

AMERICAN SAMOA  
DEPARTMENT OF COMMERCE



AUGUST  
2012

TERRITORIAL CLIMATE CHANGE ADAPTATION  
FRAMEWORK



AMERICAN SAMOA GOVERNOR'S CORAL REEF ADVISORY GROUP

**TABLE OF CONTENTS**

Executive Summary .....3

    Vision Statement .....3

    Mission Statement.....3

    Goals & Objectives.....3

Territorial Climate Change Advisory Group .....4

List of Acronyms .....7

Climate Change and American Samoa .....8

    Making Climate Change Local: “Building Resilient Communities in the Pacific” 2011 Summit.....9

Local Climate Change Impacts .....11

    Sea Level Rise.....11

    Increased Sea Surface Temperatures .....11

    Intensified Storm Systems and Associated Changes in Precipitation .....12

Territorial Climate Change Prioritized Adaptation Projects .....13

    Coral Reefs and Mangroves .....14

    Human Health.....17

    Forestry, Water and Agriculture .....20

    Education and Outreach .....23

    Coastal Hazards .....26

    Development .....29

    Energy .....31

Acknowledgements .....34

**EXECUTIVE SUMMARY**

---

**VISION STATEMENT**

The projects, goals and strategies outlined in this document aim to increase American Samoa’s local capacity to develop and implement adaptation strategies to reduce vulnerability to impending adverse climate change impacts.

---

**MISSION STATEMENT**

This document aims to serve as a guide for resource managers to steer future climate change-related management strategies for the Territory of American Samoa.

The Territorial Climate Change Framework and its associated Advisory Group aim to:

- (1) Understand American Samoa’s critical climate change adaptation needs;
- (2) Identify and develop strategies to address these needs;
- (3) Increase awareness of the adverse implications of climate change; and
- (4) Continue to build local capacity to actively address climate change and its impending impacts.

---

**GOALS & OBJECTIVES**

This document identifies and develops climate change adaptation strategies specific to American Samoa and its vulnerabilities to climate change.

The Territorial Climate Change Adaptation Advisory Group, mandated via Executive Order-002 by Governor Togiola Tulafono on 17 June 2011, developed this document to direct climate change-related management strategies in American Samoa. The strategies developed aim to protect and sustain the livelihoods of American Samoan communities.

TERRITORIAL CLIMATE CHANGE ADVISORY GROUP

*Goals & Objectives:*

The Territorial Climate Change Advisory Group intended to ensure that the Territory of American Samoa is properly prepared to endure environmental changes as brought about by global climate change.

The Advisory Group completed the section of this document entitled “Territorial Climate Change Framework Template” (pages 14 through 33). This section, developed by the members of the Advisory Group and associated expert contributors, identifies and prioritizes specific procedures to reduce American Samoa’s contribution to climate change as well as the vulnerability to climate change impacts. To this end, the Framework identifies specific actions to be taken by the government, private sector, villages, individuals, and other organizations in order to meet the goals outlined during the 2011 Climate Change Summit.

The initial term for the Advisory Group existed for one year, with the intention to continue to advise the Territory in all matters related to the prioritized adaptation projects.

The Advisory Group formally adopted the Territorial Climate Change Adaptation Framework during a meeting on August 13, 2012.

*Members:*

Representatives from the following organizations and communities were invited to serve as a steering committee, directing the actions and efforts of American Samoa’s vision for climate change management:

- (1) The Department of Commerce;
- (2) The Department of Marine and Wildlife Resources;
- (3) The American Samoa Environmental Protection Agency;
- (4) The American Samoa Power Authority;
- (5) The Department of Health;
- (6) The Department of Public Works;
- (7) The Territorial Energy Office;
- (8) American Samoa Community College;
- (9) A member of the Senate;
- (10) A member of the House;
- (11) A village mayor representing the Eastern District;
- (12) A village mayor representing the Western District; and
- (13) A village mayor representing Manu’a.

### *Subcommittees:*

The Advisory Group created subcommittees as necessary to complete the required tasks. Subcommittees reported to the Advisory Group and complete tasks as assigned by the Advisory Group. The following subjects were represented in subcommittee:

- (1) *Coral reefs and mangroves* – developing project plans related to enhancing coral reef and mangrove conservation and preservation with respect to climate change impacts;
- (2) *Human health* – developing project plans associated with improving human health issues that may be impacted by the effects of climate change. Examples of such issues include, but are not limited to, increased spread of disease and increased health problems resulting from changes in weather patterns;
- (3) *Forestry, agriculture, and water resources* – addressing issues related to enhancing the quality and sustainability of forest and water resources, as well as promoting sustainable agricultural practices;
- (4) *Education and outreach* – developing project plans related to improving climate change education and outreach opportunities throughout American Samoa communities. This may include school curriculum, specific events, and other recommendations;
- (5) *Coastal hazards* – developing project plans to enhance American Samoa’s resilience to climate change related hazards. Examples of hazards include sea level rise, increased coastal inundation, intensified storm systems, and others;
- (6) *Development* – developing project plans related to encouraging sustainable development throughout the territory. This will include addressing economic and business impacts expected from climate change;
- (7) *Energy* – addressing issues related to American Samoa’s energy system, developing projects that encouraged energy independence and sustainable energy use, and identifying options for alternative energy sources.

### *Subcommittee Organizations*

The following agencies and organizations were invited to be included in the subcommittees:

- (1) Department of Parks and Recreation;
- (2) Department of Education;
- (3) Department of Agriculture;
- (4) American Samoa Telecommunications Authority;
- (5) Department of Information Technology;
- (6) LBJ Tropical Medical Center;
- (7) American Samoa Visitors’ Bureau;
- (8) Department of Homeland Security; and
- (9) Department of Public Safety.

The Advisory Group also invited representatives from each of the following non-ASG agencies, including but are not limited to:

- (1) Fagatele Bay National Marine Sanctuary;
- (2) National Park Service;
- (3) National Weather Service;
- (4) NOAA-PIRO;
- (5) United States Coast Guard;
- (6) Federal Emergency Management Agency;
- (7) U.S. Coral Reef Task Force / Climate Change Working Group
- (8) UNDP; and
- (9) Representative from the Government of Samoa.

The Advisory Group invited other representatives as necessary including but not limited to:

- (1) Village mayors;
- (2) Representatives of the youth of American Samoa;
- (3) The American Samoa Chamber of Commerce;
- (4) Business representatives;
- (5) Pacific Resources for Education and Learning (PREL);
- (6) Other regional bodies such as SPREP;
- (7) Non-profit organizations.

The Office of Samoan Affairs assisted in the invitation and communication with non-governmental agencies and individuals.

### *Experts*

The Advisory Group requested the opinions of experts from a wide range of agencies, disciplines, and areas of expertise. Experts attended meetings, helped the Advisory Group draft reports and suggestions, and advised the Advisory Group regarding issues in their field of expertise. This includes concerns, comments, and suggestions from other government agencies, private industry, the community, or other individuals and organizations.

### *Staff and support*

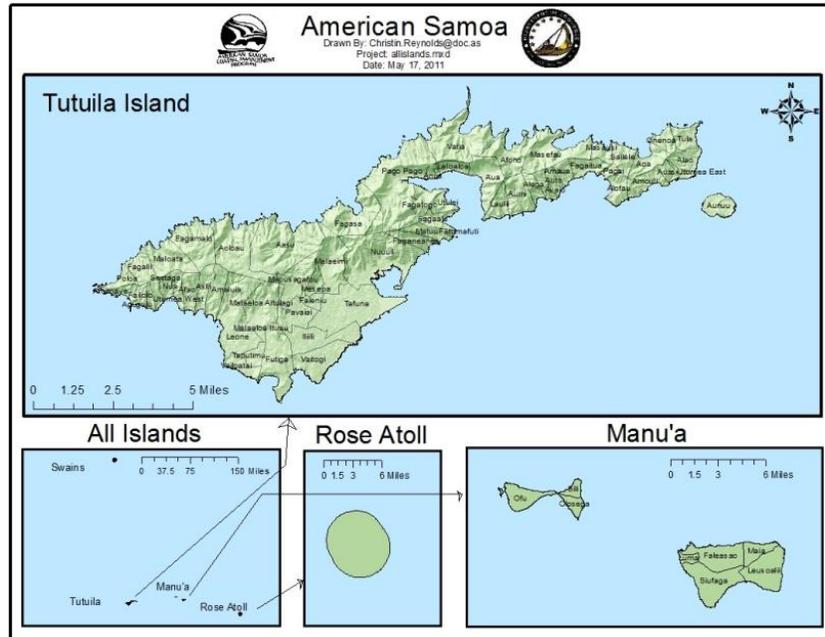
The Department of Commerce and the Governor's Coral Reef Advisory Group provided administrative and clerical support required by the Advisory Group. A representative from the Attorney General's Office provided legal counsel to the Advisory Group.

**LIST OF ACRONYMS**

<b>ASCC</b>	<b>American Samoa Community College</b>
<b>ASCMP</b>	<b>American Samoa Coastal Management Program</b>
<b>ASEPA</b>	<b>American Samoa Environmental Protection Agency</b>
<b>ASG</b>	<b>American Samoa Government</b>
<b>ASHPO</b>	<b>American Samoa Historic Preservation Office</b>
<b>ASPA</b>	<b>American Samoa Power Authority</b>
<b>CORL</b>	<b>Coalition Of Reef Lovers</b>
<b>CRAG</b>	<b>Coral Reef Advisory Group</b>
<b>DMWR</b>	<b>Department of Marine and Wildlife Resources</b>
<b>DOA</b>	<b>Department of Agriculture</b>
<b>DOC</b>	<b>Department of Commerce</b>
<b>DOH</b>	<b>Department of Health</b>
<b>FBNMS</b>	<b>Fagatele Bay National Marine Sanctuaries</b>
<b>LAS</b>	<b>Local Action Strategy</b>
<b>LBS</b>	<b>Land Based Sources of Pollution</b>
<b>MNRE</b>	<b>Ministry of Natural Resources and Environment (Independent Samoa)</b>
<b>MPA</b>	<b>Marine Protected Area</b>
<b>NOAA</b>	<b>National Oceanic and Atmospheric Administration</b>
<b>NOAA PIRO</b>	<b>NOAA Pacific Islands Regional Office</b>
<b>NPS</b>	<b>National Park Service</b>
<b>NRCS</b>	<b>Natural Resources Conservation Service</b>
<b>OSA</b>	<b>Office of Samoan Affairs</b>
<b>PacIOOS</b>	<b>Pacific Island Ocean Observing System</b>
<b>PLA</b>	<b>Participatory Learning and Action</b>
<b>PREL</b>	<b>Pacific Resources for Education and Learning</b>
<b>RC&amp;D</b>	<b>Resource Conservation &amp; Development Council</b>
<b>SPC</b>	<b>Secretariat of the Pacific Community</b>
<b>SPREP</b>	<b>South Pacific Regional Environment Program</b>
<b>SWCD</b>	<b>Soil and Water Conservation District</b>
<b>TNC</b>	<b>The Nature Conservancy</b>
<b>UNDP</b>	<b>United Nations Development Programme</b>
<b>UH</b>	<b>University of Hawaii</b>
<b>USGS</b>	<b>United States Geological Survey</b>

AMERICAN SAMOA – VULNERABILITIES TO CLIMATE CHANGE

Like other small island developing states (SIDS) in the Pacific, the Territory of American Samoa is highly vulnerable to a variety of adverse implications of climate change. The island’s geographical characteristics, socioeconomic status, and dependence on natural resources create a unique situation in terms of climate change and climate impacts.



**Figure 1.** Map of the islands of American Samoa: Tutuila, Aunu’u, Manu’a, Ofu, Rose Atoll and Swains Island, drawn by Christin Reynolds.

American Samoa is made up of five volcanic islands totaling approximately 76.1 square miles (197.1 square kilometers): Tutuila, Aunu’u, Manu’a, Ofu, Rose Atoll, and Swains Island, mapped above (Figure 1). American Samoa’s climate is typical of small, isolated tropical islands: hot, with daily temperatures ranging from 24-32 degrees Celsius, humid, and rainy year-round. The months of October through May comprise a long, wet, rainy season, while June through September are slightly cooler and drier. Tropical cyclones may occur during the summer months from December to February.

Several factors contribute to American Samoa’s high vulnerability to the impacts of climate change. The Territory’s **limited size** reduces adaptation options. Communities have been established in available coastal zones – reestablishing these villages on the limited higher ground may not be feasible, especially when accounting for **high population density** and continued **population growth**. In addition, American Samoa is quite **isolated** and endures high transport costs for imported goods and services, upon which American Samoan communities may heavily rely in the future. The **limited available natural resources**, including potable water, result in supplies that are heavily stressed and degraded from historic over-exploitation. **Stressed ecosystems** are less resilient to the kinds of environmental changes expected with the continued onset of climate change. **Limited available funding and trained personnel** also exacerbate the situation.

In light of these vulnerabilities, American Samoa has taken an active role in researching, analyzing, and predicting risks for the Territory in terms of climate change. Climate change is recognized as a real threat in American Samoa. Adaptation and mitigation opportunities continue to be developed and implemented throughout the island. The Department of Commerce’s Coastal Zone Management Program and Coral Reef Advisory Group co-hosted a Climate Change Summit in February 2011 that led to numerous adaptation initiatives.

### MAKING CLIMATE CHANGE LOCAL: BUILDING RESILIENT COMMUNITIES IN THE PACIFIC 2011 SUMMIT

#### SUMMARY OF EVENT

On February 1 and 2, 2011, American Samoa coordinated a Climate Change Summit, entitled “Making Climate Change Local: Building Climate Resilient Communities in the Pacific”. The event was highly successful, with active participation from scientists, academics, historians, government agencies, business and non-profit organizations, schools, and members of the public.

#### The Summit aimed to:

1. Raise **public awareness** on the issues regarding Climate Change and its potential impacts in the territory;
2. Develop an **adaptive community framework** to prepare the Territory for Climate Change; and
3. Establish local and regional **partnerships to increase local Climate Change adaptation capacity**.

#### The Summit focused upon:

- Developing mechanisms for bringing climate change adaptation to the local level by:
  - Fostering community collaboration;
  - Integrating traditional knowledge; and
  - Highlighting adaptation tools and ongoing regional projects.

The Summit also served as a forum for local and regional experts to work with Territorial representatives to **identify and prioritize potential Territorial impacts and available adaptation options**.

**Participation:** The Summit was a success with over two-hundred local representatives and off-island experts in attendance. The participants of the Summit created a comprehensive list of adaptation recommendations for the Territory to take, and Governor Togiola has pledged to apply these recommendations to planning and development within the Territory.

**Keynote Speakers:** Dr. Charles Fletcher, University of Hawaii; Honorable Governor Togiola Tulafono.

#### PRIORITY RECOMMENDATIONS

The participants at the Climate Change Summit split into four Working Groups to discuss vulnerable sectors and relevant adaptation measures. In addition to supporting the development of a **Climate Change Advisory Group**, each Working Group highlighted **three priority adaptation** actions to immediately implement in American Samoa.

**Coral Reef and Mangrove Ecosystems:** (1) Strengthen and develop the American Samoan youth's awareness and understanding of climate change causes, impacts, and potential adaptation measures; (2) Improve solid waste management; (3) Improve environmental stewardship.

**Human Settlements and Infrastructure:** (1) Update American Samoa's energy system; (2) Conduct assessment audits on existing building and require new structures to conform to revised building codes with consideration for traditional structures; (3) Design and implement a comprehensive coastal hazard assessment.

**Human Health:** (1) Develop individual response plans for natural disasters; (2) Increase youth participation in policy planning; (3) Integrate climate change education into health and sciences curricula.

**Agriculture, Forestry & Water Resources:** (1) Promote agro-forestry; (2) Improve education and outreach; (3) Provide opportunities for farmers to learn sustainable practices.

---

## CLIMATE CHANGE SUMMIT OUTCOMES

The Department of Commerce staff synthesized the results of the Summit into a comprehensive **Climate Change Summit Report**. The Report details recommendations provided by Summit participants and leaders for the Territory to address the effects of climate change. With these recommendations in mind, the Department of Commerce has created this Framework to guide the Territorial Climate Change Advisory Group.

The **Territorial Climate Change Adaptation Framework** will serve as a guide for resource managers, steering future climate change-related management strategies for the Territory of American Samoa. The ultimate aim of this document and the Climate Change Adaptation Advisory Group is to increase American Samoa's local capacity to develop and implement adaptation strategies to reduce vulnerability to impending adverse climate change impacts.

**Territorial Climate Change Adaptation Advisory Group** mandated via Executive Order 002-2011 by Governor Togiola Tulafono, will develop the goals of the Territorial Climate Change Adaptation Framework to direct climate change-related management strategies. The strategies developed will protect and sustain the livelihoods of American Samoan communities.

The **Community Resilience Guide** will be an education and outreach-based initiative to accompany the Territorial Climate Change Adaptation Framework. This Guide will provide American Samoan communities with feasible, practical options to enhance resilience to climate change implications.

**PROJECTED LOCAL CLIMATE CHANGE IMPACTS**

The Territory of American Samoa recognizes that the impacts of global climate change will heavily affect Pacific island nations in the future, through:

- Loss of coastal lands due to increased erosion stemming from sea-level-rise, and coastal inundation from storm systems;
- Coral reef ecosystem degradation stemming from changes in ocean water temperature and acidity trends;
- Increased dependence on off-island food sources due to projected decreases in local food production due to changes in precipitation trends (i.e. floods, droughts), severe storm systems, higher rates of pest infestation, and decreases in near-shore fish stocks;
- Economic and environmental damages caused by intensified tropical cyclones and associated changes in precipitation trends;
- Increased health risks from the transmission of diseases, potential decreases in available potable water resources, and other associated risks;
- And other, as yet unforeseen, repercussions arising from climate change.

Climate change will have detrimental effects on American Samoa’s inherently vulnerable industries, including tourism, agriculture, recreation, commercial fishing, and American Samoa’s fragile and unique natural resources. Accordingly, the Territory must understand and prepare to respond to the effects of climate change. American Samoa has a relatively small carbon footprint, and is therefore relying on the heavily-emitting developed nations to reduce their greenhouse gas emissions. Thus, while American Samoa has already taken actions to reduce the Government’s impacts on greenhouse gases, the Territory recognizes that adaptation provides the most realistic future in the face of climate change.

---

**SEA LEVEL RISE**

In terms of specific impacts of climate change, sea level rise will have a drastic effect on all Pacific island nations, including American Samoa. Communities, agricultural land, and infrastructure are all heavily concentrated in low-lying coastal zones. These coastal zones are highly susceptible to any changes in sea levels. Low-lying coastal areas are especially vulnerable to sea level rise considering the likelihood of inundation and flooding, erosion, and intrusion of seawater into the freshwater lens are the most likely impacts. Declines in agricultural production and food security will be seen as arable land is lost, soil salinity is increased. Associated increases in pest and insect control may increase American Samoa’s dependence upon domestic and foreign imports for food.

---

**INCREASED SEA SURFACE TEMPERATURES**

Sea surface temperatures are expected to increase over the next few decades. Increased sea surface temperatures will degrade coral reef ecosystems and the organisms, including humans, dependent upon those resources.

INTENSIFIED STORM SYSTEMS AND ASSOCIATED CHANGES IN PRECIPITATION

Storm systems are expected to increase in number and intensity in the future. Tropical cyclones affect all sectors and American Samoa's geographic isolation may result in problems receiving aid from the mainland. The surge associated with storms may damage coastal communities and livelihoods.

Changes in precipitation are expected with the onset of climate change. In terms of increased rainfall, American Samoa's infrastructure and agriculture may be at risk for flooding and subsequent soil erosion. Coastal areas, and the communities that have been established in these areas, are also vulnerable to soil erosion due to floods. In addition, water resources may become contaminated from floods. Increased rainfall may result in an increased incidence in mosquito-borne diseases like dengue fever.

Droughts may also occur in American Samoa. Shortages of potable water may become a serious issue for communities. In terms of agriculture, crop yields would decline and livestock would dwindle without irrigation and water. This would result in reliance upon expensive imports for food, water, and other goods and services.

TERRITORIAL CLIMATE CHANGE FRAMEWORK TEMPLATE

The Climate Change Adaptation Advisory Group consisted of subcommittees that were comprised of members of government agencies across the Territory. Over a series of meetings throughout 2011-2012, the subcommittees met to discuss their ideas for adaptation projects that should be prioritized in American Samoa. In instances where members were not willing or available to participate in the subcommittee working groups, language was adopted from other meetings and sources.

The goals below were derived from the primary recommendations suggested during the Climate Change Summit (February 2011). The goals were created to be broad and inclusive. The themes represented include:

1. Coral Reefs and Mangroves
2. Human Health
3. Forestry, Water and Agriculture
4. Education
5. Coastal Hazards
6. Development
7. Energy

The Advisory Group prioritized these themes, and the projects and programs therein, to mainstream management strategies and available funding to the most important, relevant, and feasible opportunities.

## CORAL REEFS AND MANGROVES

*Support research, analysis, and evaluation of climate change and its evolving implications for coral reefs and mangroves.*

### OBJECTIVES:

- 1) Enhance research and monitoring of coral bleaching impacts
- 2) Support research testing ways of reducing coral bleaching by cooling or shading corals, and research on reducing coral diseases which are enhanced by higher temperatures
- 3) Enforce local environmental laws and regulations related to chemical pollution, sedimentation, nutrification, overfishing and other local non-climate impacts to coral reefs
- 4) Support resilience of local communities to climate change
- 5) Increase awareness and educational opportunities regarding climate change impacts on coral reefs

### ADAPTATION OPTIONS:

By enhancing the research and monitoring of local coral bleaching impacts, the Territory will be able to better prepare for any impacts that will occur over the next century. The continued support of local research and education will enable local research and knowledge capacity to increase, ensuring that communities and individuals will have the opportunity to learn more about the environment around them and increase local stewardship. This will also increase the opportunity to communicate, coordinate and network with off-island scientists, bringing more interest and opportunities to American Samoa.

Supporting research to reduce coral bleaching will be essential as climate change increasingly contributes to the bleaching of coral. Cutting-edge projects are already underway to research a number of these treatment methods such as shading and cooling the coral. The Territory would be well-served to continue to expand and improve upon these research methods. In addition, other research projects should be implemented to examine the possible reduction in disease impacts upon coral reefs.

Another essential project recommendation for adapting to climate change is to **improve the enforcement of local environmental Executive Orders, laws and regulations**, including:

- Prohibition of sand mining
- Prohibition of phosphate detergents

It is essential to **improve the enforcement of local laws and regulations affecting non-climate impacts such as chemical pollution, sedimentation, nutrification, overfishing and more**. Reducing vulnerability from other stressors will improve overall reef health and allow the ecosystem to be more resilient in the face of the challenges and threats presented by climate change. To improve enforcement of these laws, the group recommends that the Territory work to foster interagency communication in order to improve the abilities of agencies to implement their enforcement actions. The implementation of the the Local Action Strategies (LAS), compiled by relevant stakeholders and administered by the Coral Reef Advisory Group, is also recommended.

Another essential project recommendation is to **enhance the resilience of local communities to climate change, in order to improve stewardship for the local coral reefs**. This project includes the continued research, monitoring, and addressing of priority adaptation needs in local communities. There is also the need to create a

new program specifically geared toward community-level resilience, which will in turn contribute to the overall health of the coral reef ecosystem. A community-level resilience program would focus on improved education, outreach and socioeconomic research. The Faga’alu Village Watershed Management Plan and Amouli Village Climate Change Resiliency Plan demonstrate two successful pilot projects in which village participation and management enabled the development of sensible, thorough plans for action. These pilot programs should be expanded to communities across the island, helping them understand the value and importance of the coral reef ecosystems and increase the desire to protect and care for the local coral reefs.

Finally, the group recommends **increasing awareness and educational opportunities regarding impacts on coral reefs**. This will include targeting schools by training teachers and educating students about the impacts of climate change on coral reefs through presentations and field trips. The general public can also be targeted through the media, including television, radio, and print media. This will increase awareness of the importance of reducing the local carbon footprint, as well as the importance of adapting to impacts of climate change. This may have other benefits as well, most notably improving local knowledge regarding the enforcement of local laws.

Climate Change Adaptation Advisory Group: Coral Reefs and Mangroves Subcommittee					
Threat	Risks/Impacts	Data Gaps	Current Projects	Future Projects	Potential Local Partners
Extreme Weather	-Direct damage to coral reefs -Indirect damage from debris and sedimentation after storms	-Lack of scientific understanding of location and severity of specific impacts	-Surveying reefs for resilience -Local Action Strategy and associated projects -Assessment and Rapid Reef Response Plan	-Increase local research of bleaching impacts and prevention measures -Increase monitoring/Early warning systems -Enforce other rules and regulations regarding pollution and sedimentation, increasing resilience of coral reefs to climate impacts	-CRAG -DMWR -EPA -NPSA
Sea level rise/ Water quality issues	-Increased erosion and sedimentation	-Questions of safety, public perception -Knowledge of water quality impacting disease on reefs	-Use of vertiver grass to prevent erosion -Water quality testing	-Increase monitoring of sedimentation impacts -Increase public awareness/ education	-CRAG -EPA -USDA-NRCS
Increased mean temperature/ heat waves	-Coral bleaching	-Impact of other phenomena (current, depth, etc.)	-Assessment and Rapid Reef Response Plan	- Increase local research of bleaching impacts and prevention -Increase public	-CRAG -NOAA

**AUGUST 2012 – TERRITORIAL CLIMATE CHANGE FRAMEWORK – AMERICAN SAMOA**

				awareness of threats and warnings	
Changing ecosystems	-Warming ocean in combination with increased population, affecting health of coral reef	-Projection of warming locally - Projection of population growth	-Community level pilot programs such as Faga’alu Village Watershed Management Plan and Amouli Village Climate Change Resiliency Plan	-Increase public awareness/education of coral reef health and resilience plans, including projects to decrease non-climate threats like pollution and sedimentation	-CRAG -NOAA

## HUMAN HEALTH

*Improve collaboration regarding overall health and safety while increasing outreach and education regarding climate change impacts on health*

### OBJECTIVES:

1. **Create and implement a Strategic Health Plan to improve planning and avoid redundancy**
2. **Institute an Environmental Health Taskforce to improve collaboration between agencies**
3. **Improve access to medical care, with increased treatment and medications available in villages instead of relying solely LBJ hospital**
4. **Improve safety monitoring and surveillance of food and water resources**
5. **Improve education/outreach regarding health impacts of climate change, as well as factors influencing overall health and well-being**

### ADAPTATION OPTIONS:

**A Strategic Health Plan is essential to improve overall public health infrastructure, including planned and calculated reactions to climate change impacts on human health.** This will increase the Territory's overall preparedness and minimize the risk of impacts of climate change by preparing and training medical staff to monitor and address any hazardous impacts of climate change. A Strategic Health Plan will also allow the Territory to reassess any present health regulations to include new applications, including those related to climate change impacts on health. Finally, a Strategic Health Plan will also improve overall primary care and disease prevention, a necessary step to making individuals stronger and more resilient to any negative impacts brought about by climate change.

**An Environmental Health Taskforce was also recommended in order to improve collaboration between agencies.** Health issues like disease and heat stress are projected to be exacerbated by climate change, and as such collaboration between agencies that deal with public health and well-being will be essential. By establishing a Taskforce, the agencies will be better able to both prevent and respond to any impacts, while also avoiding unnecessary duplication. A Taskforce will be able to manage and prioritize climate change adaptation projects, in addition to establishing a forum for more communication and collaboration in general.

**Improving access to medical care will be vital in the face of climate change.** With the threat of extreme weather and increased disease prevalence, more people may need immediate access to medical care throughout the different villages in the Territory. Currently, the only established access to medications is at LBJ Hospital, which means that even if individuals seek medical care at a clinic elsewhere they still must go to the hospital to receive medication. With increased availability and access to medical care and medications, the pressure will be reduced on the staff and facilities at LBJ, and more individuals will have the freedom to obtain the needed expertise and medications if faced with climate-change related health issues.-

Another recommendation put forth by the group is to **improve the overall safety and quality of food and water resources.** This would include increased monitoring and testing of agriculture and water supplies across the Territory. Increased use of personal water storage unites is also essential, especially as the water supply is increasingly threatened by saltwater intrusion due to sea-level-rise. One additional need is the implementation of community water storage testing, to maintain the same standards of quality in local communities that is provided by the general water supply. Increased threats of climate change are bound to impact the quality and safety of

food and water, and the necessity of these resources to every individual means that it is essential that they be monitored in a strict manner.

**The last recommendation is to implement education and outreach regarding the impacts of climate change upon health, in addition to improving education and outreach regarding general nutrition and the danger of non-communicable diseases.** Communities in American Samoa should begin learning about the danger of impacts from increased extreme weather, the possibility of increased disease prevalence, and any other dangerous impacts to food and water. In addition, communities should learn more about methods for improving overall health, such as improved nutrition, access to local farming, and increased fitness. This will make individuals across the island much more resilient to any negative impacts presented by climate change, as improved overall health will minimize the susceptibility to diseases and potential risk during hazardous events.

Climate Change Adaptation Advisory Group: Human Health Subcommittee					
Threat	Risks/Impacts	Data Gaps	Current Projects	Future Projects	Potential Local Partners
Infectious disease	-Unusual trends makes it difficult to predict and treat disease	-Lack of Dengue testing kits		-Increased monitoring/Early warning systems - Strategic health plan -Local epidemiologist -Increased treatment/medications available locally - Increased education to strengthen response rate to any outbreaks	-DOH -LBJ -ASCC
Extreme weather events: floods, droughts, other natural	-Risk of injury/drowning -Vector-, food- and water-borne diseases -Crop/fishery destruction	-Emergency preparedness needs		-Increased emergency preparedness -Increased public knowledge and awareness of healthy and	-DOH -DOH -DOA -DHS

**AUGUST 2012 – TERRITORIAL CLIMATE CHANGE FRAMEWORK – AMERICAN SAMOA**

disasters	-Malnutrition and non-communicable diseases			nutritional lifestyle options	
Sea level rise/ Water quality issues	-Drinking water pollution/salinization -Possible dehydration -Issues of bacteria/parasites	-Questions of availability, safety, public perception	-Testing of streams	-Increase monitoring of quality -Personal water storage -Desalinization unit -Increased public awareness	-EPA -ASPA
Increased mean temperature/ heat waves	-Heat stress for age extremes (very old/young), athletes, people with respiratory disease	-Lack of public knowledge of threats		-Increased public awareness of threats, warnings -Increased capacity to accommodate those with heat stress	-DOH -LBJ
Changing ecosystems	-Invasive species -Spread of pathogens -Agricultural impacts leading to malnutrition	-Lack of knowledge of possible threats to agriculture	-Land Grant teaches variety/rotation practices	-Increased public awareness/education of healthy and nutritional lifestyle options	-ASCC -DOA

## FORESTRY, WATER, AND AGRICULTURE

*Ensure the sustainability of forestry and freshwater resources, while also improving food security.*

### OBJECTIVES:

1. **Improve knowledge of sea-level-rise impacts on drinking water, water storage, and agriculture**
2. **Introduce new methods of water collection and storage**
3. **Encourage best practice techniques in agriculture and water safety**
4. **Increase monitoring and testing of water and food supply systems**
5. **Invest in the improvement of existing Village Water Catchments Systems**
6. **Improve education/outreach regarding farming techniques, food safety and other health information**

### ADAPTATION OPTIONS:

The first recommendation to improve the resilience of forestry, water, and agriculture is to **enhance research being done locally to improve knowledge of the ways in which sea-level-rise will impact resources in American Samoa**. This will allow communities to better prepare and adapt to the impacts to drinking water, water storage and agriculture. In order to do this, the inundation models presented by Dr. Chip Fletcher must be expanded to demonstrate the threats to water resources in communities across the Territory.

**Introducing new methods of water storage will also help the Territory prepare for increased impacts of climate change including the possibility of drought and saltwater intrusion into freshwater resources.** The increased use of catchments and personal water storage systems are necessary to obtain and store water on an individual household basis. This in turn will ensure that households have secure access to freshwater, while also reducing dependence and over-use of the drinking water supplies. To ensure the access to freshwater in the future, the use of a desalinization unit may also be necessary.

**Surveying and investing in existing village water catchments system infrastructures is another essential project.** These catchments systems collect surface water runoff from rain events and are all located in high elevation areas within the villages. They are immune to saltwater intrusions because of their elevations and have large liquid holding capacities for sustainability over a certain period of time.

**Encouraging best practice techniques in agriculture throughout American Samoa will improve the ability of individuals and communities to adapt to climate change.** For instance, introducing new crop and animal breeds will improve agricultural diversity and avoid inbreeding. This is vital for increasing resilience of agriculture in the face of increased disease, pest infestation, extreme weather and other negative impacts due to climate change. Other best practices include terracing, planting hedges, changing the timing of farming operations, altering the intensity of fertilizers and pesticides, implementing water efficiency measures, improving access to weather forecasts, and improving local storage facilities.

**Increasing and improving the testing of food and water systems is essential to improve overall resilience of communities throughout American Samoa.** As the impacts of climate change become more prevalent, it will be necessary to improve knowledge of threats to the food and water supply. Ensuring an overall clean food and water supply is essential, as that will increase the potential for resilience in the face of climate

## AUGUST 2012 – TERRITORIAL CLIMATE CHANGE FRAMEWORK – AMERICAN SAMOA

impacts. Along with this, the monitoring of contamination from the piggeries is equally important. The bacterial contamination of local water supplies and runoff is potentially dangerous to the overall resilience of water in American Samoa.

Finally, **the group recommends that the Territory improve education and outreach regarding the impacts of climate change upon forestry, water and agriculture.** This will improve the abilities of individuals and communities to adapt to climate change impacts. Improving knowledge of emergency and hazard preparedness throughout the Territory will also likely increase resilience of communities throughout American Samoa.

Climate Change Adaptation Advisory Group: Forestry, Water and Agriculture Subcommittee					
Threat	Risks/Impacts	Data Gaps	Current Projects	Future Projects	Potential Local Partners
Drinking Water and Pollution	-Daily use and leakage (60%) -Pesticide contamination -Chemical contamination (hospital?) -Bacteria contamination	-Regarding testing: Who has data, who uses data	- Testing of streams - AS-EPA conducts monthly bacteria testing of ASPA drinking water system, pre-determined beaches, and streams	-Feasibility of desalinization unit (small, portable) -Research on timing, possibilities of saltwater intrusion, knowledge of sea level rise affecting water supply	-AS-EPA -ASPA -DOH
Changing weather patterns	-Storms, hazardous weather: could wipe out airport -Emergency energy/fuel supply: capacity enough for 9 days	-Future predictions/modeling -Future demand on groundwater -Erosion	-Homeland Security: drought plan -All agencies: Hazards plan	-Best practices (mulching, terracing, etc.)	-ASCC Land Grant -DHS
Water storage	-Any large-scale impacts on water supply-- need personal catchment for use	-Number of personal catchment systems (ASPA issues) -Future water outlook , population outlook		-Increased overall water storage -Personal water storage systems, including catchments -Desalinization -Investing in the existing village water catchments systems infrastructure	-ASPA -AS-EPA -DOA -DOH -DHS

**AUGUST 2012 – TERRITORIAL CLIMATE CHANGE FRAMEWORK – AMERICAN SAMOA**

<p>Low agricultural biodiversity</p>	<ul style="list-style-type: none"> <li>-Only banana, taro, available</li> <li>-Emergency supply: Department of Agriculture has enough food for 30 days</li> <li>-Inbreeding</li> </ul>	<ul style="list-style-type: none"> <li>-Possible alternate food sources</li> </ul>	<ul style="list-style-type: none"> <li>-Land Grant teaching new variety testing, rotating practices</li> </ul>	<ul style="list-style-type: none"> <li>-New breeds, increase feed variety</li> <li>-Open up seed markets and regulation to land grant and SWCD</li> <li>-Public awareness/education programs</li> </ul>	<ul style="list-style-type: none"> <li>-NRCS</li> <li>-ASCC Land Grant</li> <li>-DOA</li> </ul>
<p>Changing ecosystems</p>	<ul style="list-style-type: none"> <li>-Invasive species</li> <li>-Spread of pathogens risk</li> <li>-Agricultural impacts leading to malnutrition</li> </ul>	<ul style="list-style-type: none"> <li>-Knowledge of potential invasive species</li> </ul>	<ul style="list-style-type: none"> <li>-Land Grant (teaching variety/rotation practices)</li> </ul>	<ul style="list-style-type: none"> <li>-Increased public awareness/education of healthy and nutritional lifestyle options</li> </ul>	<ul style="list-style-type: none"> <li>-ASCC Land Grant</li> <li>-DOE</li> <li>-DOA</li> <li>-NPSA</li> </ul>

## EDUCATION AND OUTREACH

*Enhance education and understanding of: (1) the factors that contribute to global climate change, (2) the climate change impacts relevant to the Pacific islands, and (3) knowledge of applicable mitigation and adaptation options.*

### OBJECTIVES:

1. Encourage increased coordination and collaboration between natural resource agencies and teachers
2. Improve and increase use of climate change curriculum for primary and secondary schools, while refining and developing new climate change curriculum resources
3. Improve outreach to the community regarding the science and impacts of climate change
4. Improve outreach regarding nutrition and food security to improve overall resilience in the face of climate hazards and impacts
5. Increase scientific and climate-related research opportunities and career choice knowledge for high school and college students in American Samoa

### ADAPTATION OPTIONS

**In order to improve knowledge of climate change science and impacts across the Territory, increased coordination and collaboration is recommended between agencies and teachers.** This is intended to increase the number of agencies invited to the classroom to provide expert knowledge regarding climate change and marine science, using local examples to provide relevance and promote interest. Developing a sustained program that includes volunteering or interning will allow students to benefit from a maintained, long-term interaction between agencies and schools. Another method of improving local knowledge is to develop interactive tools to connect real life local stories to climate change impacts. This would include community outreach events that allow community members to brainstorm impacts that they have seen in their villages in the past and use projections to visualize the impacts they will witness in the future. Using visual tools, such as the sea level rise simulator developed by Dr. Chip Fletcher at the University of Hawaii, can also serve to improve knowledge and encourage preparedness.

Another recommendation is to **continuously refine current and develop new climate change and general science curriculum in primary and secondary schools across the Territory.** Doing this in collaboration with the Department of Education will improve students' knowledge of current and potential impacts of climate change across the world, as well as locally in American Samoa. By consistently updating and improving the curriculum with evidence-based research, teachers can provide students with more accurate and relevant learning material as climate science continues to uncover new results and more impacts of climate change are observed in the years to come. A summer workshop for both new and veteran teachers that presents new curriculum materials, and working with the DOE during orientation, will provide for a hands-on introduction to locally produced environmental curricula.

**By improving outreach through newspapers, radio and television, the Territory will ensure that communities are more prepared to be as resilient as possible to the impacts of climate change.** Outreach can be done through public service announcements, as well as general news updates regarding climate change. An additional method for outreach is on-the-ground outreach through village councils and mayors. By improving the awareness and respect for resources throughout local communities, the desire to protect and care for the local ecosystem will be vastly improved. It is therefore recommended that each local government agency incorporate climate change into their current outreach plans.

**To improve overall resilience and health on the island, increased outreach regarding nutrition and food security is recommended.** This will encourage local families to grow their own food and thus be more self-sufficient in the face of any impacts of climate change. By encouraging such outreach in both schools and villages, other sustainable activities (including recycling and sustainable agricultural practices) will also have the opportunity to be expanded. Improving knowledge regarding the nutritional, environmental and security values of locally-grown agriculture in the Territory will also serve to address both mitigation and adaptation issues, improving the local environment and contributing to less pollution due to the importation of food. This will increase the resilience of the residents, making them healthier and better able to face the threats presented by climate change.

Finally, **the group recommends the increased presentation of science-based career choices for high school and community college students, including careers focused on marine science and climate change.** By increasing the visibility of opportunities available to students, the Territory will improve the potential for local capacity-building in training, research and employment in science and climate-related areas. These opportunities should be presented through a number of different venues, including internship, volunteering, career days, and scholarships. This will encourage those seeking higher education to pursue careers that will bring success individually as well as to serve and protect their home.

Climate Change Adaptation Advisory Group: Education/Outreach					
Threat	Risks/Impacts	Data/Knowledge Gaps	Current Projects	Future Projects	Potential Local Partners
Extreme Weather	-Emergency impacts, risk of injury or drowning -Long-term impacts of flooding/drought	School: Curricula related to the causes and impacts of local extreme weather events (e.g., drought, flooding, storms) Community: Knowledge of threats and impacts	-Coral reef resilience training/outreach in June 2012	-Implement climate change into science curriculum -Improve outreach to public regarding potential climate impacts and threats	-DOH -DOE -EPA -Le Tasaugi -CRAG -PREL

**AUGUST 2012 – TERRITORIAL CLIMATE CHANGE FRAMEWORK – AMERICAN SAMOA**

Sea level rise	-Infrastructure impacts: storm surge and inundation	-Lack of knowledge prior to planning/building		-Increase outreach to public regarding sea level rise projections, including visual tools	-DOC -DPW -PREL
Increased mean temperature/ heat waves	-Impacts to health	-Lack of knowledge of health impacts	-Coral reef resilience training/outreach in June 2012	-Increased public awareness of threats, warnings	-DOH -PREL
Changing ecosystems	-Invasive species -Spread of pathogens -Agricultural impacts leading to malnutrition	-Lack of understanding of impacts of invasive species, proper agriculture techniques	-Land Grant (teaching variety/rotation practices) -NPS invasive species program	-Improved educational outreach regarding agriculture and forestry Increased public awareness/education of healthy, nutritional and sustainable local lifestyle options	-ASCC Land Grant -DOA -PREL

## COASTAL HAZARDS

*Enhance ability of local communities to prepare for, adapt to, and withstand the environmental changes brought about by the effects of climate change.*

### OBJECTIVES:

1. Increase capacity for planning in response to local impacts
2. Increase the enforcement of rules and regulations serving to protect and improve areas of American Samoa that are susceptible to damage from climate change threats
  - a. Enforce building codes
  - b. Enforce National Flood Insurance Program
  - c. Enforce fines for sand mining
  - d. Implement and enforce new setback rule
3. Improve knowledge and familiarity with emergency plans
4. Create an adaptation assessment, to examine the technical aspects of potential climate impacts
5. Create and implement a plan to prepare for 1 foot of sea level rise by 2050

### ADAPTATION OPTIONS:

The first action that has been recommended by the Coastal Hazards group is to **increase the local capacity for planning and responding to local impacts such as storms, flooding, and other impacts exacerbated by sea-level-rise**. This includes improved inundation models, which will help to identify areas across the island that will be susceptible to impacts from sea-level-rise. Obtaining and implementing more bathymetric and topographic data will inform community planning and development related to potential climate change impacts throughout American Samoa. In addition, the improvement of regional and local climate models will be necessary to project and prepare for future localized impacts of climate change. **While improving the scientific capacity to adapt to changes in climate, local planning and community capacity must also be improved through the expansion of village resiliency plans for disaster and climate change modeling.**

**American Samoa must also work to increase the enforcement of rules and regulations that serve to protect and improve areas susceptible to damage from climate change threats.** This includes the enforcement of building and planning codes strenuous enough to withstand a significant level of winds, earthquakes, flooding, and landslides. The enforcement of the National Flood Insurance Program (NFIP) is critical to protect infrastructure across the island from flooding. As of 2012, the NFIP has not been enforced in American Samoa to a sufficient extent, and the government has ample opportunity to lead by example. Additionally, there must be increased monitoring and enforcement of fines for the violation of regulations. An example of this is sand mining, which currently lacks sufficient enforcement. Enforcing the fines for violations of the sand mining regulations will prevent further erosion and loss from beaches across the Territory, which in turn will allow for the protection of beaches and coral reefs from sedimentation. This will increase the resilience of both communities and ecosystems in the face of climate change.

American Samoa should also work **to improve overall knowledge and awareness of emergency plans**. With coastal hazards projected to increase in both frequency and intensity, it is essential that government agencies, communities and individuals are made fully aware and trained in emergency plans and preparedness. By doing

this, the Territory will be empowering its people to be as prepared as possible for any disaster or emergency that may be exacerbated by climate change.

**The group also recommends that the government create a technical adaptation assessment, examining the scientific aspects of potential sea-level-rise, combined with the projected increased extreme weather and accompanying storm surge.** As a result of the technical adaptation assessment, a rule for setbacks should be instituted that incorporates rates of erosion as well as sea-level-rise. This will allow the Territory to prepare its infrastructure for the impacts of climate change threats and enable Smart Growth throughout American Samoa.

The last suggestion from the Coastal Hazards Adaptation Advisory Group is to **plan for 1 foot of sea-level-rise by 2050<sup>1</sup> to guide all actions in terms of development.** A need exists to establish a concrete number to guide planning actions, and while this number may possess some inherent uncertainty, the Territory should be fully prepared for any impacts of climate change to improve overall ecosystem and community resilience. Already, the South Pacific region has experienced much more sea-level-rise than other parts of the world, and this is projected to continue to be the case. By planning for this sea-level-rise, the Territory can, as a consequence, prepare for storm surges and other problems associated with sea-level-rise.

Climate Change Adaptation Advisory Group: Coastal Hazards					
Threat	Risk/Impacts	Data Gaps	Current Projects	Future Projects	Potential Local Partners
Drought	-Pipe leakage -Salinity intrusion -Development -Contamination	-Questions of severity -Water conservation needs	-Education regarding variety and rotation of crops	-Water catchments to prevent overreliance on water pipes	-ASCC Land Grant -DOA -EPA -ASPA
Storms	-Coastal development -Sea walls -Sand mining (improved enforcement needed)	-Inundation models -LiDAR -Critical Infrastructure Assessment	-Tsunami studies -Sea wall projects -Environmental restoration	-Enforce and adopt planning codes -Environmental restoration -Village resiliency plans-expanding soft armoring of coastlines -Critical infrastructure maps -LiDAR Bathymetric data -Stopping wetlands loss -Incorporate climate change into emergency	-DOC -DPW -DMWR -CRAG -NOAA

<sup>1</sup> From the Amouli Village Resilience Plan: “Approximately one foot of sea level rise is predicted for American Samoa by the year 2050.”

**AUGUST 2012 – TERRITORIAL CLIMATE CHANGE FRAMEWORK – AMERICAN SAMOA**

				operations plans	
<p>Flooding</p>	<ul style="list-style-type: none"> <li>-Development</li> <li>-Building code enforcement</li> <li>-Lack of drainage and runoff Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>-Hydro modeling</li> <li>-Updated firm maps</li> <li>-LiDAR bathymetric data</li> </ul>	<ul style="list-style-type: none"> <li>-Enforcement in Tafuna by Army Corps and Public Works</li> <li>-University of Hawaii Resilience project</li> </ul>	<ul style="list-style-type: none"> <li>-Samoa House Project</li> <li>-Enforce NFIP—government must lead by example</li> <li>-Resilience Guide</li> <li>-Infrastructure updates , including drainage</li> <li>-Improved building codes</li> </ul>	<ul style="list-style-type: none"> <li>-FEMA</li> <li>-DOC</li> <li>-CRAG</li> <li>-NOAA</li> </ul>
<p>Sea level rise</p>	<ul style="list-style-type: none"> <li>-Increased development</li> <li>-Sand mining</li> <li>- Population pressure</li> <li>- Building code enforcement</li> </ul>	<ul style="list-style-type: none"> <li>-Climate change models</li> <li>-Inundation models</li> <li>-Erosion rates</li> </ul>	<ul style="list-style-type: none"> <li>-LiDAR</li> <li>-Amouli Village Resilience Plans-expansion</li> <li>-National Flood Insurance Policy</li> </ul>	<ul style="list-style-type: none"> <li>-Armoring permits</li> <li>-Formula for setback rule - Smart Growth Plan</li> <li>-Visualizations of inundation</li> <li>-Improve mining permit system</li> <li>-Rolling conservation easements</li> <li>-Policy: plan for specific SLR by 2050</li> </ul>	<ul style="list-style-type: none"> <li>-DOC</li> <li>-DPW</li> <li>-DPR</li> <li>-CRAG</li> <li>-NOAA</li> </ul>

---

## DEVELOPMENT

*Encourage sustainable infrastructural and agricultural development throughout the Territory*

### OBJECTIVES:

1. **Incorporate climate change into all territorial and emergency plans**
2. **Create time-tables for re-evaluation of infrastructure and planning documents, continuously updating with regard to the progression of climate change impacts**
3. **Institute green building design throughout Territory, allowing for sustainable development**
4. **Encourage recycling and methods to reduce pressure from land-based sources of pollution and increase resilience of communities**

### ADAPTATION OPTIONS:

In order to prepare for the inevitable impacts and threats presented by climate change, it is necessary to **incorporate sound science and projections regarding climate change into both territorial planning and emergency management plans**. For instance, the emergency management plans do not presently account for the projected increased intensity and frequency of extreme weather. It is necessary to incorporate climate change threats because they will fundamentally alter the weather patterns and impacts that the Territory encounters in the future. American Samoa will thus be well-served to take these projections into consideration when planning for the future.

**Another necessary step to improving development in the face of climate change is to create specific time-tables (every five years) for re-evaluating and updating planning documents with regard to the progression of climate change impacts.** As sea-level-rise and other progressively worsening impacts become more of a serious issue within the Territory, planning documents and regulations may need to be revised and adjusted on a regular basis. **Local infrastructure must be continuously monitored and evaluated for impacts of climate change.** Threats like the increased frequency and intensity of flooding will increasingly damage infrastructure, so the Territory must be prepared to examine the level of damage and assess the needs as the impacts and threats worsen. The energy infrastructure will likewise need to be monitored for increased impacts of climate change, and continuously assessed for possible improvement. Building codes and enforcement must also be updated on a regular basis as the Territory witnesses more and more negative impacts due to climate change.

Instituting green building design throughout the Territory will allow for sustainable development and increased resilience to extreme weather impacts. **Pursuing a reduction in local greenhouse gas emissions while also implementing buildings that are better able to withstand any impacts of climate change will allow communities throughout American Samoa to become more resilient to climate change threats.** For instance, increasing the number of plants and greenery on roof space can increase a building's ability to retain and filter rainwater, reducing the stress and intensity of runoff. Actions like this will be necessary as climate change increases the frequency and intensity of extreme weather events.

## AUGUST 2012 – TERRITORIAL CLIMATE CHANGE FRAMEWORK – AMERICAN SAMOA

By encouraging recycling and other methods of reducing land-based sources of pollution, pressure will be reduced on communities and coastal environments. This will allow them to be more resilient and better able to withstand the impacts of climate change. This can be done through education and outreach to communities, encouraging individuals to reduce their impact on the local environment. Additionally, the enforcement of local pollution regulations already in place will go a long way in helping to minimize the non-climate change threats to coastal communities. As those threats are reduced, communities become better able to withstand impacts of climate change.

Climate Change Adaptation Advisory Group: Development					
Threat	Risks/Impacts	Data Gaps	Current Projects	Future Projects	Potential Local Partners
Extreme Weather	-Emergency impacts including risk of injury, drowning -Disaster recovery over long-term, including infrastructure and economic impacts	-Lack of coordinated planning activities -Lack of infrastructure able to withstand extreme weather	-Emergency/disaster planning	-Implement climate change into territorial and disaster planning - Increased education/ awareness to strengthen response rate to any emergency	-All agencies (territorial and disaster plans)
Sea level rise	-Infrastructure impacts directly from sea level rise and storm surge	-Lack of enforcement of setbacks -Lack of enforcement of flood insurance rules	-National Flood Insurance Program (not presently enforced)	-Increase monitoring of quality -Personal water storage -Desalinization unit -Increased public awareness/ education	-DOC (CZM) -DPW
Increased mean temperature/ heat waves	-Infrastructure, health impacts	-Lack of infrastructure that can sufficiently withstand heat, extreme weather	-New infrastructure, including new EPA building, built to withstand environmental change	-Infrastructure improvements -Increased public awareness of threats, warnings	-DOC -DPW
Changing ecosystems	-Invasive species -Spread of pathogens -Agricultural impacts on development		-Teaching variety/rotation practices	-Improved Increased public awareness/education of healthy and nutritional lifestyle options	-ASCC Land Grant -DOA -NPSA

## ENERGY

*Encourage government, industries, private sector, villages, individuals, and other organizations to reduce carbon emissions and improve present energy infrastructure to move towards a sustainable energy future.*

### OBJECTIVES:

1. **Reduce fossil fuel reliance while developing local renewable energy sources to improve energy diversification**
2. **Improve energy generation infrastructure and energy efficiency**
3. **Preserve, restore, and enhance resources to avoid wasted energy use**
4. **Train and educate public regarding energy efficiency and conservation**
5. **Implement Territory's Energy Master Plan and Strategic Energy Assurance Plan**

### ADAPTATION OPTIONS:

**By reducing reliance on fossil fuels, American Samoa has the opportunity to achieve increased energy security, which in turn will allow the Territory to adapt to the threats of climate change.** In order to reduce reliance on fossil fuels and diversify the overall energy supply, American Samoa should implement programs to increase renewable energy. With high costs and a heavy reliance on energy imports, American Samoa can undoubtedly benefit from a significant increase in locally-created, renewable energy. Renewable energy will improve energy security due to the diversification of energy resources, ensuring that the country has access to energy resources even in the case of extreme weather or other interruption to standard energy supply. The following renewable energy sources are strongly recommended for implementation or expansion within the Territory: solar photovoltaic, solar thermal, tidal and wave/current energy, and geothermal<sup>2</sup>.

**Improving energy generation infrastructure and efficiency will also serve to improve energy security throughout American Samoa, creating a Territory more resilient to any impacts of climate change.** This improvement includes addressing and reducing electrical generation and distribution inefficiencies, placing restrictions on energy infrastructure construction in vulnerable coastal areas, and increasing the deployment of non-petroleum base load electrical generation system<sup>3</sup>. Improving overall energy infrastructure will have the twin benefits of enabling the use of more renewable energy (which necessitates a secure and reliable energy infrastructure) and improving the resilience to any impacts of climate change. Energy efficiency can be achieved by a number of measures, including the increased use of pre-paid electricity meters, increased use of hybrid vehicles, expansion of the appliance efficiency incentive programs, and the increased use of LED streetlights<sup>4</sup>. Each of these projects offers an option to improve the overall use and efficiency of energy throughout the Territory, which is essential in creating resilient communities that are better able to withstand climate change impacts.

<sup>2</sup> Schaller, David. (2012). American Samoa Greenhouse Gas Inventory.

<sup>3</sup> Schaller, David. (2012). Strategic Energy Assurance Plan.

<sup>4</sup> Schaller, David. (2012). American Samoa Greenhouse Gas Inventory.

**Another essential prioritized adaptation project is to pursue resource preservation, restoration, and enhancement of resources.** Specifically, it is recommended that the Territory pursue a project to reduce the volume of non-revenue water loss. It is estimated that about 60% of water is being lost between the pumping of water and the end use<sup>5</sup>. As the impacts of climate change become more pronounced on the water supply, it will be necessary to improve the water supply infrastructure to better supply water and withstand any threats from climate change. The improvement of this type of infrastructure will serve to save unnecessary energy currently being wasted to secure these resources. Other projects, like diverting organic materials from landfills will also ensure that less energy is needed to collect and incinerate trash.

Yet another project that will contribute to the adaptation to climate change in the Territory is **increasing the training and education surrounding energy efficiency and conservation.** This will allow for an increase in local knowledge and capacity, while improving the ability of individuals and communities to improve their personal energy use and energy security in the face of uncertainty regarding climate change impacts. The increased availability and use of efficient appliances and automobiles will require less energy to operate, reducing the negative impacts on the environment while allowing for the Territory to be resilient to any threats to energy infrastructure.

The final prioritized recommendation is to **establish an organizational structure to appropriately adopt and implement the Territory’s Energy Master Plan and the Strategic Energy Assurance Plan for the Territory.** As an isolated Territory, American Samoa cannot easily or quickly import fuels from alternative sources and has no back-up infrastructure. As such, it is essential that American Samoa develop a comprehensive, long-term plan for action as well as a contingency plan in the event of any damage or disruption due to climate change or otherwise. By encouraging increased collaboration between agencies and enabling the reassessment of energy use as it relates to climate change, the adoption and full implementation of both the Energy Master Plan and Strategic Energy Assurance Plan would allow the government to prepare for and minimize the risk presented by any impacts of climate change on energy infrastructure.

Climate Change Adaptation Advisory Group: Energy Subcommittee					
Threat	Risks/Impacts	Data Gaps	Current Projects	Future Projects	Potential Local Partners
Extreme Weather (tropical storms and cyclones, high winds, landslides, flooding, storm surges)	-Damage to already weak energy infrastructure -Limited fuel reserves -Single road for fuel transport-vulnerable to damage -Less access to energy from off-island	-Lack of stable energy infrastructure—short term power outages, etc. -Lack of sufficient local energy capacity -Electricity and liquid fuel inefficiencies - Need to identify key stakeholders, and assign roles and responsibilities during preparation,	- Solar energy installation - Solar hot water - Efficient appliances -Project to implement energy efficient building codes -Prepaid electricity meters -Energy audits of government,	-Increase renewable energy installation (energy source diversification) - Increase efficiency programs -Restrictions on energy infrastructure construction in	-TEO -ASPA

<sup>5</sup> Schaller, David. (2012). American Samoa Greenhouse Gas Inventory.

**AUGUST 2012 – TERRITORIAL CLIMATE CHANGE FRAMEWORK – AMERICAN SAMOA**

		<p>response, and recovery operations</p> <ul style="list-style-type: none"> <li>- Providing for continuous monitoring and evaluation of the plan as the nature of the vulnerabilities and the Territory's response capabilities change with time.</li> </ul>	commercial and residential buildings	<p>vulnerable coastal areas</p> <ul style="list-style-type: none"> <li>- Increase deployment of non-petroleum base load electrical generation system</li> </ul>	
Changing ecosystems, extreme impacts	<ul style="list-style-type: none"> <li>-Diminished availability of limited resources</li> </ul>	<ul style="list-style-type: none"> <li>-Lack of preservation of limited resources</li> <li>-Need to identify measures for mitigating the effects of energy supply disruptions before they occur</li> </ul>	<ul style="list-style-type: none"> <li>-Planned implementation of recycling projects</li> <li>-Planned implementation of efficiency projects</li> </ul>	<ul style="list-style-type: none"> <li>- Preservation, restoration, and enhancement of resources</li> <li>-Improved public awareness of efficiency and conservation efforts</li> <li>- Explore opportunities to deploy Smart Grid applications</li> </ul>	-ASPA
Sea level rise	<ul style="list-style-type: none"> <li>-Impact of inundation and storm surge on already inefficient, outdated energy infrastructure</li> <li>-Projected 55-inch sea level rise by 2100<sup>6</sup></li> </ul>	<ul style="list-style-type: none"> <li>- Need to characterize vulnerabilities and threats to the Territory's energy infrastructure assets from the onset of climate disruption<sup>7</sup></li> </ul>		<ul style="list-style-type: none"> <li>-Address generation and distribution inefficiencies</li> <li>- Limitations and restrictions on energy infrastructure construction in vulnerable coastal areas</li> </ul>	-ASPA
Increased mean temperature/ heat waves	<ul style="list-style-type: none"> <li>-Increased sensitivity of energy infrastructure</li> <li>-Increased use of energy-intensive products like air conditioning and refrigeration</li> </ul>	<ul style="list-style-type: none"> <li>- Need to characterize vulnerabilities and threats to the Territory's energy infrastructure assets from the onset of climate disruption</li> <li>- Identifying measures for mitigating the effects of energy</li> </ul>		<ul style="list-style-type: none"> <li>-Infrastructure improvements: stronger building codes</li> <li>-Increased use of efficient products</li> </ul>	-TEO -ASPA

<sup>6</sup> Schaller, David. (2012). Strategic Energy Assurance Plan.

<sup>7</sup> Schaller, David. (2012). Strategic Energy Assurance Plan.

		supply disruptions before they occur			
--	--	---	--	--	--

**ACKNOWLEDGEMENTS:**

**Report Compilation and Guidance:**

Carolyn Doherty, Whitney Peterson, Hideyo Hattori, Kristine Bucchianeri

**Chairman of the Climate Change Adaptation Advisory Group:**

Senator HC Fuata I'atala

**Subcommittee Leads and Expert Contributors:**

Sean Morrison, William Sili, Si'itia Lemusu, Douglas Fenner, David Schaller, Daniel Lin, Corrin Barros

**Additionally, thank you to all of the various experts and natural resource managers who provided valuable time, input and feedback to inform the various sections of this document.**