

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Climate Change- improving the quality of water runoff from agricultural production

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				50%
133	Pollution Prevention and Mitigation				50%
	Total				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	0.0	5.7
Actual Paid Professional	0.0	0.0	0.0	4.1
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
0	0	0	199057
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	199057
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	167020

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research in water quality monitoring.

Develop outreach materials.
 Communicate findings to producers/end users.
 Train students.

2. Brief description of the target audience

Agricultural producers, environmental scientists, environmental regulatory agencies.

3. How was eXtension used?

Agricultural and natural resource agents (ANR) from TSU were encouraged to attend an in-service training conducted in May 2012 concerning surface water quality monitoring and pollution prevention.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	6	15	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	1	1	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Workshops to communicate research findings to stakeholders.

Year	Actual
2012	1

Output #2

Output Measure

- Workshops to educate producers in the target population on how to reduce sediment load to surface water.

Year	Actual
2012	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increase in number of nursery producers in the target population aware of nonpoint source pollution from field production of specialty crops.
2	Students trained in water quality monitoring.
3	Number of producers in the target population with increased knowledge of the relationship between land cultivation practices and sediment load to surface water.

Outcome #1

1. Outcome Measures

Increase in number of nursery producers in the target population aware of nonpoint source pollution from field production of specialty crops.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

During storm events, a large volume of sediment can be added to creeks from surface runoff, especially from field plots where the land has been plowed or disked. Nursery crop growers are not aware of the impact of these management practices on surface water. Water managers and residents that live in the Collins River sub-watershed and state regulatory agencies are concerned about this issue because plowing, liming and fertilization of nursery fields can result in the runoff of tons of soil and essential crop nutrients, such as phosphorus, to tributaries of the Collins River.

What has been done

Hills Creek and Mountain Creek in Warren County Tennessee were sampled for eight consecutive weeks in the summer and fall of 2012. Water samples were collected mostly during normal stream flow, and in very few instances, after rainstorm events. The creeks were monitored for turbidity, specific conductance, total dissolved solids, dissolved oxygen, pH and temperature. Nitrogen, phosphorous, calcium, magnesium and potassium were also monitored in the creek water samples.

Results

While growers are being viewed as contributors to surface water quality degradation, our data indicate otherwise. We found during base flow that essential crop nutrients like phosphorus (P) were relatively low; the dissolved P ranged from 0.02 ppm in Mountain Creek to 0.10 ppm in Hills Creek. It is worth mentioning that the dissolved form of phosphorous usually serves as potential nutrient for algae in the water and as such may support eutrophication in surface water. However there was no visual evidence of eutrophication in either creek.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #2

1. Outcome Measures

Students trained in water quality monitoring.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is the need to train a future workforce to meet the need of water resource issues, especially in the area of surface and ground water quality assessment and monitoring.

What has been done

Three students (one graduate student and two undergraduate students) hired as student workers are involved in the program; they are gaining both research and extension experiential training.

Results

The students are assisting in instrument calibration and the analyses of stream water quality parameters.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #3

1. Outcome Measures

Number of producers in the target population with increased knowledge of the relationship between land cultivation practices and sediment load to surface water.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	15

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nursery crop production activities can contribute to both point and non-point source pollution. Plowing, liming and fertilization of nursery fields can result in the runoff of soil and essential crop nutrients at a watershed scale. There is a strong correlation between surface water quality and land use within a watershed. The residents, including nursery growers, in the Collins River watershed care about the water quality of the water bodies that drain the watershed.

What has been done

Preliminary results have been shared with nursery crop growers and county agents in forums such as field days, organized workshops and in-service training of ANR agents.

Results

Turbidity values were slightly higher during the winter sampling seasons. Concentrations of essential crop nutrients such as phosphorus were also found to be low in the creeks monitored; suggesting efficient use of fertilizers by growers. Six growers in the sub-watershed indicated an increase in knowledge concerning land use and water quality.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Government Regulations
- Competing Public priorities

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The primary deliverable of this project is the creation of a new paradigm for field nursery crop growers, especially in Middle Tennessee, so growers are well educated on surface water quality and watershed management principles. Growers were able to make improved field-scale decisions such as testing their soils before lime and fertilizer applications. The effectiveness of the project is evaluated by a) the heightened local awareness of surface water quality problems and solutions; b) best management practices (BMPs) adopted by growers for individual nursery fields; c) demand by growers for better and efficient fertilizers that are not prone to excessive surface runoff during storm events and d) better trained students in the environmental protection and enhancement area.

Key Items of Evaluation