

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

**Program # 2**

**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
102	Soil, Plant, Water, Nutrient Relationships			10%	5%
111	Conservation and Efficient Use of Water			10%	5%
112	Watershed Protection and Management			5%	15%
123	Management and Sustainability of Forest Resources			5%	5%
125	Agroforestry			5%	5%
131	Alternative Uses of Land			5%	5%
132	Weather and Climate			10%	10%
133	Pollution Prevention and Mitigation			10%	10%
135	Aquatic and Terrestrial Wildlife			5%	5%
201	Plant Genome, Genetics, and Genetic Mechanisms			5%	5%
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			5%	5%
304	Animal Genome			5%	5%
403	Waste Disposal, Recycling, and Reuse			10%	10%
610	Domestic Policy Analysis			5%	5%
903	Communication, Education, and Information Delivery			5%	5%
	<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	0.0	0.0	20.0	12.0
Actual Paid Professional	0.0	0.0	22.0	12.0
Actual Volunteer	0.0	0.0	0.0	0.0

**2. Institution Name:** Auburn University

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	1232000	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	1232000	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**2. Institution Name:** Alabama A&M University

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	0	541791
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	806682
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**2. Institution Name:** Tuskegee University

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	0	321187
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	307890
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**

Although this program was named Climate Change, the program was expanded to include environment, natural resources, and ecosystems.

Research was conducted to develop sustainable agricultural systems emphasizing energy and resource conservation; improve understanding of the land-water interface and the urban-agriculture interface; contribute to solutions to the consequences of global climate change; provide a framework for understanding and addressing issues of water quality and quantity, water reuse, carbon sequestration, air quality, and seek economically viable practices for improved sustainability in large- and small-scale agriculture; management of agricultural waste and residues generated through the animal and poultry and crop production systems; sustainable agriculture systems to enhance soil productivity and improve water infiltration and the plant-root environment; ecotourism; invasive species; soil conservation, quality, and bio-indicators; rural-urban interface and environmental issues; wildlife management; restoration and best management practices; remote sensing and precision agriculture; and science-based policy development. This priority is aligned with the USDA research priority area of Climate Change with Alabama's long-term goal of best conserving and utilizing natural resources while sustaining the environment.

Auburn University was awarded \$1.8 million from the U.S. Department of Defense to help develop a plan for sequestering carbon in longleaf pine forests on military bases - thus reducing the amount in the atmosphere. Professor Lisa Samuelson, director of the Center for Longleaf Pine Ecosystems in Auburn's School of Forestry and Wildlife Sciences, will lead the project that includes as collaborators the USDA Forest Service's Southern Research Station and the University of Florida. The overall grant for the study is \$2.4 million. The project, "Developing Tools for Ecological Forestry and Carbon Management in Longleaf Pine," is funded by the Department of Defense's Strategic Environmental Research and Development Program. This is the first year of the study.

Some of the highlights of activities include studies of ozone exposed forage in relation to nutritional values to beef cattle, analysis of effects and implications of agronomic practices on soil fertility and environmental quality in Alabama, development of regional curves or hydraulic geometry relationships of streams in the Alabama Appalachian Plateau that includes in-stream biota response and documentation of floodplain vegetation assemblages and soil characterization, development of management practices for the biological component of soil, analysis of how crop rotations influence carbon (C) and nitrogen (N) amounts in the soil, and its impact on soil C sequestration and N availability for plant growth, analysis of the impact of variable-rate application of nutrients in Alabama and distribution and successful implementation of nutrient management planning, development of techniques for vegetation establishment and management on steep slopes of construction sites to provide erosion control and minimize off-site impacts, modeling for TMDL development, and watershed based planning, management and assessment, application of precision agriculture technologies or improved crop production in the Tennessee Valley, development of systems for controlling air pollutant emissions and indoor environments of poultry, swine, and dairy facilities, development of nutritional and management abatement strategies for improvement of poultry air and water quality, and development of strategies for carbon sequestration and greenhouse gas emission reduction in horticultural production practices.

Long term studies being conducted to evaluate the effect of land use on soil and water quality in two watersheds in the Alabama River basins, the Catoma creek and Mulbarry Creek watersheds. Using PLOAD method, the results show that both watersheds had total Nitrogen and total Phosphorus values exceeded the EPS' limits for rivers and streams.

Studies are being conducted at Alabama A&M University for a better understanding of the processes responsible for the development of redoximorphic features in soil, and to improve our knowledge to use such soil features as well as climatic data to identify flood vulnerable soils.

A study was conducted to quantify potential interactions (positive and negative) between introduced yellow perch and resident sport fishes in two lake ecosystems (Lake Martin and Yates Lake). Results indicated that negative effects from competition were essentially nonexistent, while yellow perch actually provided potential positive effects as prey for piscivores during a short time in the spring. As an introduced member of these lakes, they are likely having neutral to positive effects, and in Yates Lake, and small fishery may be established for them.

A comprehensive study of eight years was conducted to assess ecosystems interactions of largemouth bass in the Mobile-Tensaw Delta of Alabama that face a complex set of challenges and advantages in the coastal environment. Salinity can represent a stressor for freshwater fish, but the diversity of prey that can be found in low salinity waters is actually beneficial for young bass. It was found that largemouth bass in the Delta live shorter lives and reproduce earlier in life than their freshwater counterparts.

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

Farmers, producers, land owners, industry leaders, policy-makers, citizens, and related state and federal agency personnel.

**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>	10000	50000	20000	100000

**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
<b>Actual</b>	10	260	270

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

**Output Target**

**Output #1**

**Output Measure**

- publications

<b>Year</b>	<b>Actual</b>
2012	270

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

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

O. No.	OUTCOME NAME
1	Reduced carbon footprint by adopting improved agricultural practices
2	Increased carbon sequestration by adoption of technologies and improved agricultural practices.
3	Identification of crop varieties and animal stocks that can adapt to a changing environment.

### **Outcome #1**

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

Reduced carbon footprint by adopting improved agricultural practices

Not Reporting on this Outcome Measure

### **Outcome #2**

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

Increased carbon sequestration by adoption of technologies and improved agricultural practices.

Not Reporting on this Outcome Measure

### **Outcome #3**

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

Identification of crop varieties and animal stocks that can adapt to a changing environment.

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

- 1862 Research
- 1890 Research

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

Change in Knowledge Outcome Measure

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

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

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

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

Crop varieties and animal breeds more adaptable to elevated temperature need to be developed in the face of climate change and extreme weather.

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

Breeding work was conducted to select for drought and high temperature resistant cotton and peanut varieties;

Initial gene expression work was conducted to assess molecular responses of catfish to elevated

temperature.

Breeding work was conducted to select sweet potato varieties adaptable to drought conditions

### **Results**

Not achieved to the new varieties yet, but progress are being made to have drought resistant peanut varieties;

Many genes are identified as the response genes to heat in catfish, and further analysis of associated genome markers are underway.

Selection of drought tolerant sweet potato varieties have been selected for further field testing

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
201	Plant Genome, Genetics, and Genetic Mechanisms
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
304	Animal Genome
403	Waste Disposal, Recycling, and Reuse
903	Communication, Education, and Information Delivery

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

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

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

### **Brief Explanation**

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

### **Evaluation Results**

This program was named climate change (and starting this year, to be changed to Natural resources, environment sustainability and climate change) covers a broad range of research activities. It is the second largest program. Researchers work in the areas of natural resource conservation, management and utilization, environmental sciences, and

climate change. This is perhaps the most active research area in Alabama under the umbrella of AAES and AALGA.

We have many different research projects under this area with traditional environmental research and the more climate change oriented projects. Overall, research is very active in this area. Our recent research summary in the retreat indicated that we have the largest number of faculty who works in this area.

### **Key Items of Evaluation**

To be prepared for a changing climate, greater funding opportunities are essential. In spite of the very active research in this area in Alabama, funds are limited.

NIFA should have long term sustainable funding in this area. It may seem to be remote, but climate is quietly changing. If we are not prepared, climate change may threaten the very existence of the human kind.