adaptation needs and the criterias to select and prioritize these needs; and articulate the key adaptation needs based on ideas from the consultations and from the national climate synthesis report;
5. Undertake the Criteria Prioritization process;
6. Rank the Project and the Activities with continued periodic review of risks and prioritization of activities; and
7. Develop the Project Profiles and submit NAPA.

In the overall development process of the NAPA, the following guidelines were used and some developed during the course of the project and helped guide the process into its final step.

GUIDING PRINCIPLES

In line with the annotated guidelines for the preparation of the NAPA (LEG, 2002), Samoa's NAPA process is guided by the following principles that have helped in determining the set up of the framework for the adaptation programme:

- Community participatory approach

  The participation of local communities or the men and women at the grassroots level who are the most vulnerable to the impacts of climate change. Countrywide public consultations enabled their views to be solicited under the NAPA process. Three main inter-related social groups were the key groups/participants in the participatory approach, and include: the village council of chiefs, the untitled men, and the women's committees and/or women's council.

- Consensus Approach

  The faa-Samoa or Samoan culture is a key factor in achieving and maintaining social harmony within Samoan society. It is a valuable social security system that provides cohesion in the

community (see Annex IV, p. 12). This approach guided the identification, selection, prioritization and the ranking of the key adaptation activities for NAPA.

- Multidisciplinary Approach

  The employment of the NCCCT to put together the existing information for NAPA is imperative. The views of the key stakeholders ensured representation in the NAPA process as well as participation in the selection, prioritization and ranking of the final adaptation activities.

- Complementary Approach

  The existing information used to develop the NAPA and the NAPA process was based upon the existing national plans, programmes and policies of Samoa. This principle meant complementing national and international documents such as the SDS, NEMS, CIMS, CBD NBSAPS, UNCCD NAPS and more.

- Sustainable development

  The mainstreaming of NAPA into national plans and policies that support sustainable development goals is considered in the process. The NAPA builds upon development initiatives and programmes such as the CIMS plans and the PUM Act 2004. For instance, climate change factors are increasingly being assessed against development proposals in EA and EIA regulations formulation process of the sustainable development unit and strategic planning unit of the PUMA.

- Gender equality

  The NAPA process carefully considered a balanced representation of the views of both men and women. This was reflected in the CV&A tool used to differentiate the views of both genders (see Annex III).

- Country-driven Approach

  In order to obtain as much information as possible from the public and communities of Samoa, including the business community, NGOs, government ministries and corporations, a total of 5 country-wide consultations were held. This was done using country-driven principles that augmented community-participatory approach, the consensus approach, multidisciplinary and complementary approach. The uniqueness of Samoa's NAPA representation is an example of the country-drivenness and emphasis.

- Strategic Planning Approach

  Samoa is increasingly taking a holistic approach on sound environmental management. This means the development of the urban as well as rural areas must be strategically planned and designed, not only to compliment sustainable development goals but to increase the resilience

of these densely populated areas from the extreme impacts of climate change and climate variability.

- Cost-effectiveness

  The NAPA process takes into consideration the feasibility and implementation costs, learning from ongoing projects, plans and programmes that NAPA builds upon and integrates into. For instance, the CIMS and CIM Plans aims to increase resilience of coastal infrastructural assets and livelihood and is highly considered by NAPA as an imperative adaptation activity that is now in its implementation phase, and is therefore highly cost-effective to consider as an urgent and immediate need to fulfill.

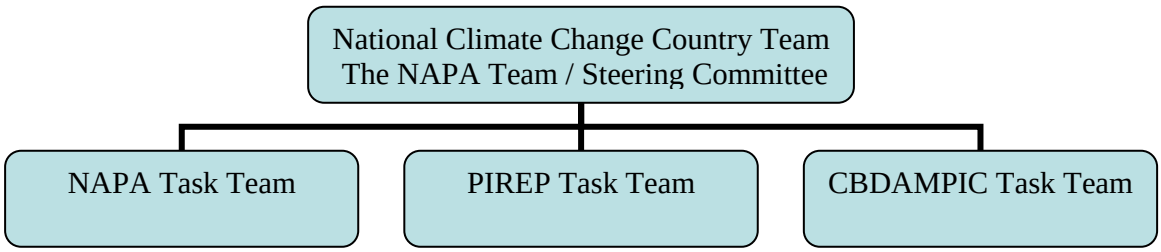
- Simplicity

  The NAPA process aims to build on simplicity of implementing the most immediate and urgent needs for Samoa. The projects under NAPA are aimed to be simple and appealing to the communities who will be the recipients of these project-based activities. The coping measures or adaptation solutions to climate variability and extremes impacts will be similar to those designed for the impacts of climate change.

Building the NAPA Team and Multidisciplinary Team

The existing National Climate Change Country Team (NCCCT) that was established in 1999 to develop the First National Communication Report to the UNFCCC was reconstituted as the NAPA Team. The team has since expanded to include academic institutions such as the National University of Samoa (NUS), the Samoa Polytechnic, and the School of Agriculture – University of the South Pacific, Alafua. The participation of the Samoa Umbrella for Non-government Organizations (SUNGO) ensured solicitation of the NGO views in the team.

Key experts were selected and invited from within NCCCT to form the multidisciplinary team, known as the NAPA Task Team (NTT). The responsibility of the NTT was to carry out the activities set out by the NAPA process. The NCCCT currently steers three projects and include the NAPA, the Pacific Island Renewable Energy Programme (PIREP) and the Canadian-funded project known as the 'Capacity Building for the Development of Adaptation Measures in the Pacific Island Countries (CBDAMPIC) as shown in the following organizational chart.



The multiple government agencies, ministries, corporations, the private and business communities, non government organizations and civil society organizations that were involved and are potentially involved for implementing development plans include in no particular order:

Samoa Water Authority, Attorney General's Office, Ministry of Natural Resources, Environment & Meteorology Division, Ministry of Agriculture, Ministry of Finance, Ministry of Foreign Affairs & Trade, Ministry of Communications & Information Technology, Red Cross Society, Ministry of Health, Ministry of Women, Community & Social Development, Samoa Umbrella for Non Governmental Organizations, Samoa Tourism Authority, UNDP, National University of Samoa, Samoa Polytechnic, Ministry of Works, Transport & Infrastructure, Central Bank of Samoa, Secretariat of the Pacific Regional Environment Programme, University of the South Pacific School of Agriculture, Malua Theological College and all village communities of Upolu, Savaii, Manono and Apolima.

Vulnerability and Adaptation Assessment Process

The NCCCT and the Ministry agreed that all sectors critical to the development of Samoa, with emphasis on village community livelihood, be considered for their vulnerability to the impacts of climate change and their adaptation activities, if any.

The MNREM and NCCCT concluded that no existing information regarding the impacts of climate change and climate variability on a sector was documented. It was found however that vulnerabilities exist, most of which are attributed to the impacts of climate change, the possible strategies currently being implemented and some that could not be implemented due to institutional and financial barriers; were identified under NAPA as potential vulnerabilities and coping measures to adapt to the stresses of the key sectors and communities caused by the impacts of climate change.

PARTICIPATORY RAPID ASSESSMENT TOOLS

On the basis of the annotated guidelines such that the assessment be based on participatory rapid assessment tools, the NCCCT agreed on the following tools to assess the current vulnerability and potential increase in climate hazards and associated risks of the critical sectors including the livelihood of the communities. These tools are:

1. Pre-Synthesis Sectoral Reporting

The initiation of a 'pre synthesis reporting' of the vulnerabilities and adaptation based on existing information was initially consulted amongst the NCCCT and further contracted out to experts of each of the sectors. The information gathered were then synthesized into one national climate change synthesis report (Annex IV) that processed the interconnectedness of each sector to achieve a wider and big picture of the vulnerability (and adaptation) of Samoa. The pre-synthesis reports were collected from the following sectors;

2) Agriculture & food security;
3) Forestry;
4) Water,
5) Health,
6) Village communities,
7) Biological diversity;
8) Fisheries,

9) Trade & industry;
10) Works transport & infrastructure;
11) Tourism,
12) Urban planning and development;
13) Coastal environments, and
14) Energy

2. Community Vulnerability & Adaptation Tool

The Community Vulnerability & Adaptation (CV&A) tool was the main approach used in the countrywide community / public consultations to obtain vulnerability and adaptation information from the village communities. This tool was adapted from the first successful community-level adaptation project in Samoa, in partnership with the government of Canada.

Briefly, the tool was utilized as follows:

1. Assign three experts from the NTT to each of the social groups. The three experts include a facilitator, a note taker and the observer. The village community inter-related social groups include the *pulenuu* (mayor and or high chiefs) group; the women's council and or women's committee group, and the youth group that involve the *aumaga* (the untitled men of the village).
2. The discussions were facilitated in an open and unrestricted manner;
    a. Asking a series of open-ended questions (designed by the NTT),
    b. Conducting interview questions and filling in open-ended questionnaires, and
    c. Presentation of the group discussions amongst all groups to solicit more feedback and comments.

More than 500 representatives of these groups from all communities around the country (a total of 299 traditional villages including new villages) were participants to the 4-day consultation workshops. The quantitative findings from these public consultations were discussed, presented and later analyzed to provide a holistic view of the village communities. Their views on criteria and ranking process were also discussed and were given weight in the final selection, prioritization and ranking process.

The Framework Development Process

In line with the principles of good governance, the framework was widely consultative. It involved five countrywide consultation meetings with a wide range of stakeholders, which included *Pulenuu*, women's committees, farmers and fishermen, non-government organizations, youth groups, the business community as well as government ministries and corporations.

The four countrywide consultation meetings gathered ideas and views for articulating the outline of the framework and how this framework will fit or compliment other national projects and programmes.

The ideas gathered from the consultations especially on the national level with government ministries and corporations, enabled the building of the outline of the framework that include the vision, mission, objectives, guiding principles, the key adaptation needs and the implementation

strategy. The NCCCT took into account the following ideas gathered during the NAPA process to build the NAPA framework:

- Build on the development approaches and plans of existing national strategies and frameworks such as the NBSAPs, NEMS, the National Communication report to the UNFCCC, CIMS, as well as SDS reports;
- The country's national vision;
- The NAPA vision;
- The SDS vision for 2002-2004 and SDS vision 2005-2007;
- The summary of vulnerability and adaptation activities of all sectors including communities as displayed in table 6; and
- The annotated guidelines for the preparation of the NAPA.

The Synthesis Process

Refer to separate document: Annex II

The Country-wide Consultations Process

Refer to separate document: Annex III

The Criteria Development Process

Refer to separate document: Annex IV

The Ranking Process

The ranking was based on what the communities conveyed as the most needed in their communities. For example, most communities indicated that they are urgently in need of good quality water or they needed to get access to water supply and need more water as the supply to their communities is very limited given the problems they face every day. In essence, the ranking process was based on the immediate and urgent needs disclosed and or argued by the village communities.

Therefore, the ranking order established in table 6 was identified and agreed by the NCCCT as the template to base the ranking of activities for the NAPA. This ranking order was formulated under analysis of the findings of the country-wide consultation workshops. The rationale for this basis rests widely on the community livelihood approach, utilizing the bottom-up approach and where the views of those identified as most vulnerable are highly considered.

Firstly, the NCCCT identified and agreed that some of the 'immediate and urgent community needs' in Table 6 were cross-cutting and not project-based activity-type needs, were exempted and considered further under apposite project-based activities. The exempted activities include the education and awareness programmes, village development inspections; capacity building for social groups and others. In refinement of Table 6, the 'immediate and urgent community needs' in the same ranking order are as follows;

a. water resources;

b. reforestation programs and activities;
c. health warning programs;
d. agriculture and food security activities;
e. transport and coastal infrastructural development; and
f. Others.

The ranking of the 'key sectors' (Table 5) were then based on the following criterias;

- Rank the key sectors in the template order as shown in (the refined) Table 6.

  Therefore, the water sector in Table 5 is ranked the foremost immediate and urgent adaptation activity since water resources (compounding availability, quality and accessibility) have been highly ranked by the communities as evident in Table 6.

  If cross-examined, this process is in line with the synergy assessment process, the selection and prioritization processes of the development of the NAPA.

- Further review the 'key adaptation needs / activities' of each key sector based on the following;
  a. Identify if the need/activity be considered as a potential project-based activity or profile; or
  b. Identify if the need/activity be considered under one of the project-based activities or profiles.
- Subject the ranking and the contents of the profiles to public and stakeholder review.
- List the final ranking and identify the project profile name for each activity based on its overall objective.

Evaluation and Monitoring

The implementation strategy of the NAPA requires full proposals for its project profiles by the implementing agencies. One of the requirements of the proposals is submission of its plans with indicators that will allow for monitoring and evaluation of the project.

The project steering committee is fully responsible for future evaluation of the NAPA including its project-based activities underlined in the 9 project profiles.

The monitoring and evaluation of NAPA is subject to government audit requirements, protocol and procedures at all times.

The Government Endorsement Process

In approval by the Chief Executive Officer, the NAPA is to be signed by the Minister of NREM for submission with Cabinet Paper presentation and accompanied by assisting documents of other Ministries such as the Ministry of Finance, strictly following all Cabinet Procedures per se.

The NAPA becomes an official national document once approval is given by Cabinet that is legally binding requiring full mandatory government support and commitment to implement the outcomes required of NAPA.

It is envisaged that the implementation strategy for NAPA will be adhered to by the government where its responsibilities will be measured for accountability and transparency.

Implementation Strategy

The NAPA enables the implementing agency, the Ministry of Natural Resources, Environment & Meteorology (MNREM) to:

- Synthesize existing information on Samoa's vulnerability to climate change and sea level rise
- Work and communicate with relevant stakeholders in prioritizing urgent adaptation needs
- Communicate to the development partners that we are vulnerable and urgently need assistance to protect the livelihood of Samoa from the damaging impacts of climate change.

In line with the annotated guidelines for the preparation of the NAPA, as well as the country-driven approach for the execution of the NAPA project profiles, the implementation of the adaptation activities rests on the plans of actions further explained in the project profiles of each of the priority-based activities identified in Table 7.

It is envisaged that:

(a) In the next phase after cabinet endorsement, Samoa is to launch the NAPA and its project profiles locally via an outreach program and internationally as a side event in the upcoming Conference of the Parties 2005. The launching of an outreach program locally to target a roundtable discussion with the development partners on the best avenues and funding opportunities that can provide successful implementation of each of the project profiles. The potential international development partners include Australia, New Zealand, JICA, GEF-UNDP, EU, ADB, World Bank, UNEP, etc. This program aims to foster partnership with the private sectors and government on the implementation activities of the project profiles.

(b) In securing development partners and financial assistance for a project based on its profile, it is mandatory for both the implementing and coordinating agency (mostly MNREM) to submit a full proposal to the development partner(s) involved describing the details of the project.

(c) The specific implementation strategies outlined in each of the project profiles is designed to form the basis for further funding and responsible partnership arrangements and execution of each project. The strategies are to be outlined further in detail in the project proposals. At the most, the implementation of the project is to be conducted in close collaboration and cooperation of the (highly vulnerable) village communities. The rate of implementation for each project profile is dependent on the financial resources and support of the development partners and the accountability and commitment from government.

(d) The NCCCT will oversee all projects as the project steering committee. This committee extends mandatory observer status to the development partners involved in the projects. The coordinating agency is to work hand in hand with the steering committee on all projects and both to be involved with the monitoring progress and project effectiveness during implementation of the projects. Evaluation of vulnerability to climate change and the adaptation strategies applied by the project will be measured against the indicators identified in each of the project profiles and proposals.

(e) In the long term, it is envisaged that the NAPA will continue to serve as the country's national adaptation programme where future and potential adaptation-related programmes for climate change adaptation is to be directed under. It is also envisioned that once the draft national climate change policy is endorsed and approved by cabinet, the foundation for mainstreaming and or incorporating climate change into national planning such as SDS and NEMS will re-affirm the strong commitment of Samoa to meet its obligations under the UNFCCC. This is to continue identifying opportunities to meet obligations under the UNCCD by complimenting and synthesizing actions in NAPs; as well as the NBSAPs of the UNCBD.

(f) The future of the adaptation works for Samoa to build resilience to the hostile impacts of climate change and climate variability rests on maintaining the national vision for the NAPA in which this strategy looks to preserve, and that is, maintaining the *'achievement of a high level community capacity for adaptation to adverse impacts of climate change and climate variability.*'

It is expected that this strategy will ensure an increased and strengthened adaptive capacity for communities, civil society and government to urgently and immediately adapt to the impacts of climate change and climate variability.

Annex Reference Table

ANNEX	Reference
II	Climate Change Synthesis Report
III	Public Consultation Report
IV	Criteria Development Report