

**V(A). Planned Program (Summary)**

**Program # 3**

**1. Name of the Planned Program**

Climate Change

Reporting on this Program

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
112	Watershed Protection and Management	15%		25%	
123	Management and Sustainability of Forest Resources	30%		25%	
124	Urban Forestry	25%		20%	
125	Agroforestry	15%		20%	
132	Weather and Climate	15%		10%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.5	0.0	0.2	0.0
Actual Paid Professional	3.0	0.0	1.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
49193	0	46271	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
49193	0	46271	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

Pago Pago Harbor was monitored monthly for evidence of another algae bloom. We identified a FIFA soccer field, adjacent to the harbor head, as the source of nutrients (nitrogen and phosphorus) that were responsible for past blooms. CES agents worked with the field managers to schedule fertilizer applications in a manner that would adequately feed the turf without excessive runoff. Since then, no bloom has been detected.

We monitored tap water from 20 widely dispersed areas of Tutuila Island for Total Dissolved Solids, as determined by electrical conductivity and atomic absorption analysis for calcium, magnesium, potassium, and sodium. We found that the municipal water distribution system serving the southeastern shore was high in TDS/EC. Meetings with the local water utility identified a series of wells in the Pago Harbor area (village of Aua) as the source of this drinking water. The high EC was owing in large part to seawater infiltration of the fresh water lens, source of groundwater for these wells.

We will collaborate with partners at the local Department of Marine and Wildlife and the EPA for monitoring and reducing sedimentation on our fringing coral reef.

Conduct conservation and climate change workshops.

Propagate trees for agroforestry, watershed, and coastal stabilization projects.

Survey areas infested with invasive tree species.

Conduct control program for invasive tree species.

Develop GPS/GIS maps.

Develop FSP management plans.

**2. Brief description of the target audience**

Scientists involved in environmental resources protection.

Local water utility personnel.

Policymakers in the Executive and Legislative branches of local government.

The Public.

Students

Farmers

Forestry clients

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	831	6000	3473	10000

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2012  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
Actual	1	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Technical Reports/Peer-reviewed papers/Media reports

Year	Actual
2012	4

**Output #2**

**Output Measure**

- Number of conservation and climate change workshops completed.

Year	Actual
2012	35

**Output #3**

**Output Measure**

- Number of plants propagated at nursery for climate change projects.

Year	Actual
2012	1305

**Output #4**

**Output Measure**

- Number of workshops' participants.

Year	Actual
2012	1513

**Output #5**

**Output Measure**

- Number of trees planted for climate change projects.

<b>Year</b>	<b>Actual</b>
2012	1305

**Output #6**

**Output Measure**

- Number of acres (infested by invasive species) surveyed using GPS/GIS.

<b>Year</b>	<b>Actual</b>
2012	32

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Bacterial and sediment loads in stream runoff.
2	Number of agroforestry projects established.
3	Number of watershed projects established.
4	Number of coastal stabilization projects completed.
5	Number of acres infested by invasive tree species controlled.
6	Number of GPS/GIS maps developed.
7	Number of Forest Stewardship Management plans completed.

## **Outcome #1**

### **1. Outcome Measures**

Bacterial and sediment loads in stream runoff.

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	0

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Agricultural and construction activities in stream riparian zones may lead to soil erosion and pollution of streams with anthropogenic nutrients and coliform bacteria loads. These activities have a greater impact on the reef, where a blanket of soil may impede coral photosynthesis while excess nutrients promote algae growth. As a nursery for many marine fauna and shoreline safeguard against wave erosion, loss of coral at the expense of algae has serious repercussions on fish and crustacean stocks as well as shoreline erosion.

#### **What has been done**

Monitoring bacterial counts at the mouths of streams, where access is relatively easy, alerts regulators, i.e, EPA, of a potential violation upstream. Likewise, visiting stream mouths soon after storm events allows for a qualitative assessment of soil erosion problems.

#### **Results**

Since an EPA initiative in 2009 to remove illegal piggeries from riparian areas and to identify possible households with ineffective sewage handling procedures, stream and off-shore bacterial counts have been substantially reduced and soil runoff seen only after the most severe storms with accompanying intensive rainfall.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
112	Watershed Protection and Management

## **Outcome #2**

### **1. Outcome Measures**

Number of agroforestry projects established.

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Condition Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	1

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Population pressure and land clearance for agriculture and economic development in the mountainous areas of the limited land area (76 square miles) of American Samoa are major threats and challenges to the forests and natural resources.

Forty two percent (42%) of American Samoa's 76 square miles has a slope of more than 45%. Soil erosion is highly visible in many of these sites.

#### **What has been done**

Forestry program conducted 35 conservation and climate change workshops for 1513 participants. Moreover, forestry staff propagated 1035 plants for climate change projects.

#### **Results**

Established one agroforestry project at Leone village. The mixed cropping system (crops & trees) at the site not only provided food for the family (food security) but also control soil erosion. Moreover, the landowner and staff controlled all the invasive tree species and replanted with 30 recommended native tree species at the one-acre site. The landowner appreciated the support from the forestry program.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry

132 Weather and Climate

### **Outcome #3**

#### **1. Outcome Measures**

Number of watershed projects established.

#### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

#### **3a. Outcome Type:**

Change in Condition Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	2

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

Pollution (trash & pig wastes), sedimentation, nutrients enrichment, soil erosion, invasive species, and human activities are major threats and challenges to the fresh water supply and quality in American Samoa. The threats also impacted mangroves, fresh water fish, and marine life and coral reefs.

##### **What has been done**

Conducted 35 workshops on conservation and climate change education on agro-forestry, technical assistance, land management planning, and building partnerships with villages and landowners.

##### **Results**

Forestry staff established partnerships with two villages (Nu'uuli and Faga'alu. Sixty three (63) youth members and 3 church pastors from Nu'uuli village; eighty nine (89) youth members and 5 village officials from Faga'alu village established two watershed projects at the respective villages. One hundred twenty (120) native trees (60 trees per village) were planted at these two watersheds to control soil erosion, replace invasive species with native trees, and to maintain healthy water quality and wildlife habitat. Villagers are able to continue youth watershed cleanup activities once a month. Families agreed to relocate their piggeries 50 feet away from the streams to maintain fresh water quality.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
132	Weather and Climate

#### **Outcome #4**

##### **1. Outcome Measures**

Number of coastal stabilization projects completed.

##### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

##### **3a. Outcome Type:**

Change in Condition Outcome Measure

##### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	4

##### **3c. Qualitative Outcome or Impact Statement**

###### **Issue (Who cares and Why)**

On September 29, 2009 an 8.1 magnitude earthquake generated a massive tsunami that struck American Samoa, killing 32 people and injuring many others, both physically and psychologically. The shorelines and coastal areas of American Samoa were no longer enjoyed by its people, due to the destruction from this natural disaster. Trees that were use for windbreaks, coastal stabilization, and soil erosion were wiped out by the tsunami. Coastal and shorelines were not safe for the people.

###### **What has been done**

Forestry propagated 2,175 plants for climate change projects and conducted 35 conservation and climate change workshops.

###### **Results**

Planted 1150 trees at the 4 coastal stabilization projects involving the 27 tsunami impacted villages that requested assistance with coastal and shoreline stabilization.

##### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
132	Weather and Climate

## **Outcome #5**

### **1. Outcome Measures**

Number of acres infested by invasive tree species controlled.

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	5

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

The spread of exotic invasive plants has become the greatest danger to American Samoa's native rainforest. Such serious invasive plants included the African tulip (*Spathodea campanulata*), Panama rubber tree (*Castilla elastica*), albizia (*Falcataria moluccana*), red-bead tree (*Adenanthera pavonina*), strawberry guava (*Psidium cattleianum*), cinnamon (*Cinnamomum verum*) and false kava (*Piper auritum*). These invasive species have slowly replace native trees of American Samoa.

#### **What has been done**

Forestry staff surveyed 64 acres of land at Maloata village. Thirty two (32) of the 64 acres are infested with *Castilla elastica*.

#### **Results**

Forestry team controlled 5 acres of the 32 acres of surveyed *Castilla elastica* infested area. Forestry staff eradicated 40 large trees, 280 saplings, and 2,336 seedlings.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
132	Weather and Climate

## **Outcome #6**

### **1. Outcome Measures**

Number of GPS/GIS maps developed.

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	1

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

The spread of exotic invasive plants are identified as the greatest danger to American Samoa's native rainforest. Maps of invasive species distributions is a critically needed data. Mapping invasive plant distributions is critical to planning, implementation, and evaluation of invasive species control programs in American Samoa.

#### **What has been done**

CNR forestry program received assistance from NASF to develop a strategy for mapping and monitoring of invasive plants in American Samoa using geospatial technology. The USFS Region 5, Sr. GIS Analyst assisted ASCC-CNR GIS Specialist and Forestry staff in developing a long term strategy for mapping and monitoring invasive trees using the latest mosaic WorldView-2 (WV2) 8-band pan-sharpened satellite imagery made available very recently through the Pacific Island Imagery Consortium.

#### **Results**

Completed one invasive map for Tutuila island based on data and information collected in the field. A pilot mapping of red-bead tree (*Adenantherepavonina*) in part of the villages of Fagalii and Maloata was conducted successfully using latest WorldView-2 (WV2) very high-resolution

(VHR) satellite imagery and automated classification algorithm. 150 copies of the American Samoa's invasive plants map and posters were produced, distributed, and made available to the public.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
132	Weather and Climate

#### Outcome #7

##### 1. Outcome Measures

Number of Forest Stewardship Management plans completed.

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

##### 3a. Outcome Type:

Change in Condition Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2012	31

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

At the end of year 2010, the population was estimated at 80,000. Out of 34,082 acres of land on Tutuila Island, only 18,626 acres have less than 45% slope. Land for development and agriculture are limited. Many landowners do not have any existing management plans to care for and manage their own lands. The spread of exotic invasive species throughout the island, population increase, and climate change will negatively impact the future of forests and natural resources in American Samoa.

###### **What has been done**

Forestry staff conducted 35 conservation education workshops and presentations to the community at large. Assisted 31 clients in developing management plans for their lands. Forestry staff and CNR-GIS Specialist secured resources maps for each FSP clients to assist with

planning and evaluation.

### **Results**

Forestry staff completed 31 forest stewardship management plans for 31 landowners. Landowners are now able to manage their family lands. Landowners are visiting our greenhouse more often for technical assistance or needed plants.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
124	Urban Forestry
125	Agroforestry
132	Weather and Climate

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

### **Brief Explanation**

The impacts of the September 29, 2009 earthquake and tsunami impacted program activities. Loss of staff reduced program capacity. Population increase, limited land area, invasive species, agricultural and economic development affected programming and outcomes. In the process of recruiting for: 4-H Specialists, Fruit Tree Specialist, Marketing Specialist, Energy Specialist and field and support staff.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

In FY-2012, Forestry Program served 831 adults and 3,473 youth. 1,513 program participants participated in the 35 conservation education workshops and completed the program evaluations. Workshop participants learned about Agro-forestry, Tree Standing Improvement, Watershed Management, Natural Resources Conservation, Plant Propagation, Invasive Species Management, and Urban Community Forestry programs.

Program evaluation indicated the following: 1). forestry program staff should be more visible in the community to assist and encourage landowners to plant more native trees to address climate change challenges; 2) forestry program must work with village councils in managing watersheds and coastal areas; 3) forestry program must focus on native tree

species and medicinal plants; 4) forestry program must extend programs to the Manu'a islands and Aunu'u; 5) need to hire more professional forestry staff to implement programs; 6) vehicles and equipments are needed to effectively deliver programs to the communities. Overall, clients are impressed with forestry staff performance in the communities and recommended funding sources to sustain the forestry program in American Samoa.

### **Key Items of Evaluation**