V(A). Planned Program (Summary)

Program # 8

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
101	Appraisal of Soil Resources	0%		24%	
111	Conservation and Efficient Use of Water	15%		0%	
112	Watershed Protection and Management	0%		22%	
132	Weather and Climate	85%		0%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		1%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		30%	
206	Basic Plant Biology	0%		23%	
	Total	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	0.2	0.0	0.5	0.0
Actual Paid Professional	0.1	0.0	0.6	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**
2171	0	27227	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
2171	0	2667	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	52799	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research and outreach must not only adapt to a changing climate, but must improve efficiency under these new conditions. They must anticipate more limited access to both energy and water.

2. Brief description of the target audience

Rural Communities, small towns that are seeing new challenges for handling stormwater due to higher rainfall intensities.

3. How was eXtension used?

The resources provided through eXtension were used to supplement and enhance our public learning experiences provided by MSU Extension agents and specialists. eXtension was also used as a resource in state-based planning processes. Overall, 212 MSU employees are eXtension users, with 15 new registrations during this reporting period. Further, MSU Extension has 64 employees that serve on one or more of the 72 Communities of Practice (COPs); MSU Extension employees are member of 33 COPs. Twelve MSU Extension employees serve as a leader for a COP, leading 9 COPs. An Extension faculty member is on the Climate, Forests, and Woodlands COP.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	80	1181	0	0

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	0	2	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of people attending workshops, short courses, etc.

Year	Actual
2012	210

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of producers adopting new practices based on research/extenson recommendations.
2	Number of producers reporting increased income/decreased expenses based on practice changes.

Outcome #1

1. Outcome Measures

Number of producers adopting new practices based on research/extenson recommendations.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	42

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Water and energy conservation will become critical needs for sustaining high yield agricultural under climate change models that predict locally increasing temperature and declining rainfall for portions of the Southeast. Development of production systems that conserve water and energy are the focus of integrated research and Extension programs in the Mississippi Delta.

What has been done
MAFES and MSU Extension scientists have worked with rice growers to determine if intermittent flooding could work in Mississippi, as it does in Asia. Under this system, farmers flood their rice fields and then let the floodwaters naturally subside. When saturated mud is exposed in the upper half of the paddy, they pump back to a full-flood depth of about four inches. Growers using this method might pump water onto their fields only every five to nine days, depending on weather and soil conditions.

Results
By allowing the water level in the paddies to decrease, growers can better capture rainfall. For every inch of rainwater that is captured or groundwater that is not pumped, farmers save about one gallon of diesel fuel per acre. For large operations, such savings can add up to tanker truckload quantities of fuel. Typically the MS Delta gets 10-14 inches of rain during the growing season. If rice paddies are completely filled, there is no room to capture rainfall. Runoff may carry away nutrients and other chemicals that are expensive to purchase and may contaminate streams and rivers. The study found that even partial adoption of intermittent flooding can save producers money on energy and relieve stress on those producers who struggle to maintain their rice crop when other crops also need watering.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
132	Weather and Climate

Outcome #2

1. Outcome Measures

Number of producers reporting increased income/decreased expenses based on practice changes.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	34

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
With sub-tropical climate, abundant water resources, and long growing seasons, rice performs well and is an important crop in the Mid-south. However, high temperatures during flower formation and grain-fill can cause reductions in yield and grain quality. Increasing temperatures associated with climate change may threaten the rice industry in the southeast if heat tolerant varieties are not developed.

What has been done
MSU scientists in the Department of Plant and Soil Sciences utilize a unique artificial environment called the SPAR (Soil-Plant Atmospheric-Research) Units to precisely simulate diverse combinations of environmental conditions and rapidly screen for heat tolerance in a multitude of elite lines of rice. The facility provides a robust platform for studying crop physiology, crop modeling, climate change, drought tolerance, and carbon sequestration.

Results
In one experiment, 20 standard cultivars and seven advanced lines grown in outdoors were transferred to sunlit controlled environmental SPAR Units. All cultivars produced panicles with filled grains in the optimum temperature, although there were differences among the cultivars. Under higher temperatures, many cultivars/lines either produced no panicles or panicles, but no filled grains. The advanced lines were not much different compared many of the commonly cultivated cultivars with most of them either produced no panicles or sterile panicles. The

identified cultivars/lines will be valuable resource in the rice breeding programs in developing heat tolerant cultivars.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
132	Weather and Climate

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

MSU Extension agents and specialists, as well as MAFES faculty, used a variety of recommended methods to gather needed information. Specific strategies will be initiated and utilized for collecting evaluation information to determine program outputs and outcomes (see impact statements for examples).

In FY 2012, MSU Extension agents and specialists were required to submit four quarterly reports (January, April, July, and September). This quarterly report collects information about the number of contacts, types of contacts, and number of programs conducted in each Priority Planning Area. In addition, two narrative Accomplishment Reports are required from each MSU Extension employee each year. Finally, a specific request for impact statements is also made. The evaluation results are a combination of this quantitative and qualitative data.

MAFES scientists operate research programs under an approved Hatch or Hatch-Multistate CRIS project plan of work. Outputs, outcomes, target audiences, and impacts are reported annually through the CRIS (REEport) system. Annual and project termination reports are developed by scientists and reviewed by Department Heads and the Director's office before submission to USDA-NIFA through REEport.

Key Items of Evaluation