Tallapoosa Watershed Project

Annual Report
for
Auburn University Water Resources Center

Jayme Oates, Project Coordinator
Dr. Bill Deutsch, Project Director
July 1, 2009

Cover photo: Examples of Tallapoosa Watershed Project Year One activities, clockwise from top, 1) 5th Annual State of Our Watershed Conference speakers and panelists, taken at Central Alabama Community College campus, Alexander City, 2) TWP Team Members floating Saugahatchee Creek from Lovelady Bridge to the Embayment, 3) TWP Team Members meet with representatives from the City of Auburn Water Resource Management Department at the Bailey Alexander Water and Sewer Complex, Auburn.

Table of Contents

Page

Executive Summary 5

Project Background 7

Project Personnel 8

Project Description 11

Goal and Objectives 11

Sub-Project Titles 13

YEAR 1 14

SUB-PROJECT REPORTS APRIL 2009 14

Sub-Project 1 Hydrology 15

Sub-Project 2 Land Use Land Cover and Sub-Project 3 Historical Trends 20

Sub-Project 4 Scenarios and Planning Toolbox 24

A. Scenarios 24

B. Toolbox Development 27

C. Toolbox Application 29

Sub-Project 5 Socio-Econ 31

Sub-Project 6 Algae Study 32

Sub-Project 7 Catchment Study 35

Sub-Project 8 Municipal Outreach 37

Sub-Project 9 Waste Water Outreach 38

Sub-Project 10 Education Outreach 39

Sub-Project 11 State of Our Watershed Conference 39

Sub-Project 12 Multi Media PR 44

YEAR 1 RESEARCH SYNOPSES JUNE 2009 46

Sub-Project 1 Hydrology 47

Sub-Project 2 Land Use Land Cover, Sub-Project 3 Historical Trends 53

Sub-Project 4 Scenarios and Planning Toolbox 55

Sub-Project 5 Socio-Econ Study 55

Sub-Project 6 Algae Study 56

Sub-Project 7 Catchment Study 59

Sub-Project 11 State Of Our Watershed Conference 61

SUB-PROJECT SUMMARIES FOR PUBLIC RELATIONS 64

Sub-Project 1 Hydrology 65
Sub-Project 2 Land Use Land Cover and Sub Project 3 Historical Trends 66
Sub-Project 6 67
Sub-Project 7 Catchment Study 69
MEETINGS, PUBLICATIONS AND CONFERENCES 70
Meetings 71
Publications 77
Conferences 77
RELATED PROJECTS AND FUNDING 78
Related Projects 79
Related Proposals 81
In Review 81
Not Funded 81

Executive Summary

1. The Tallapoosa Watershed Project (TWP) is a three-year project that began on June 1, 2008, following a series of planning meetings by research and outreach team members, Auburn University Water Resources administrative staff and other stakeholder groups. The TWP is an interdisciplinary project (research and outreach components) funded by the Auburn University's Water Resources Center within the Natural Resource Management and Development Institute. This progress report documents activities and accomplishments of the project's first calendar year (June 2008-May 2009).
2. The Year 1 Budget totaled $274,000 and was divided among 14 sub-projects; 80% went to research sub-projects and 20%went to Outreach and Administration sub-projects; 47% went to support 9 graduate and 2 undergraduate students in two colleges, two schools and four departments.
3. The Research Team, led by Dr. Puneet Srivastava (Biosystems Engineering), and including additional team members from the School of Forestry and Wildlife Sciences, the Department of Fisheries and Allied Aquacultures, the Department of Geography, the School of Landscape Architecture and the Department of Agriculture Economics and Rural Sociology, concentrated on preparing their graduate students for work within their aspects of the project, data collection and data collation for the Saugahatchee watershed, a representative sub-basin of the Tallapoosa Watershed.
4. The Outreach Team, co-led by Charlene LeBleu from the School of Architecture and Katie Lamar Jackson from Office of Agriculture Communications and including members of the Department of Agronomy, the Alabama Cooperative Extension System, and the Department of Fisheries and Allied Aquacultures, developed multimedia materials to extend research findings to the general public, and included the TWP website (www.twp.auburn.edu), the State of Our Watershed Conference, Alexander City, and a video discussing landuse and landscape design in relation to water supply and quality.
5. The TWP Team met seven times between September 2007 and May 2008 to plan and prepare the proposal, and met twice between June 2008 and May 2009 for project planning and overall coordination.
6. The TWP Research Team met with the City of Auburn three times between October 2008 and April 2009 to coordinate AU utilization of Auburn City Water Usage Data. The Research Team also met two times during this period for project planning and coordination. Individual sub-project teams held additional meetings at various intervals during this time period.
7. The TWP Outreach Team met twice between October 2008 and April 2009 for website and video development. The Outreach Team met once in this period for project planning and coordination. Individual sub-project teams held additional meetings at various intervals during this time period.

8. The Project Director, Project Coordinator, sub-project 13 Primary Investigator and AUWRC administration staff met numerous times during this time period to plan and coordinate the 5th Annual State of Our Watershed Conference. The conference was held at the Central Alabama Community College in the City of Alexander City May 13-14, 2009. Conference presentations, articles and pictures have been posted on the TWP website. Conference proceedings will be published, and provided to the public. The conference Keynote, Senator Kim Benefield, Chairperson, Permanent Joint Legislative Committee on Water Policy and Management, will be provided the proceedings and additional documentation as a source of guidance in moving forward on statewide water policy. In addition, a discussion group, *talla-vision@ag.auburn.edu*, has been formed to keep stakeholders engaged in the dialog on watershed management in the Tallapoosa, and to broaden and expand the dialog to include others who live and work in the Basin.
9. TWP presentations were made at Alabama Water Resources Conference in Orange Beach, Al in September 2008, at the Applied Geography Conference in Wilmington, DE in October 2008, and at the Council of Educators for Landscape Architecture (CELA) Conference in Tucson, AZ in January 2009.
11. In addition to TWP funding, research and outreach specialists accrued $449,202 for TWP related projects, with total proposed funding of $621,728 for related projects.
12. One refereed journal article was published and one is in review. Three abstracts were published in conference proceedings, and presentations were given at five conferences and professional meetings.
13. In Year 2 the budget will be divided among TWP teams, with about 65% allocated for Research, and 34% allocated for Outreach and Administration.

Project Background

Project Personnel

Project Director

Dr. Bill Deutsch

Project Primary Investigator, Department of Fisheries and Allied Aquacultures

Primary- Investigators

Dr. Puneet Srivastava

Research Team Leader, Department of Biosystems Engineering

Dr. Latif Kalin

Research Team, School of Forestry and Wildlife Sciences

Dr. Yaoqi Zhang

Research Team, School of Forestry and Wildlife Sciences

Charlene LeBleu

Outreach Team Co-Leader, School of Architecture

Katie Lamar Jackson

Outreach Team Co-Leader, Agricultural Communications and Marketing

Co- Investigators

Dr. Luke Marzen

Research Team, Department of Geography

Dr. Alan Wilson

Research Team, Department of Fisheries and Allied Aquacultures

Dr. Jim Stoeckel

Research Team, Department of Fisheries and Allied Aquacultures

Dr. Denis Nadolnyak

Research Team, Department of Agricultural Economics and Rural Sociology

Dr. Eve Brantley

Outreach Team, Department of Agronomy

Tommy Futral

Outreach Team, Alabama Cooperative Extension System

Eric Reutebuch

Research Team and Outreach Team, Department of Fisheries and Allied Aquacultures

Wendy Seesock

Research Team, Department of Fisheries and Allied Aquacultures

Jayme Oates

Project Coordinator, Department of Fisheries and Allied Aquacultures

Graduate Students

Michael Chislock,

MS Fisheries

Suman Majumdar

Ph. D. School of Forestry

Mac Martin

M.P. Landscape Architecture Community Planning

Tyler Kreps

MS Agricultural Economics

Suresh Sharma

PhD Biosystems Engineering

Rewati Niraula

MS School of Forestry

Erin Swindell

MP Landscape Architecture Community Planning

Kelly Lee

MP Landscape Architecture

Mathew Biesecker

MP Landscape Architecture

Project Description

TWP is addressing water quality, quantity and policy issues in the Tallapoosa River Basin of the Alabama Piedmont Physiographic Province with a trans-disciplinary team of research and outreach specialists that represent eight departments of five schools and colleges of Auburn University. A thorough understanding of watershed conditions and trends, including scientific and policy components, will be used to develop practical alternatives for achieving sustainable water management and watershed protection.

We believe that improvements in water use and management in the Tallapoosa Basin are best accomplished by focusing biophysical and socioeconomic research on a watershed scale (hydrologic unit 11 or 12; approx. 100-200 sq. miles) while addressing water policy and public attitudes and behaviors about water on a larger-scale. This project will, therefore, conduct research on two watersheds of the Lower Tallapoosa River Sub-Basin, with outreach activities and policy recommendations extending to other watersheds basin-wide. The research watersheds are each of the approximate scale of the companion project of the Water Resources Center in the Wolf Bay Watershed of the Alabama Coastal Plain.

Goal and Objectives

The Project Goal is to develop alternative water use and watershed management strategies that optimize economic and ecological factors, are accepted by local governments and the public, and are transferable throughout the Tallapoosa Basin and beyond. Objectives are five-fold: 1) to compile existing biophysical and socioeconomic data for the Saugahatchee and Chewacla Creek watersheds, assess trends and current conditions, and identify science and policy gaps, 2) to strategically collect biophysical and socioeconomic data in the Saugahatchee and Chewacla watersheds for improved calibration of watershed and other models, 3) to develop alternative scenarios of land use, landscape design, socioeconomics, and policy; conduct a comprehensive analysis of hydrologic, ecologic, and economic implications of these alternatives; and identify alternative scenarios that optimize watershed management, 4) to disseminate the current and alternative scenarios via an outreach program in ways that municipal officials, policy makers, extension agents and the general public can understand, adapt and practically apply, and 5) to regularly produce scholarly publications and other forms of outreach that convey research results to professional and general audiences, and to expand the project by securing additional funding through national and regional sources.

Following is an illustration of the current projects, plans, initiatives, programs and agencies working towards conservation and protection of our water supplies and water rights. The TWP anticipates bringing these entities together in a concerted effort to protect the Tallapoosa River Basin for generations to come.

Sub-Project Titles

1. Assess Historical Trends to Summarize Current Watershed Conditions and Identify Data Gaps for Future Scenario Analyses

2. Compile Land Use/Land Cover (LULC), Community Planning, and Landscape Design Data

3. Develop Alternative Scenarios of LULC, Community Planning, Landscape Design, and Socioeconomics and Policy

4. Demand and Consumption: Prices, Policies and Information

5. Sediment-phosphorus catchment study

6. Interactions Between Variable Phosphorous Pulses and Herbivorous: Implications for Toxic Blooms in a Reservoir System

7. Develop Outreach Package for Municipal Water Management

8. Develop the Outreach Package for Wastewater Management

9. Develop an Outreach Package for Classrooms

10. Develop an Outreach Package for Water Festivals

11. Alabama's Lawns and Yards Program

12. Water Conservation Programs

13. State of Our Watershed Conference

14. Public Relations and Multi Media

YEAR 1

SUB-PROJECT REPORTS
APRIL 2009

The following Sub-Project Reports were authored by each sub-project team and submitted to the Project Coordinator in April 2009.

Sub-Project 1 Hydrology

Department/School: Biosystems Engineering/School of Forestry and Wildlife Sciences

PI: Dr. Puneet Srivastava

Co-PI(s): Dr. Latif Kalin

Other Investigators: N/A

I. Accomplishments from June 1, 2008 to February 28, 2009:

Two graduate students (names listed below) started in August 2008. During the first year their schedule was loaded with course work. They took 3 courses in each semester leaving little time to do research. Modeling was new to both. They are both taking a modeling course this semester to master in this field. Below is what they have accomplished in their research this year.

a. Activities and milestones:

Literature Review: The following reports specifically related to Tallapoosa basin and Saugahatchee watersheds were reviewed:

- A calibrated QUAL2E Model of Pepperell branch and Saugahatchee Creek prepared by USEPA, April 1991.
- Surface water Quality Screening Assessment of the Tallapoosa River Basin-2000. A report prepared by Aquatic Assessment Unit, ADEM, Sep 2002.
- Nutrient and Sediment Loading in Saugahatchee Creek and the Impacts on Aquatic Biota prepared by Department of Fisheries and Allied Aquaculture, Auburn University, Feb 2004.
- Influence of landscape characteristics on Nutrient and Sediment Loading in Piedmont streams in Alabama.
- Saugahatchee Watershed Management Plan prepared by Swamp Stakeholder Group and Auburn University, Oct 2005.
- Tallapoosa Watershed Project, Annual Report prepared by Department of Fisheries and Allied Aquaculture, Auburn University, 2005.
- Saugahatchee Watershed Management Plan, Annual Report prepared by Department of Fisheries and Allied Aquaculture, Auburn University, 2007.
- Final Saugahatchee Creek Watershed, Total Maximum Daily Load (TMDL)- Nutrients & OE/DO, ADEM, water Quality Branch, April 2008.

Data Collection: Data was collected from various sources. Below is a summary of collected data:

- Digital Elevation Model (DEM) –downloaded from USGS website
- Land use data : 3-yrs Land cover data, downloaded from albamaview.org
- Stream Network: downloaded from Alabamaview.org
- Soil data(STATSGO as well as SSURGO data) downloaded from NRCS soil data mart
- Rainfall and Temperature data: downloaded from NOAA
- Flow (discharge) data: downloaded from USGS website.

Data Processing: All the land use, soil and DEM were downloaded for Tallapoosa, Lee, Chambers and Macon County and projected to UTM NAD 83 16N.

- Watershed delineation was carried out with 10 m resolution DEM.
- SSURGO soil data - All the soil properties of the high resolution soil data is generated from available soil report (soil db_US_2002). There are 31 different soil types.
- STATSGO soil data: Included five different soil types.
- Land use data - The NLCD 2001 data is used.
- Rainfall data - Daily data were collected from 1997 to 2008 and three input files were prepared for precipitation input for the following three stations: Auburn 2 (coop ID: 010425), Opelika (coop ID: 016129), Walnut Hill (coop ID: 018653).
- Flow data - The available flow data were collected and tabulated for Loachapoka (USGS gage station # 02418230) with continuous flow data from 9/11/1999 to present, and Lovelady Bridge which has sporadic data.
- Point source data - Monthly data were available from 2000 to 2002 on random days. The concentration of different nutrient and flow is organized and monthly data was prepared in a SWAT specific format for the following three sources:
    - *Auburn WWTP*: Flow data observed for 3 years which also includes, total P, soluble reactive P, total N, organic N, inorganic N, TSS and DO.
    - *Opelika WWTP*: TN, TSS, TP, SRP, DO, organic N, inorganic N, and flow.
    - *West Point Stevens*: TSS, TP, SRP, DO, organic N, inorganic N, and flow.

Model Setup: model setup involved following steps:

- Watershed delineation
- Incorporation of Point sources and different sampling stations in Saugahatchee and Pepperell branch (37 station)
- Creation of 93 subbasins
- Clipping of land use, soil and slope map
- Creation of 1547 HRU's
- Incorporation of rainfall and temperature data

We delineated the Saugahatchee Creek watershed by taking the outlet near the Yates Reservoir (Fig 1). Total 93 sub basins were generated which are crucial for the study. All the sampling stations on the Saugahatchee creek and Pepperell branch, which were previously used by Alabama Water Watch and ADEM for nutrient and flow measurement, were considered as outlets during watershed delineation. Fig 1 also shows the USGS gage station (Loachapoka) for the flow measurement. Three point sources, Auburn waste water treatment plant, West point Stevens, and Opelika waste water treatment plant are also defined during watershed delineation.

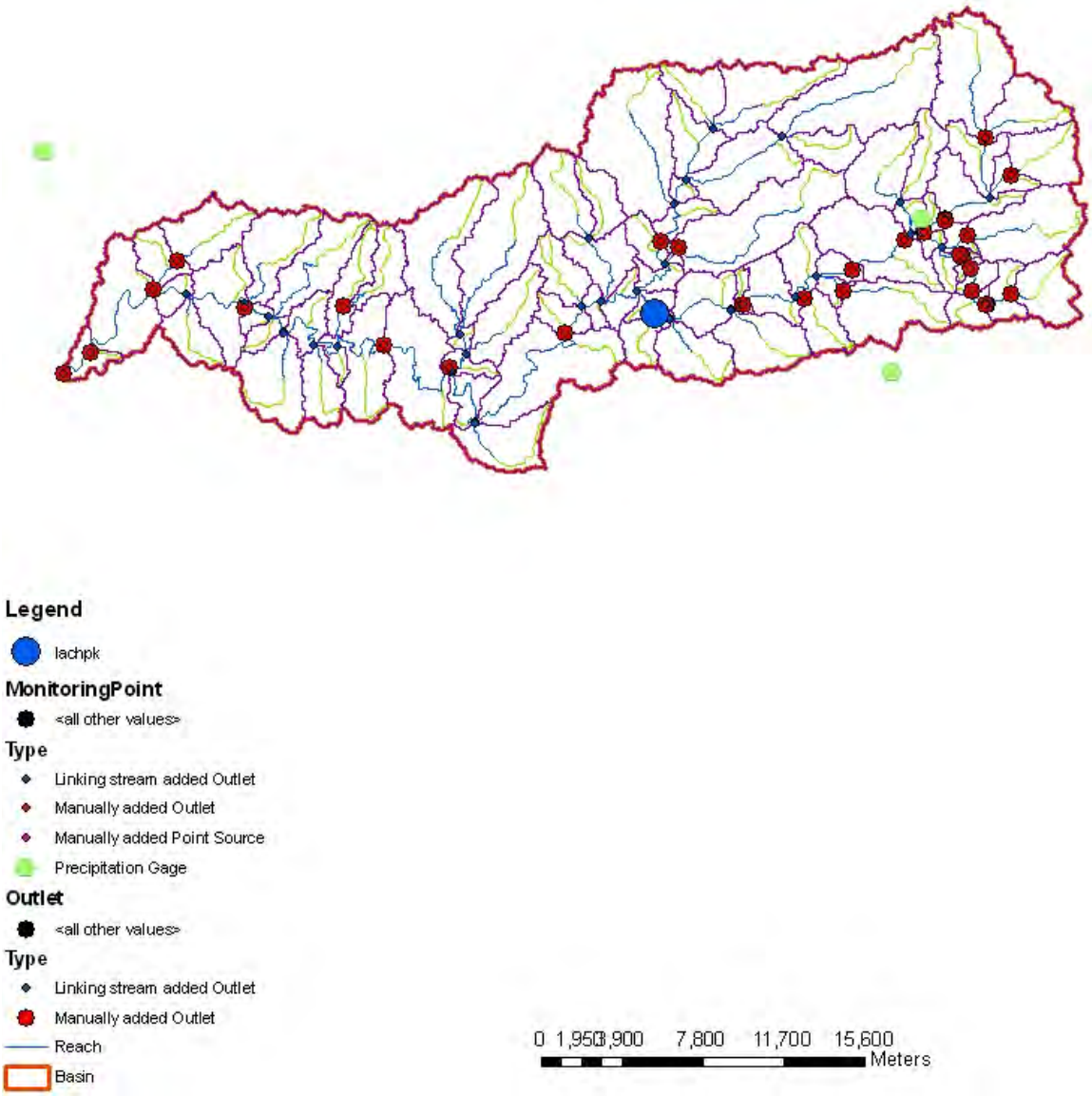


Figure 1. Saugahatchee Creek Watershed Model Setup.

Model Calibration: Model is currently being calibrated for the period 2000-2004. Later it will be validated for the period 2005-2008. The flow calibration should be accomplished first because the accuracy of sediment and water quality modeling is depended upon how accurately we calibrate the flow. For flow calibration, we first separated baseflow and direct runoff by using Baseflow filter program available in SWAT documentation. So far, the observed discharge in Loachapoka (USGS gage station which is the only outlet in the watershed where we have continuous flow data from November 1999 to present date) is used for the calibration of the model. We have been able to calibrate with good accuracy for the streamflow. Fig 2 compares monthly simulated flows with the observed flows.

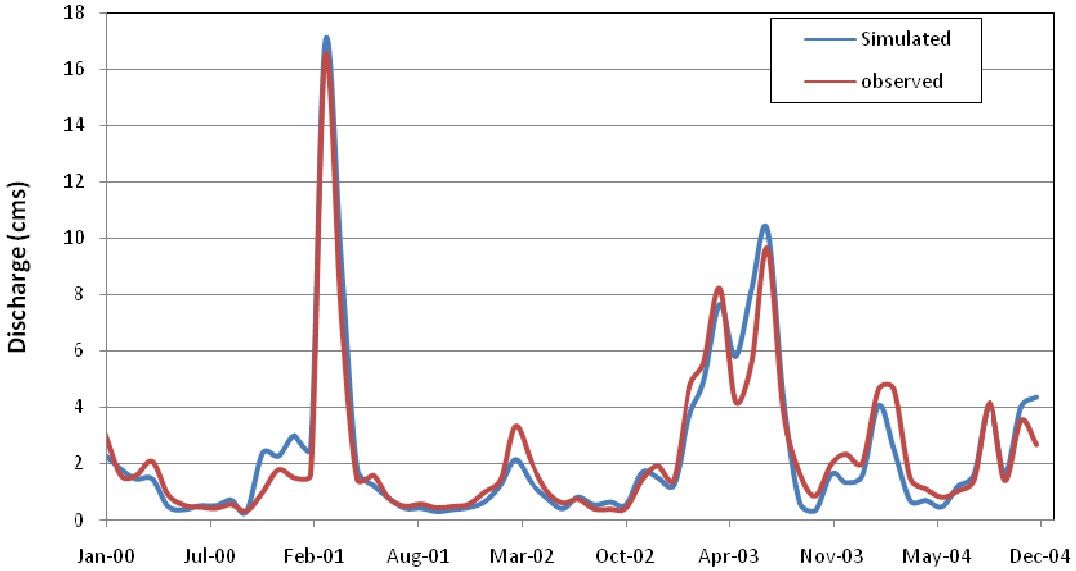


Fig 2. Comparison of SWAT simulated monthly flows with observed flows.

b. Graduate Students:

Suresh Sharma, PhD, Biosystems Engineering
Rewati Niraula, MS, School of Forestry and Wildlife Sciences

c. Conferences and Professional Meetings:

N/A

d. Publications:

N/A

e. Funds Leveraged from Other Sources:

N/A

f. Proposals Submitted and Planned to be Submitted: (Include Titles, funding Agency and Amount Requested.)

(1) Reducing Drought Risks in the Southeast USA: Quantification of Drought Information Value, Development of Drought Indices, and Communication of Drought Information (PI: P. Srivastava; Co-PIs: D. Nadolnyak, L. Kalin, N. Breuer, K. Ingram, R. Marcus, D. Stooksbury, and M. Chelliah). Funding Agency: NOAA-SARP. Requested Funding: $291,199. Period: August 2009 - July, 2011.

(2) A Comprehensive Assessment of Drought and Population Growth Induced Stress on Water Supply and Demand. Alabama Water Resources Research Institute (PI: L. Kalin; Co-PI: P. Srivastava). Funding Agency: Alabama Water Resources Research Institute. Requested Funding: $25,000. Period: March 1, 2009 – February 28, 2010.

g. Interdisciplinary work:

Since we are still in the process of setting up our model, we have not discussed interdisciplinary work with other groups. The collaboration so far has been through data exchange.

h. Impacts: (Describe impacts this sub-project have on Research, Teaching, and Outreach at Auburn University.)

We see a number of impacts this sub-project will have on Research, Teaching, and Outreach at Auburn University.

(1) The project initiated a closer collaboration between Srivastava in Biosystems Engineering and Kalin in School of Forestry and Wildlife Sciences. This has lead to development of a new watershed modeling course (BSEN 7970: Non-point Source Pollution Modeling). Such a course has never been taught at Auburn University. This newly developed course will also be taught to senior-level undergraduate students enrolled in the proposed Ecological Engineering program in the Biosystems Engineering Department. Ten graduate students are currently being trained through this course.

(2) A new course utilizing the material developed by USEPA Watershed Academy will be used to develop a new distance education course. This course will be available to students at AU campus as well as to extension professionals, and local, state, and federal employees. The course is currently under development for approval from University Curriculum Committee. Dr. Srivastava and Dr. Fowler will co-teach this course. We anticipate hundreds of professional and students to receive training through this course.

(3) The project has lead to closer ties among collaborators and has lead to two proposals. We plan to submit many more proposals this year.

II. Plans and Ideas for Year Two of the Project (June 1, 2009 thru May 31, 2010).

a. Description:

We still need to calibrate the flow at other points near the outlet of whole watershed, especially at Lovelady Bridge where we have some sporadic flow data available. The SWAT model will be then calibrated as well as validated for sediment and water quality parameters. Simultaneously, we will set up and run the GWLF model to simulate the runoff, sediments and nutrient loading. The results from two different models will then be utilized to test the hypothesis that the identification of hot spots is independent of the complexity of the model. Likewise, the application of these two models in Saugahatchee watershed will make a testing of hypothesis that relative change in pollution is independent of model calibration. Moreover, these two models will be used to analyze the different alternative scenarios for reducing the pollution level in the Saugahatchee Creek and Pepperell Branch. After this, we will be able to furnish the results as required by the project and to answer our research questions.

We also plan to expand the scope of this project by adding new hypotheses.

Sub-Project 2 Land Use Land Cover and Sub-Project 3 Historical Trends

Department: Geography

PI: Luke Marzen

Co-PI(s): Charlene Lebleu, Denis Nadolnyak

Other Investigators: Puneet Srivastava, Latif Kalin, Chris Anderson, and others all will be using these datasets

I. Accomplishments from June 1, 2008 to February 28, 2009:

a. Activities and milestones:

-Landsat scale land use/land cover (LULC) datasets have been produced for the Saugahatchee, Creek Watershed for 1991, 2001, and 2007/8.

-Datasets are in the process of being created for Uphapee, Chewacla, Upper Halawakee, and the Chattahoochee River watersheds as these are the drainage systems encompassing all of Auburn and Opelika and a substantial portion of Lee County.

-Collected and processed over $100,000 worth of imagery from City of Auburn that will be used to better assess urban areas

-High resolution datasets (6 inch CIR aerial imagery)

-High resolution LiDAR datasets (sub-meter) for topography

-LULC at the parcel level collected for City of Auburn

-Leveraged grant funds from USGS for study of drought in Tallapoosa Basin

-In the process of ordering high resolution 2.5m SPOT data (on the $6k from Charlene's grant) for the urban areas of the Saugahatchee Watershed

-investigating scenario models for future change

-attended and presented a poster on Drought Monitoring at the State of Our Watershed Conference in Alexander City

-attended and presented preliminary analysis of LULC and affects on nutrient loadings at AWRRI conference and the Association of American Geographers Conference (with E. Reutebuch, W. Deutsch, M. Martin, and T. Kreps)

-attended outreach sessions for alternative forms of development, rainwater catchment, and greywater use organized by SWaMP

-met several times with research group to plan next years agenda based on this year's training of new students

-Charlene has been focused on the alternative developments and specifically on monitoring the current Conservation Development going on in Auburn. We have met several times to brainstorm but our collaboration will be more involved in years 2 and especially 3 when the models will allow us to test the affects of various methods of development.

-Denis has been working hard to bring the assessment of water supply and use into the equation but I get the sense that the data are sensitive.

b. Graduate Students:

-Mac Martin, M.P. Community Planning

-Tyler Kreps, M.S. Agricultural Economics

c. Conferences and Professional Meetings related to Data and Methodologies used in TWP

*indicates student authors

*Kreps, T., L.Marzen. 2008. Estimating Surface Moisture with Remote Sensing as an Indicator of Drought in the Southeast US. Alabama Water Resources Conference. Orange Beach, AL, September.

Reutebuch, E., L. Marzen, and *M. Martin. 2008. Impact of Urbanization on Water Quality in the Saugahatchee Watershed. Alabama Water Resources Conference. Orange Beach, AL, September.

*Martin, M., L. Marzen, D. Hite, W. Byrd. 2008. Waterfront Land Use Competition in Southern Mobile County, Alabama: A Case for a GIS Baseline Inventory. Alabama-Mississippi Bays and Bayous Symposium, Biloxi MS, October.

*Kreps, T., L.Marzen. 2008. Estimating Regional Scale Surface Moisture in the Southeast with MODIS Data. Applied Geography Conference. Wilmington, DE. October. 2008.

Marzen, L.M. E. Reutebuch, W. Deutsch. *M. Martin. Anthropogenic Stresses on Water Quality in a Rapidly Urbanizing Alabama Watershed and the Case for Best Management Practices. AAG, Las Vegas, March 2009.

d. Publications related to Data and Methodologies used in TWP:

*Bhattarai, Gandhi, Puneet Srivastava, Luke Marzen, Diane Hite, and Upton Hatch. 2008. Assessment of Economic and Water Quality Impacts of Land Use Change Using a Simple Bioeconomic Model. Environmental Management 42(1):122-131.

*Styers, D.M., A.H. Chappelka, L.J. Marzen and G.L. Somers. (in review). Developing A Land-Cover Classification To Select Indicators Of Forest Ecosystem Health In A Rapidly Urbanizing Landscape. *Styers, D.M., A.H. Chappelka, L.J. Marzen and G.L. Somers. *Landscape and Urban Planning.*

e. Funds Leveraged from Other Sources:

Title: StateView Research Program Development and Operations for the State of Alabama
Source: USGS
PI: L.J. Marzen and J.M. Wersinger
Date submitted: 6/08
Grant period: 7/1/08-6/30/09
Amount: $24,000
Status: Funded

Title: Estimating Regional and Local Scale Surface Moisture as an Indicator Of Drought And Crop Yield Using Thermal IR Remote Sensing
Source: AWRRI/USGS
PI: L.J. Marzen, D. Hite and W. Tadesse
Date submitted: 11/07
Grant period: 3/1/08-2/28/09
Amount: $45,894
Status: Funded

f. Proposals Submitted and Planned to be Submitted:

Title: Assessing Impacts And Vulnerabilities Of Surface Water in Streams And Reservoirs Of The Tallapoosa River Basin Due to Climate Variations, Droughts, and Global Climate Change
Source: AWRRI/USGS
PI: X. Fang and L. Marzen
Date submitted: Nov. 2008
Grant period: 3/01/09-2/28/10
Amount: $71,000
Status: Not Funded

Title: Assessing Vulnerabilities of Surface Water Supply in Streams And Reservoirs of the Tallapoosa River Basin Due to Climate Variability, Climate Change, and Human Activities
Source: USGS
PI: X. Fang, L. Marzen, K. Odum
Date submitted: February 2009
Grant period: 9/1/2009-8/31/2011
Amount: $158,234
Status: in review

g. Interdisciplinary work:

-Co-Investigators have been instructed that the Landsat scale Level 1 land use has been posted online at http://www.alabamaview.org/watershed_project.html
-I expect much more interaction in year 2 as year 1 seemed to encompass the training of students in modeling procedures.

h. Impacts: (Describe impacts this subproject have on Research, Teaching, and Outreach at Auburn University.)

The LULC sub-project in the scope of the overall project is a major component and will be a key input into the modeling process. I believe the modelers need to look at these datasets at the beginning of year 2 and provide feedback in terms of what they need for their models.

I will say it has been a nice resource to share the Saugahatchee experiences in this project within all my classes and I teach many students every year (up to 400 students/year). As this project develops we will continue to gather fieldwork photos and experiences that will lead to real-world examples that explain the importance of this project and the science behind our investigations.

II. Plans and Ideas for Year Two of the Project (June 1, 2009 thru May 31, 2010).

a. Description

Year 2 will be used to develop future projections of land use, population growth, socioeconomic changes, and alternative scenarios of development. My funds will be used to fund a student in the new M.S. program in Geography to develop a thesis revolved around the methods of forecasting urban growth and land use change. It will also fund a non-thesis student (at halftime) that is dedicated to providing GIS technical support to the group.

In addition we will be working closely with the modeling projects to provide data input for the models including land use, soils, topography, and other geospatial datasets.

Sub-Project 4 Scenarios and Planning Toolbox

A. Scenarios

Department: Landscape Architecture

PI: Charlene LeBleu

Co-PI(s): Luke Marzen & Nadolnyak

Other Investigators:

I. Accomplishments from June 1, 2008 to February 28, 2009:

a. Activities and milestones:

LeBleu

- 8/15 – 12/15—Visual Survey of Land USE (LeBleu & Biesecker)
- 1/20—Display of student work to date at ADEM Non-Point Source Conference (LeBleu)
- 2/09—Case Studies of Development (LID) (LeBleu & Biesecker)

Marzen

- 10/30—Purchase GIS Data (Marzen); more data still to be purchased

Nadolnyak

- Surveying the literature on water economics and, specifically, on water consumption patterns and demand management in arid areas of the country.
- Collection of local precipitation and other weather data.
- Collection of Auburn water consumption and pricing data (with little success)
- Looking for a graduate student to work on survey administration and analysis.

b. Graduate Students: (Name, degree, Department)
(List student activities in order by date. Also, denote any change in graduate student status from budget.)

LeBleu
Matthew Biesecker—Landscape Architecture
8/15 – 12/15—Visual Survey of Land USE (LeBleu & Biesecker)
2/09—Case Studies of Development (LID) (LeBleu & Biesecker)

c. Conferences and Professional Meetings:
(List conferences and professional attended and presentations given related to project.)

LeBleu

- 1/14— „Bridging the Gap Between Science and Design: A Transdiciplinary Approach." 2009 CELA Conference (Council of Educators for Landscape Architecture), Tucson, AZ. Peer review. (LeBleu)

d. Publications: (List the titles of all publications and manuscripts in preparation relative to TWP with projected publication dates.)

LeBleu

- 1/14— „Bridging the Gap Between Science and Design: A Transdiciplinary Approach." 2009 CELA Conference (Council of Educators for Landscape Architecture), Tucson, AZ. Peer review. Conference Proceedings.(LeBleu)

e. Funds Leveraged from Other Sources: (List grant, project name, P.I.'s and amounts. Please list funds that are relative to TWP only.)

- CADC Seed Grant, Charlene LeBleu, PI. Travel—Tallapoosa Watershed. $237.00.

f. Proposals Submitted and Planned to be Submitted: (Include Titles, funding Agency and Amount Requested.)

g. Interdisciplinary work:
(Describe integration of your sub-project with other sub-projects.)
LeBleu

- Assisted SWAMP with restoration of Saugahatchee Creek tributary restoration.
- Planning Toolbox #12—Visual survey qualified sites for video footage.

h. Impacts: (Describe impacts this subproject has on Research, Teaching, and Outreach at Auburn University.)

LeBleu

- Outreach—Display of student work to date at ADEM Non-Point Source Conference.
- Teaching—Fall 2008 LAND 7330: Landscape Ecology class (12 grad students) received hands on instruction in stream restoration techniques and planting of vegetative buffer.

Marzen

- Procurement of data and Landsat scale land cover for 1991, 2001 and 2008. Data can be used by other sub-projects and other grants. Hot spots for erosion will be identified.

II. Plans and Ideas for Year Two of the Project (June 1, 2009 thru May 31, 2010).

a. Description: (Follow Proposal Hypotheses. Also, feel free to add any new ideas beyond the original proposal.)

- Alternative scenarios will be developed based on future LULC projections and collaboration with city and county planning agencies. Will test several models in YR 2.

B. Toolbox Development

Sub-Project: Community Planning Toolbox

Department: Landscape Architecture

PI: Charlene LeBleu

Co-PI(s):

Other Investigators:

I. Accomplishments from June 1, 2008 to February 28, 2009:

a. Activities and milestones:
(List overall project activities and Milestones in order, by date.)

- June 2008 – November 2008: Investigation of Alexander City, AL development policy with emphasis on industrial park development.

b. Graduate Students: (Name, degree, Department)
(List student activities in order by date. Also, denote any change in graduate student status from budget.)

- Erin Swindell (In-Kind Match)—See below @ Funds Leveraged
- Kelly Lee, Landscape Architecture (one semester)

c. Conferences and Professional Meetings:
(List conferences and professional attended and presentations given related to project.)

- 1/14— „Bridging the Gap Between Science and Design: A Transdiciplinary Approach." 2009 CELA Conference (Council of Educators for Landscape Architecture), Tucson, AZ. Peer review.

d. Publications: (List the titles of all publications and manuscripts in preparation relative to TWP with projected publication dates.)

- 1/14— „Bridging the Gap Between Science and Design: A Transdiciplinary Approach." 2009 CELA Conference (Council of Educators for Landscape Architecture), Tucson, AZ. Peer review. Conference proceedings.

e. Funds Leveraged from Other Sources: (List grant, project name, P.I.'s and amounts. Please list funds that are relative to TWP only.)

- CADC Seed Grant, Charlene LeBleu, PI. Graduate Student (Erin Swindell, Distance Learning, Community Planning Graduate Student) as in-kind match ($12,000). Synthesis: *"Economic Development in Alexander City, Alabama."*

f. Proposals Submitted and Planned to be Submitted: (Include Titles, funding Agency and Amount Requested.)

- 2009 – 2010 AU VPO Outreach Grant. "Building Green Communities: A Hands-on Educational Approach--Green for Life!" Location: Pilot program at Boykin Community, Auburn, AL

g. Interdisciplinary work:
(Describe integration of your sub-project with other sub-projects.)

h. Impacts: (Describe impacts this sub-project have on Research, Teaching, and Outreach at Auburn University.)

II. Plans and Ideas for Year Two of the Project (June 1, 2009 thru May 31, 2010).

a. Description: (Follow Proposal Hypotheses. Also, feel free to add any new ideas beyond the original proposal.)

Products in development:

a) a community planning template/ toolbox for low impact development (LID) (sum of b,c & d)

b) LID Architecture/ Landscape Architecture Design Standards that are appropriate for the Saugahatchee and Chewacla Watersheds (currently in development Planning Toolbox (#12); will continue into YR 2))

c) Materials list/ and sources for LID strategies (Planning Toolbox (#12); YR 2)

d) Format templates/ toolboxes/ design standards used by planners and designers (currently in development; will continue into YR 2).

C. Toolbox Application

Department: Landscape Architecture

PI: Charlene LeBleu

Co-PI(s):

Other Investigators:

- Anna Souza, Master of Landscape Architecture. Videographer.

I. Accomplishments from June 1, 2008 to February 28, 2009:

a. Activities and milestones:
(List overall project activities and Milestones in order, by date.)

- 10/09 – 12/09—Opelika, AL footage collected (Biesecker).
- 2/09—hire Anna Souza to oversee video production; Alexander City footage collected (using Erin Swindell's (see Community Planning Toolbox) recommendations); Lochapoka, AL footage collected.
- 3/30/09—Draft of video narrative and speaking parts.

b. Graduate Students: (Name, degree, Department)
(List student activities in order by date. Also, denote any change in graduate student status from budget.)

- Matthew Biesecker—Assisted in collecting video footage before Anna Souza was hired.

c. Conferences and Professional Meetings:
(List conferences and professional attended and presentations given related to project.)

d. Publications: (List the titles of all publications and manuscripts in preparation relative to TWP with projected publication dates.)

e. Funds Leveraged from Other Sources: (List grant, project name, P.I.'s and amounts. Please list funds that are relative to TWP only.)

f. Proposals Submitted and Planned to be Submitted: (Include Titles, funding Agency and Amount Requested.)

- 2009 – 2010 AU VPO Outreach Grant. "Building Green Communities: A Hands-on Educational Approach--Green for Life!" Location: Pilot program at Boykin Community, Auburn, AL

g. Interdisciplinary work:
(Describe integration of your sub-project with other sub-projects.)

h. Impacts: (Describe impacts this sub-project have on Research, Teaching, and Outreach at Auburn University.)

II. Plans and Ideas for Year Two of the Project (June 1, 2009 thru May 31, 2010).

a. Description: (Follow Proposal Hypotheses. Also, feel free to add any new ideas beyond the original proposal.)

- It was not my original intention to put together a video but it evolved as an exciting idea. I expect to produce a good draft of a video, but it may need some additional editing. I don't anticipate having to ask for more money but would like to shift funds as needed to accommodate this.
- Products in development:
- a) a community planning template/ toolbox for low impact development (LID) (sum of b,c & d)
- b) LID Architecture/ Landscape Architecture Design Standards that are appropriate for the Saugahatchee and Chewacla Watersheds (currently in development Planning Toolbox (#12); will continue into YR 2))
- c) Materials list/ and sources for LID strategies (Planning Toolbox (#12); YR 2)
- d) Format templates/ toolboxes/ design standards used by planners and designers (currently in development; will continue into YR 2).

Sub-Project 5 Socio-Econ

Title: Water Demand and Consumption: Prices, Policies and Information
Leader: Yaoqi Zhang
By 4/1/2009

1. Grad student acquisition and progress

Currently Suman Majumdar is mainly working on the project. Suman's Ph.D. study has made good progress. His Ph. D. proposal "Demand Side Analysis of Quantity and Quality of Residential Water Use in Alabama" was presented in March, 2009.

Bin Zheng is getting involved with the project as well. In the future, I might invite one more master degree student to get involved.

2. Sub-project status

1) Meeting with Auburn City Water Boards:

After our persistent and time consuming arrangement for several months, eventually we had a meeting with Auburn City Water Board. We provided a detail list of data request at the meeting and discussed the availability. Although we were promised, so far we have not received the data yet. We will continue on requesting.

2) Survey Questionnaire Design

One important part of the project is to conduct a household survey in Alabama. Suman has been working on that for several months, and a draft of the survey is ready for discussion among his Ph.D. committee members (Dr. Diane Hite and Dr. Henry Kinnucan) shortly.

3) Papers

Majumdar, S., Zhang,Y. 2008. Providing Water Quality Services: A New Opportunity for Forest Landowners. Alabama's Treasured Forests 27(3):14-15.

Majumdar, S., Zhang,Y. Economic Value of Recreational Fishing in Alabama: 1996 versus 2006. (In Review)

4) Meeting presentation

Majumdar, S., Zhang,Y. Is Demand For Outdoor Activities Declining? Evidence from the Southeast. Presented at Southern Forest Economics Meeting, 9-11, March, 2009, Chapel Hill, NC.

5) Grant proposal efforts

We are preparing some proposals and hopefully are able to submit some in near future

Sub-Project 6 Algae Study

Department: Fisheries

PI: Dr. Alan Wilson

Co-PI(s): Dr. James Stoeckel

Other Investigators: Michael Chislock (M.Sc. Fisheries), Kristin Adamson (B.S Wildlife)

I. Accomplishments from June 1, 2008 to February 28, 2009:

a. Activities and milestones:

Water chemistry, zooplankton, and phytoplankton sampling – September 15, 2008; September 24, 2008; October 17, 2008; November 9, 2008; March 10, 2009.

Field enclosure experiments – December 13–December 18, 2008; March 18 – March 24, 2009 (See Appendix for a brief description of experimental design, key results, and photos).

b. Graduate Students: (Name, degree, Department)

Michael Chislock, M.Sc., Fisheries, started July 2008

c. Conferences and Professional Meetings:

none related to TWP project

d. Publications:

none related to TWP project

e. Funds Leveraged from Other Sources:

none related to TWP project

f. Proposals Submitted and Planned to be Submitted:

Michael Chislock (PI), Genetic and Phenotypic Responses of Zooplankton to Harmful Algal Blooms: Grazer-Algal Interactions in a Changing Landscape, National Science Foundation Graduate Research Fellowship Program, $110,000, three years (Submitted)
Michael Chislock (PI), Biomanipulation of Grazer Communities to Control Harmful Algal Blooms: Experiments with Fish, Snails, and Filamentous Cyanobacteria, Graduate Research Award (Auburn University), $1,000, one year (Planned submission – April 3, 2009)

Michael Chislock (PI), Effects of Ultraviolet-B Radiation and Fish Predation on the Ecology of Zooplankton Dormant Egg Pigmentation, Sigma Xi Grant-in-Aid of Research, $1,000, one year (Awarded)

g. Interdisciplinary work:

We will use our observations of variability in nutrient concentrations at study sites in Yates Reservoir and Saugahatchee Creek, in conjunction with data generated through the hydrology and water quality

monitoring studies of other groups, to guide our nutrient additions in future field experiments. Our research efforts have already been aided by the wealth of historic and current data collected by several researchers working on related sub-projects. As we gain a better understanding of other sub-projects through additional team meetings, we will continue to devise novel field experiments which complement the work of the entire group. In addition, we will continue to collect and provide any requested data that will aid in our ultimate goal of sustainable watershed management in the Tallapoosa Basin.

h. Impacts:

Michael recently submitted a proposal to the National Science Foundation Graduate Research Fellowship Program based on his work on the Tallapoosa Watershed Project. He plans to integrate research and education by teaching high school and middle school students the effects of water pollution on algal communities as part of the Alabama Water Watch (AWW) Program's educational outreach activities. As many members of other sub-projects have a number of strong partnerships in the Tallapoosa Basin, Michael plans to take advantage of these opportunities as he continues to learn more about the watershed. Furthermore, Michael plans to use his involvement in AWW's educational outreach programs to identify an enthusiastic and highly-motivated high school student to assist him with his research. Not only will this provide an invaluable mentoring experience for Michael, but it will also aid in the recruitment of high quality students into the ecology program at Auburn University. Furthermore, the Tallapoosa provides an ideal setting to introduce undergraduate students at Auburn to field methods in limnology. The PI and Michael plan to take advantage of the opportunities available on the Tallapoosa to teach students the principles of experimental design, data analysis, and aquatic ecology during the PI's spring limnology course. Finally, we plan to publish future experimental results in scientific journals and to present results at regional, national, and international conferences.

II. Plans and Ideas for Year Two of the Project (June 1, 2009 thru May 31, 2010).

a. Description:

Observational study
We will collect biweekly to monthly water samples at several sites near the Saugahatchee embayment during year two. The primary focus of this effort will be to document natural variability in nutrient concentrations at each site – before and after rain events. During each sampling period, surface temperature, dissolved oxygen, pH, and conductivity measurements will be made using a Hydrolab multisonde. Whole-water samples will be collected from the photic zone, stored on ice, and returned to the lab. At the lab, whole water samples will be analyzed for chlorophyll, algal toxins, total phosphorus, and total nitrogen. Phytoplankton and zooplankton in each sample will be identified and enumerated. The observed variability in nutrient conditions at the study site will help guide our nutrient additions in the field experiments described below.

Field experiment
Several times during the year, we will conduct week-long experiments to determine the influence of phosphorus additions, sediment pulses, and the presence of grazers on algal abundance and community structure. Simultaneous experiments will be conducted in Saugahatchee Creek and the Tallapoosa River (Yates Lake). Four experiments will be conducted in early spring (February to April) and in late summer (August to October). During each season, two experiments will be conducted after a rain event and two experiments will be initiated at least two weeks after any precipitation in the

watershed. We will use this experimental design to take advantage of ambient nutrient and sediment pulses produced from rain runoff. We will use 44-gallon garbage cans as enclosures and will fill them with water from the experimental site after being filtered through 75 um sieves to remove large grazers. The experimental design will be a 2 (phosphorus addition: ambient; 200 ppb P) × 2 (grazers: none, 2× ambient) factorial design, which will allow us to test the importance of phosphorus, grazers, and the interaction between these two factors on algal community structure across both primary study sites. Each treatment combination will be replicated 4 times. We will collect physical, chemical, and biological samples at the beginning and end of each experiment, using methods similar to those used in our weekly sampling scheme.

Sub-Project 7 Catchment Study

Department: Forestry

PI: Chris Anderson

Co-PI(s): Eric Reutebuch, Wendy Seesock

Other Investigators:

I. Accomplishments from June 1, 2008 to February 28, 2009:

a. Activities and milestones:

Activity 1.1.4 Reviewed and compiled pertinent past reports related to physical, chemical and biological conditions associated with the Saugahatchee Creek. These reports were posted on the TWP web to be available as a database for future modeling efforts.

Activity 2.1.1 During the first several months of the study, we conducted an extensive field review of prospective tributary study creeks throughout Saugahtchee Creek watershed. This involved extensive review time and coordination with property owners. Through the end of February, a total 10 creeks influenced by a range of urban land uses were selected for the study. At each of these sites, water level recorders were installed and we have begun a sampling protocol to collect water samples and measure flow. In spring 2009, we will continue monitoring the streams and implement the other components of this study (i.e., channel morphology, sediment tracing).

b. Graduate Students: (Name, degree, Department)

I am currently recruiting a Masters level graduate student for Fall 2009. This student would take the lead on data collection related to Ecology Subproject #1 (Sediment-Phosphorus Catchment Study-Activity 2.1.1).

c. Conferences and Professional Meetings:

None.

d. Publications:

None.

e. Funds Leveraged from Other Sources:

None.

f. Proposals Submitted and Planned to be Submitted: (Include Titles, funding Agency and Amount Requested.)

As data comes in this year, I will begin to look for grant opportunities to expand my part of the TWP or (preferably) collaborate with other team members.

g. Interdisciplinary work:

We will begin to work with Luke Marzen to quantitatively characterize the catchments selected for the study. We are also communicating with the team members developing research models (Srivastava and Kalin) regarding our future results and their needs for water model calibration/validation.

h. Impacts: (Describe impacts this subproject have on Research, Teaching, and Outreach at Auburn University.)

The approach of using categorical stages of urban development is a relatively novel approach. If we can relate water quality and degradation processes to different stages of urban development, this has the potential to have a significant impact on related research, management, and outreach. Using a temporal approach, this research will reveal potential long-term impacts to streams and water quality associated with stages of urban development. Because most of the public sees construction of commercial and residential areas on a daily basis, relating water conditions to these various stages will improve the comprehension of our results to students and the general public.

I will be teaching an urban ecology class in Fall 2009. Because of the proximity and topic of this project, I will be able to use this project and the whole TWP as potential lecture material and as a field demonstration or laboratory.

II. Plans and Ideas for Year Two of the Project (June 1, 2009 thru May 31, 2010).

a. Description: (Follow Proposal Hypotheses. Also, feel free to add any new ideas beyond the original proposal.)

Activity 2.1.1 is well suited to be a Masters thesis and therefore I have requested funds for a graduate stipend in place of the funds originally budgeted for TES and undergraduate salary. This will result in a slightly higher budget than anticipated however there are other related research items that could be explored by a graduate student that justify the added cost.

In our meetings with Dan Ballard of the City of Auburn, he has volunteered extensive turbidity and water quality data that has been regularly collected throughout the Auburn area. The relation between turbidity and sediment load is often closely tied and once established, this data could expand our abilities to demonstrate the relations between land use and water quality. Other research interests that could be explored include examining the sediment/phosphorus dynamics of the Saugahtchee main stem especially related to delivery to embayment.

Sub-Project 8 Municipal Outreach

Department: Agronomy/ACES

PI: Eve Brantley

Co-PI(s):

Other Investigators:

I. Accomplishments from June 1, 2008 to February 28, 2009:

Waiting for research results and recommendations for creation of an outreach package.

a. Activities and milestones:
(List overall project activities and Milestones in order, by date.)

b. Graduate Students: (Name, degree, Department)
(List student activities in order by date. Also, denote any change in graduate student status from budget.)

c. Conferences and Professional Meetings:
(List conferences and professional attended and presentations given related to project.)

d. Publications: (List the titles of all publications and manuscripts in preparation relative to TWP with projected publication dates.)

e. Funds Leveraged from Other Sources: (List grant, project name, P.I.'s and amounts. Please list funds that are relative to TWP only.)

f. Proposals Submitted and Planned to be Submitted: (Include Titles, funding Agency and Amount Requested.)

g. Interdisciplinary work:
(Describe integration of your sub-project with other sub-projects.)

h. Impacts: (Describe impacts this subproject have on Research, Teaching, and Outreach at Auburn University.)

II. Plans and Ideas for Year Two of the Project (June 1, 2009 thru May 31, 2010).

a. Description: (Follow Proposal Hypotheses. Also, feel free to add any new ideas beyond the original proposal.)

Sub-project collaborators will integrate outreach materials and messages with research results.

Sub-Project 9 Waste Water Outreach

Department: Agronomy/ACES

PI: Eve Brantley

Co-PI(s):

Other Investigators:

I. Accomplishments from June 1, 2008 to February 28, 2009:

Waiting for research results and recommendations for creation of an outreach package.

a. Activities and milestones:
(List overall project activities and Milestones in order, by date.)

b. Graduate Students: (Name, degree, Department)
(List student activities in order by date. Also, denote any change in graduate student status from budget.)

c. Conferences and Professional Meetings:
(List conferences and professional attended and presentations given related to project.)

d. Publications: (List the titles of all publications and manuscripts in preparation relative to TWP with projected publication dates.)

e. Funds Leveraged from Other Sources: (List grant, project name, P.I.'s and amounts. Please list funds that are relative to TWP only.)

f. Proposals Submitted and Planned to be Submitted: (Include Titles, funding Agency and Amount Requested.)

g. Interdisciplinary work:
(Describe integration of your sub-project with other sub-projects.)

h. Impacts: (Describe impacts this subproject have on Research, Teaching, and Outreach at Auburn University.)

II. Plans and Ideas for Year Two of the Project (June 1, 2009 thru May 31, 2010).

a. Description: (Follow Proposal Hypotheses. Also, feel free to add any new ideas beyond the original proposal.)

Sub-project collaborators will integrate outreach materials and messages with research results.

Sub-Project 10 Education Outreach

Department: Agronomy/ACES

PI: Eve Brantley

Co-PI(s):

Other Investigators: Tommy Futral

I. Accomplishments from June 1, 2008 to February 28, 2009:
Waiting for research results and recommendations for creation of an outreach package.

a. Activities and milestones:
(List overall project activities and Milestones in order, by date.)

b. Graduate Students: (Name, degree, Department)
(List student activities in order by date. Also, denote any change in graduate student status from budget.)
N/ A

c. Conferences and Professional Meetings:
(List conferences and professional attended and presentations given related to project.)

d. Publications: (List the titles of all publications and manuscripts in preparation relative to TWP with projected publication dates.)

e. Funds Leveraged from Other Sources: (List grant, project name, P.I.'s and amounts. Please list funds that are relative to TWP only.)

f. Proposals Submitted and Planned to be Submitted: (Include Titles, funding Agency and Amount Requested.)

g. Interdisciplinary work:
(Describe integration of your sub-project with other sub-projects.)

h. Impacts: (Describe impacts this subproject have on Research, Teaching, and Outreach at Auburn University.)

II. Plans and Ideas for Year Two of the Project (June 1, 2009 thru May 31, 2010).

Sub-Project 11 State of Our Watershed Conference

Department: Fisheries

PI: Eric Reutebuch

Co-PI(s):

Other Investigators:

I. Accomplishments from June 1, 2008 to February 28, 2009:

a. Activities and milestones:
(List overall project activities and Milestones in order, by date.)

Water quality data collection for the Saugahatchee Watershed

Dissemination of water quality data to project PIs

Stream gage installation on five catchments in the Saugahatchee and Chewacla watersheds

Creation of the TWP project website at www.twp.auburn.edu

Compilation of a digital library of pertinent scientific studies of the Saugahatchee Watershed in the grey literature (see http://www.aces.edu/dept/fisheries/aww/twp/references/index.html)

Coordination of *4th Annual State of Our Watershed Conference – The Tallapoosa River Basin* (see https://fp.auburn.edu/twpOld/ExtSOWconf08.aspx for information)

Organization and planning for the 5th *Annual State of Our Watershed Conference – The Tallapoosa River Basin* (see http://blog.auburn.edu/twp/?p=36 for agenda, announcement, registration and other details). This year's conference, at the direction of the stakeholder-driven conference steering committee, will focus entirely on water management policy. Morning of Day 1 will consist of a summary of the Tallapoosa River Basin Management Plan (compiled by CH2M Hill in partnership with the East Alabama Regional Planning and Development Commission and Environmental Insight, Inc. in 2005, the product of years of stakeholder involvement), as well as guidance on essential legal components for successful, comprehensive watershed management (presented by the Assistant Attorney General and Counsel at the Geological Survey of Alabama). During the afternoon of Day 1, conference participants will be briefed on the pros and cons of watershed management policy structures in Florida, Georgia and the Choctawhatchee, Pea and Yellow Rivers Watershed Management Authority (currently, the only one in Alabama). Both Day 1 and 2 will contain breakout sessions during which Tallapoosa Basin stakeholders will discuss presented information and present their concerns and priorities in moving toward a watershed management structure for the Tallapoosa Basin. Conference proceedings will be published, and provided to the conference Keynote, Senator Kim Benefield, Chairperson, Permanent Joint Legislative Committee on Water Policy and Management, which will be a source of guidance in moving forward on statewide water policy.

b. Graduate Students: (Name, degree, Department)
None

c. Conferences and Professional Meetings:
(List conferences and professional attended and presentations given related to project.)

Alabama Water Resources Conference, September 4, 2008, Orange Beach, Alabama: *Impact of Urbanization on Water Quality in the Saugahatchee Watershed*

d. Publications: (List the titles of all publications and manuscripts in preparation relative to TWP with projected publication dates.)

Eric Reutebuch, Luke Marzen and Mack Martin. 2008. *Impact of Urbanization on Water Quality in the Saugahatchee Watershed*. Abstract at the Alabama Water Resources Conference: September 4, 2008, Orange Beach, Alabama.

Luke Marzen, Eric Reutebuch, William Deutsch and Mack Martin. 2009. *Anthropogenic Stresses on Water Quality in a Rapidly Urbanizing Alabama Watershed and the Case for Best Management Practices*. Abstract at the Association of American Geographers Annual Meeting: March 25 2009, Las Vegas, NV

e. Funds Leveraged from Other Sources: (List grant, project name, P.I.'s and amounts. Please list funds that are relative to TWP only.)

Central Alabama Community College, $2,000 (discount of $1,000/day on Betty Carol Graham Technology Center for the Tallapoosa Watershed Conference)

Middle Tallapoosa Clean Water Partnership, $2,000

Montgomery Water Works and Sanitary Sewer Board, $1500

f. Proposals Submitted and Planned to be Submitted: (Include Titles, funding Agency and Amount Requested.)

IMPACTS OF INSTALLED BMPS AND CURRENT LAWN CARE PRACTICES ON NUTRIENT LOADING FROM STORMWATER RUNOFF INTO SAUGAHATCHEE CREEK; to AWRRI; from Deutsch, Seesock and Reutebuch; $25,000

Documentation of Stakeholder Evaluations of Water Governance Models for the Tallapoosa River Basin, Alabama; to the AU Outreach Scholarship Program; from Deutsch, Rouse, Reutebuch and Oates; $16,750

2009 Lake Martin Water Quality Study; to Alabama Power Company; from Deutsch, Glasier, Seesock and Reutebuch; $39,072.29

Use of ALOS Imagery in the development of a toolbox for resource managers in the Tallapoosa Watershed Project: Bridging the Gap between Science, People, and Policy; to Americas ALOS Data Node's (AADN) Announcement of Opportunity (AO); from Marzen and Reutebuch; $2,500

g. Interdisciplinary work:
(Describe integration of your sub-project with other sub-projects.)

I've been collaborating closely with Chris Anderson on catchment research, passing on stream gage lessons learned from TWP-1 (which gage to use, how best to install it, where best to install it, how to manage gage data, etc.) to this project.

I've been collaborating closely with Luke Marzen in conference presentations, in linking water quality data to land use, and in proposal submission.

The 2008 Tallapoosa Conference served as a launch pad for this project by introducing it to the entire Tallapoosa Basin. The conference brought together not only a broad cross-section of stakeholders from government, community groups, and business/industry, but also several of the project's interdisciplinary team to learn about real issues in the Basin, including drought, conflicting water usage among stakeholders, dam relicensing, and the need for better water management policy.

h. Impacts: (Describe impacts this subproject have on Research, Teaching, and Outreach at Auburn University.)

The 2008 State *of Our Watershed Conference – the Tallapoosa River Basin* was held at Central Alabama Community College, and was the fourth annual Tallapoosa Watershed conference. The first three conferences were primarily funded through a USDA-CSREES project titled A Transferable Model of Stakeholder Partnerships for Addressing Nutrient Dynamics in Southeastern Watersheds (known as the Tallapoosa Watershed Project, or simply TWP). The first three conferences provided a forum for integrating and presenting all aspects of the TWP project results in research, education and outreach to project cooperators, educators, students, policy makers and other basin stakeholders. Reports from water management agencies such as ADEM, APCo, AL DNR, and GSA were also presented. During this period, Lake Watch of Lake Martin and the Middle Tallapoosa Clean Water Partnership became strong conference supporters, and assisted in conference planning and sponsorship. About 60-70 stakeholders were in attendance each year.
Organization and sponsorship of the fourth annual conference in 2008 was primarily adopted by a new project titled Bridging the Gap Between Science, People and Policy for Sustainable Watershed Management in the Tallapoosa River Basin and Beyond, and funded by the recently formed AU Water Resources Center. The conference was moved to the Central Alabama Community College in anticipation of a larger crowd. The 2008 conference contained updates of basin activities, but focused more on the current state of watershed management (dam relicensing, quest for OAW) and recent challenges (drought, meeting the needs of multiple stakeholder groups). About 120 stakeholders were in attendance.

The 2009 State of Our Watershed – the Tallapoosa River Basin conference agenda builds on the four years of stakeholder involvement in previous conferences. Conference planning was begun in October of 2008 by a conference planning committee composed of stakeholders who had been active in the first four conferences. Following their input, the 2009 conference focuses entirely on looking forward to what stakeholders want the Tallapoosa River Basin to look like in 20 years, and what watershed management steps need to be implemented to achieve this vision. Expected impacts from this conference include:

1. review of existing Tallapoosa Watershed Management Plan, and evaluation of what is lacking for successful, comprehensive watershed management,
2. review of watershed management strategies in Florida, Georgia and Alabama (the sole watershed management authority, the Choctawhatchee, Pea and Yellow Rivers WMA), and evaluation of their strengths and weaknesses,
3. compilation of stakeholder concerns, priorities, and recommendations for formation of a watershed management structure that ensures sustainable use of the streams, lakes and rivers that comprise the Tallapoosa Basin.

II. Plans and Ideas for Year Two of the Project (June 1, 2009 thru May 31, 2010).

a. Description: (Follow Proposal Hypotheses. Also, feel free to add any new ideas beyond the original proposal.)

Sub-Project 12 Multi Media PR

Department: Ag Communications

PI: Katie Jackson

Co-PI(s): Jayme Oates, Charlene Lebleu

Other Investigators: Eve Brantley

I. Accomplishments from June 1, 2008 to February 28, 2009:

a. Activities and milestones:
(List overall project activities and Milestones in order, by date.)
Consulted on set-up for project Web site (advised the Web managers) – July 2008
Consulted with Lebleu on script for video on the past, present and future impacts of land use scenarios – September 2008
Met with Leblue and Brantley about time-lines for producing toolkit and other materials as project progresses – September 2008
Purchased two small video cameras for use by PIs on their sites – Sept.-Oct. 2008
Photographed grant team on Saughatchee float trip – November 2008
Consulted with Web managers about blog software – January 2009

b. Graduate Students: (Name, degree, Department)
(List student activities in order by date. Also, denote any change in graduate student status from budget.)
Not applicable

c. Conferences and Professional Meetings:
(List conferences and professional attended and presentations given related to project.)
Not applicable

d. Publications: (List the titles of all publications and manuscripts in preparation relative to TWP with projected publication dates.)
Not applicable until 2009

e. Funds Leveraged from Other Sources: (List grant, project name, P.I.'s and amounts. Please list funds that are relative to TWP only.)
Not applicable

f. Proposals Submitted and Planned to be Submitted: (Include Titles, funding Agency and Amount Requested.)
Not applicable
g. Interdisciplinary work:
(Describe integration of your sub-project with other sub-projects.)
Available to all PI's – research or outreach – to write press releases, take photos and work on videos

h. Impacts: (Describe impacts this subproject have on Research, Teaching, and Outreach at Auburn University.)

The first year of the grant has been spent collecting information and ideas as well as material for future use on Web sites and in publications. This year we will be working with the other PIs and stakeholders to produce deliverables that help document results and disseminate information to the public.

II. Plans and Ideas for Year Two of the Project (June 1, 2009 thru May 31, 2010).

a. Description: (Follow Proposal Hypotheses. Also, feel free to add any new ideas beyond the original proposal.)

The coming year will begin the process of publishing results and beginning to put details of Lebleu's work, as well as other PIs, in a printable or Web publishable form.

We will likely have one or two preliminary printed or Web-based publications

We will work closely with PIs to develop press releases and other materials related to their section of the grant

YEAR 1 RESEARCH SYNOPSES JUNE 2009

The following Research Synopses were authored by each sub-project team and submitted to the Project Coordinator in June 2009. They were given to the Multi Media PR Primary Investigator as background information for a round of interviews she conducted with each research sub-project team on June 15th and 16th 2009.

Sub-Project 1 Hydrology

PIs (List names):
PI: Dr. Puneet Srivastava
Co-PI(s): Dr. Latif Kalin

1. Graduate Students (List Names):

Suresh Sharma, PhD, Biosystems Engineering
Rewati Niraula, MS, School of Forestry and Wildlife Sciences

2. What Are You Doing?

The objective of the research is to identify the major contributing point and non point sources of pollution and develop an alternative scenario for reducing pollution from those sources in order to bring the tributaries (Saugahatchee creek embayment and Pepperell Branch) within the TMDL threshold. However, the research is not limited to the identification of best scenarios for reducing the pollutants. The research objectives are listed as follows:

1. Apply two uncalibrated and calibrated watershed models (SWAT, GWLF) in the watershed under current, currently projected and suggested (that incorporates improved environmental constraints) land use scenarios.
2. Quantify changes in locations of "hot spots" in the watershed due to a) choice of model (b) model calibration.
3. Assess relative changes in water quality and quantity characteristics due to changes in landuse /cover and management using calibrated and uncalibrated models.
4. Utilize NEXRAD data to assess the spatial variability of rainfall, and rainfall sensitivity in different landuse characteristics of the watershed.
5. Conduct BMP optimization using selected models under current, currently projected and suggested land use scenarios and identify the spatial configurations of the selected "optimal" BMPs.

3. Why Does Anybody Care?

Saugahatchee Creek Embayment, a tributary to Yates Reservoir, is currently on the State of Alabama's 303(d) list of impaired waters for nutrients, organic enrichment, and dissolved oxygen. Pepperell Branch, a tributary to the Saugahatchee Creek is also currently on the State of Alabama's 303(d) list of impaired waters for nutrients. Because of the point source of phosphorous on Pepperell branch, this stream segment appears to be the main contributor to the nutrient impairment within the Saugahatchee Creek Embayment. However, since the main point source contributor to this creek has closed, it is not clear has to how it would affect the recovery of Pepperell branch and Saugahatchee Creek Embayment.

To address the diverse conditions under listed pollutants in the Saugahatchee creek watershed, it is important to identify the critical areas that contribute most of the pollution such that effective management practice can be adopted in those areas for the reduction or control of pollution in the

watershed in an economically viable way. Therefore, it is imperative to develop suitable hydrologic and water quality models for the Saugahatchee watershed based on available data and watershed characteristics so that we could accurately predict future responses of the watershed to land use/cover changes and adopt mitigation measures.

4. What Have You Done So Far?

Two Hydrology and water quality models SWAT and GWLF have been calibrated and validated for flow. Model calibration and validation is going on for sediments and nutrients.

Literature Review:

The following reports specifically related to Tallapoosa basin and Saugahatchee watersheds were reviewed:

- A calibrated QUAL2E Model of Pepperell branch and Saugahatchee Creek prepared by USEPA, April 1991.
- Surface Water Quality Screening Assessment of the Tallapoosa River Basin-2000. A report prepared by Aquatic Assessment Unit, ADEM, Sep 2002.
- Nutrient and Sediment Loading in Saugahatchee Creek and the Impacts on Aquatic Biota(prepared by Department of Fisheries and Allied Aquaculture, Auburn University, Feb 2004.
- Influence of landscape characteristics on Nutrient and Sediment Loading in Piedmont streams in Alabama.
- Saugahatchee Watershed Management Plan prepared by Swamp Stakeholder Group and Auburn University, Oct 2005.
- Tallapoosa Watershed Project, Annual Report prepared by Department of Fisheries and Allied Aquaculture, Auburn University, 2005.
- Saugahatchee watershed Management Plan, Annual Report prepared by Department of Fisheries and Allied Aquaculture, Auburn University, 2007.
- Final Saugahatchee Creek Watershed, Total Maximum Daily Load (TMDL)- Nutrients & OE/DO, ADEM, water Quality Branch, April 2008.

Data collection:

Data are the most important component of modeling. We tried to collect as much data as possible within this period from the world wide web (WWW) and various other sources such as ADEM, AU Department of Fisheries and Allied Aquaculture, Alabama Water Watch, City of Auburn, NOAA, and USGS.

- DEM (10m x 10m) –downloaded from USGS website
- Land use/cover data : 3-yrs land use/cover data, downloaded from albamaview.org
- Stream Network: downloaded from Alabamaview.org
- Soil data(STATSGO as well as SSURGO data) downloaded from NRCS soil data mart
- Rainfall and temperature data: downloaded from NOAA
- Flow (discharge) data: downloaded from USGS website.

ii) Data Preparation for model set up:

All the land use, soil and DEM were downloaded for Tallapoosa, Lee, Chambers and Macon County. All the data were projected to UTM NAD 83 Zone 16N.

DEM: The 10m resolution Dem is used.

Soil data:

- SSURGO SOIL data (county level)- All the soil properties of the high resolution soil data is generated from available soil report (soil db_US_2002). It covers 31 different soil types
- STATSGO SOIL data (state level): It includes five different soil types.

Landuse data: The 2001 National Land cover Data (NLCD) is used.

Rainfall data: Daily data were collected from 1997 to 2008 and three input file was prepared for precipitation input for the following three stations

- Auburn 2 (coop ID: 010425)
- Opelika (coop ID: 016129)
- Wallnut Hill (coop ID: 018653)

Flow data: The available flow data were collected and tabulated for

- Loachapoka (USGS gage station number - 02418230)—continuous flow data from 1999/11/9 to till date, and
- Lovelady Bridge: sporadic data

Point source data:

Monthly data were available from 2000 to 2002 on random days. The concentration of different nutrient and flow is organized and monthly data was prepared in a SWAT specific format.

- Auburn WWTP: Flow data observed for 3 years which also includes, Total Phosphorous(TP), Soluble Reactive Phosphorus (SRP), Total Nitrogen (TN), Organic Nitrogen (ON), Inorganic Nitrogen (IN), Total Suspended Solids (TSS), and Dissolved Oxygen (DO)
- Opelika WWTP: TN, TSS, TP, SRP, DO, ON, IN and flow
- West point Stevens: TSS, TP, SRP, DO, ON, IN and flow.

iii) Model set up:

a) SWAT model

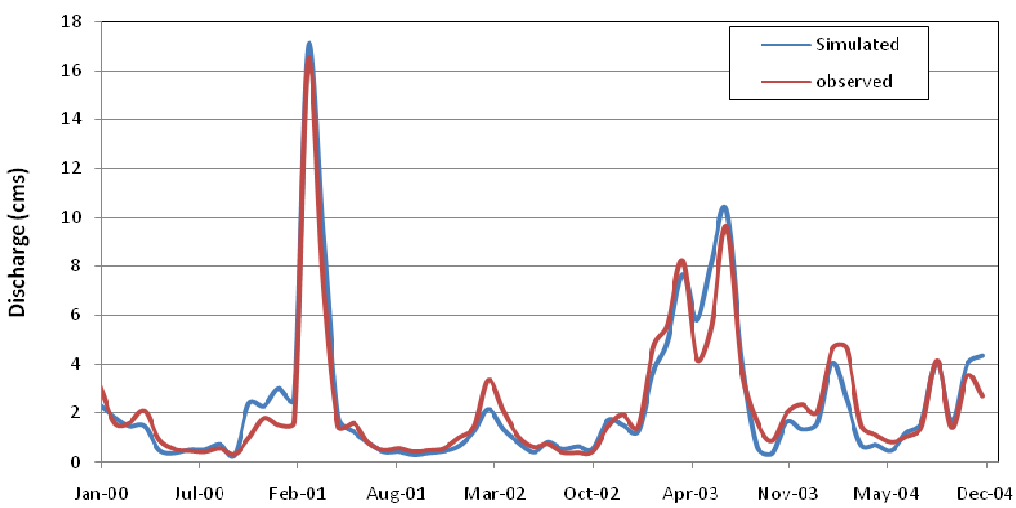
- Watershed delineation
- Incorporation of Point sources and different sampling stations in Saugahatchee and Pepperell branch(37 station)
- Creation of 93 subbasins

- Clipping of landuse, soil and slope map
- Creation of 1547 HRU's
- Incorporation of rainfall and temperature data

Saugahatchee watershed is delineated taking the point near the Yates reservoir as the outlet. The threshold value (minimum area required to generate a first order stream) for the watershed delineation is taken as 250 ha. So, altogether 93 sub basins are created. All the stations on the Saugahatchee Creek and Pepperell Branch sampling by Alabama Water Watch and ADEM for nutrient and flow were considered as outlets and added manually in the watershed. The SWAT model takes the nearby station close to the subwatersheds which are considered for modeling. Three point sources, Auburn Waste Water Treatment Plant, West Point Stevens, and Opelika Waste Water Treatment Plant we also taken into account while delineating watershed.

Model calibration:

Swat Model was calibrated for the period 2000-2004 and was validated for the period 2005-2008. The flow calibration should be accomplished first because the accuracy of sediment and water quality modeling is depended upon how accurately we calibrate the flow. For flow calibration, we first separated baseflow and direct runoff by using Baseflow filter program available in SWAT documentation. So far, the observed discharge in Loachapoka (USGS gage station which is the only outlet in the watershed where we have continuous flow data from November 1999 to present date) is used for the calibration of the model. We have been able to calibrate with good accuracy for the streamflow. Fig 2 compares monthly simulated flows with the observed flows.



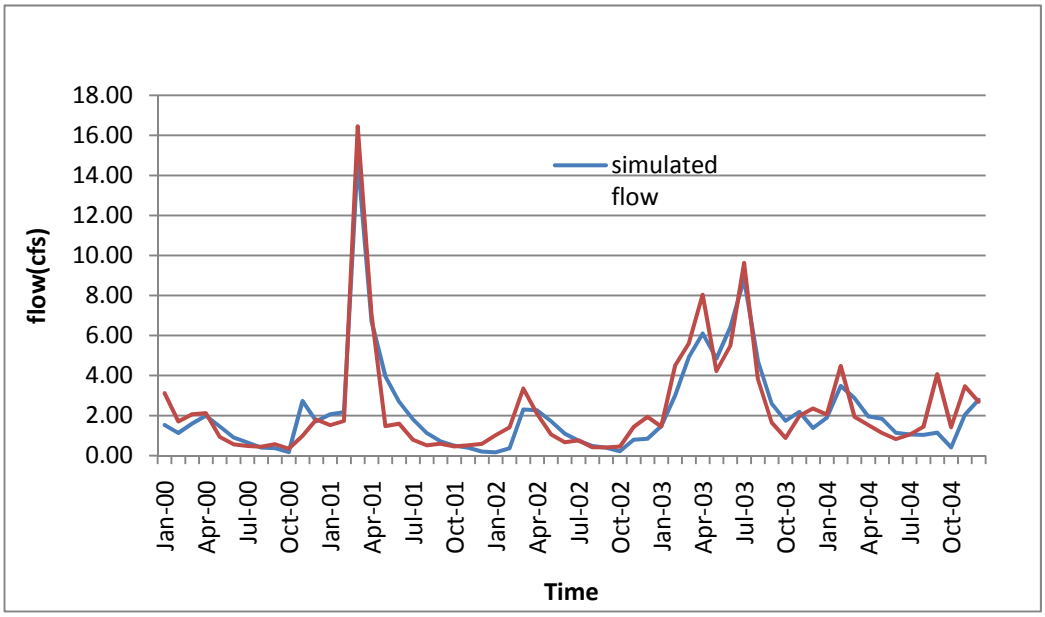
b) GWLF model

The data collected earlier were formatted and used to set up the GWLF model. The model was then calibrated and validated for flow at the USGS gage station at Loachapoka. The model is currently being calibrated for sediments and nutrients for the period from 2001 to 2002.

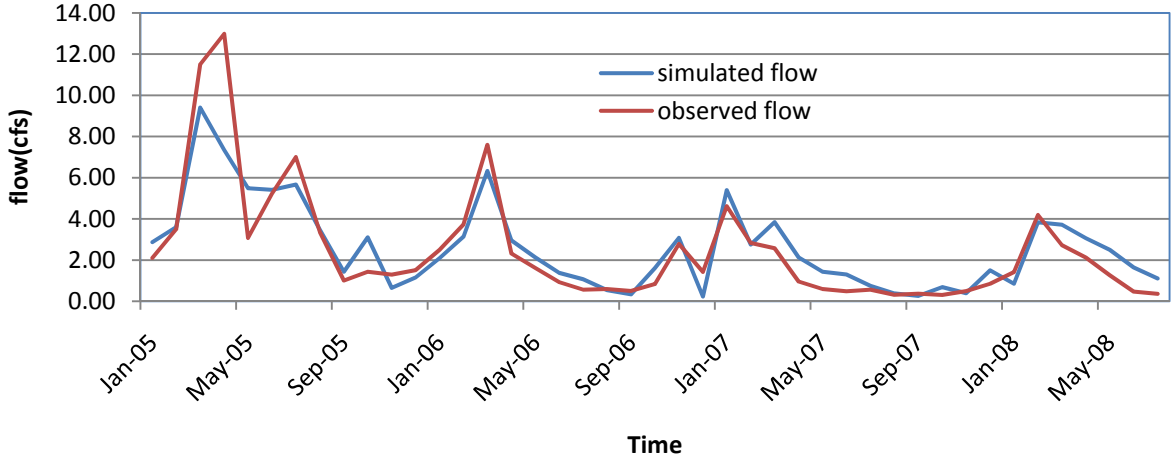
Calibration and Validation:

The GWLF model was calibrated for the period 2000-2004 and validated for the period 2005-2008 for the streamflow at USGS station at Loachapoka.

Calibration :



Validation:



NERAD data processing:

The National Weather Service's (NWS) Next Generation Weather Radar WSR-88D (NEXRAD) precipitation products are widely used in hydrometeorology and climatology for rainfall estimation (e.g., Seo et al. 1999; Krajewski and Smith, 2002), precipitation and weather forecasting (e.g., Johnson et al., 1998; Grecu and Krajewski, 2000) and flood forecasting (e.g.,Johnson et al., 1999; Young et al., 2000). Currently, the NEXRAD precipitation products are categorized into four product levels according to the amount of preprocessing, calibration, and quality control performed. The most commonly used NEXRAD product in hydrometeorological applications is the NEXRAD Stage III data (e.g., Young et al., 2000) since it involves the correction of radar rainfall rates with multiple surface rain gauges and has a significant degree of meteorological quality control by trained personnel at individual RFCs (Fulton et al., 1998).The national weather service started to produce the rainfall data in MPE (Multisensor Precipitation Estimator) format since 2002. These data are available in 13 River Forecast Center,
located throughout the United States of America. Out of the different files available in MPE format, XMRG file is the best file to use which is the analysis from both the gauges and radar with some manual quality control. The data that we need for Tallapoosa basin is available in South East River Forecast Centre

(SERFC). There is one tar file (compressed file) for each month within that one tar file for each day, then multiple binary files, each with one hour's precipitation compressed. After downloading the monthly compressed XMRG files, the next stage is uncompressing them. Although they are compressed under the UNIX operating system with "tar", Winzip can unzip them. However, this would be very time consuming process as each monthly tar file contains daily files, which are also compressed. Further, daily files contain hourly files which are compressed with gunzip (.z extension), another compression program under UNIX. In some cases daily files are gunzipped and hourly files are tarred or not compressed at all. WinZip is unable to decompress .z files. The resulting hourly files are in a binary XMRG format that should be converted to an ASCII grid format, which then should be converted to a GIS grid format. The projection of the GIS data should be defined and subsequently transferred into a common coordinate system using Arc Macro Language (AML) scripts. Multiple-period cumulative rainfalls should be created based on the retrieved hourly GIS files. For a subregion of interest i.e. saugahtchee watershed, a set of algorithms that are developed by Dr. Hongjie Xie and available through http://www.iamg.org/CGEditor/index.htm are implemented to automatically select, retrieve, and analyze the spatial and temporal properties of the radar precipitation. Following codes are being used to extract the MPE NEXRAD data.

1. mpe2ascLinux.c, mpe2ascLinux, and munch-E.pl: batch process to uncompress monthly tar files to hourly XMRG files, and then transfer them to ASCII files;
2. xmrgtoasc.c: transfer the XMRG binary format to ASCII format;
3. asc2grd.aml: batch process to transfer ASCII files to ArcInfo grid files, define the polar stereographic projection for the grid files, reproject it to geographic (sphere) coordinate, and then to UTM 16, WGS 84 (ellipsoidal earth datum) coordinate;
4. gridclip.aml: batch process to clip any region of interest, and retrieve spatial-temporal rainfall for the region of interest;
5. asc2grd2clip.aml: combined asc2grd.aml and gridclip.aml;
6. gridsum.aml: batch process to sum hourly, daily, or monthly grids
7. retrievecells.cpp: retrieve event time, station ID, and rainfall of cells of interest in a region;
8. standard.cpp: create a standard format table;

Sub-Project 2 Land Use Land Cover, Sub-Project 3 Historical Trends

PIs (List names): Luke Marzen, Charlene LeBleu

1. Graduate Students (List Names):

-Mac Martin, M.P. Community Planning
-Tyler Kreps, M.S. Agricultural Economics
-Rajesh Sawant, M.S. Geography - starting August 2009
-Matt Mosely, M.P. Community planning –independent study summer 2009 looking at modeling future scenarios that may become his thesis project. Matt is a Community Planner for the city so he requires no funding (leveraged resources)
-Matt Biesecker, M.S. Landscape Architecture

2. What Are You Doing?

-Beginning to look at future scenarios of development and population growth
-Datasets are in the process of being created for Uphapee, Chewacla, Upper Halawakee, and the Chattahoochee River watersheds as these are the drainage systems encompassing all of Auburn and Opelika and a substantial portion of Lee County.
-Assessing parcel land use change by date of built structures
-ongoing development of land use and watershed delineation
-working on hyperspectral RS of water samples at Lake Martin
-assessing climate change impacts on water supply in Tallapoosa Basin
-Visual survey of current land use trends
-Low Impact Development (LID) case study development
-in beginning stages of working with modeling teams

3. Why Does Anybody Care?

Land Use is a major factor in the amount of water use and runoff in the Basin. Almost all research projects require it for their analysis. Future scenarios will allow planners to forecast water quantity and quality based on historical trends.

4. What Have You Done So Far?

-wrote 3 grant proposals which leverage external funds for the project (2 pending, 1 not funded)
-Landsat scale land use/land cover (LULC) datasets have been produced for the Saugahatchee Creek Watershed for 1991, 2001, and 2007/8.
-Datasets are in the process of being created for Uphapee, Chewacla, Upper Halawakee, and the Chattahoochee River watersheds as these are the drainage systems encompassing all of Auburn and Opelika and a substantial portion of Lee County.
-Collected and processed over $100,000 worth of imagery from City of Auburn that will be used to better assess urban areas
    -High resolution datasets (6 inch CIR aerial imagery)
    -High resolution LiDAR datasets (sub-meter) for topography
-LULC at the parcel level collected for City of Auburn

-Leveraged grant funds from USGS for study of drought in Tallapoosa Basin
-In the process of ordering high resolution 2.5m SPOT data (on the $6k from Charlene's grant) for the urban areas of the Saugahatchee Watershed
-investigating scenario models for future change
-attended and presented posters on Drought Monitoring at the State of Our Watershed Conferences in Alexander City in 2008, 2009
-attended and presented preliminary analysis of LULC and affects on nutrient loadings at AWRRI conference and the Association of American Geographers Conference (with E. Reutebuch, W. Deutsch, M. Martin, and T. Kreps)
-attended outreach sessions for alternative forms of development, rainwater catchment, and greywater use organized by SWaMP
-attended outreach session on forest BMPs
-met several times with research group to plan next year's agenda based on this year's training of new students
-Charlene has been focused on the alternative developments and specifically on monitoring the current Conservation Development going on in Auburn. We have met several times to brainstorm but our collaboration will be more involved in years 2 and especially 3 when the models will allow us to test the affects of various methods of development.
- Visual survey of current land use trends of lower watershed
-Low Impact Development (LID) case study work displayed at ADEM Non-point Source Conference 1/20/09

Sub-Project 4 Scenarios and Planning Toolbox

PIs (List names): Charlene LeBleu

1. Graduate Students (List Names):
   Matt Biesecker, M.S. Landscape Architecture
   Kelly Lee, M.S. Landscape Architecture (one semester)

   Other—Temporary Employment Services
   Ana Souza—Videographer

2. What Are You Doing?
   Low Impact Development (LID) Tool Box. Innovative tools for stormwater management planning, design and implementation will be developed for city and county planners and other water professionals. Project research outputs and lessons from successful stormwater programs in other parts of the country will be combined to produce this tool box.

   --Introduction video for toolbox (Ana Souza)

   --Identification of Best Management Practices (BMP's) for LID (Matt Biesecker)

   --Digital template of each BMP in multi-format (JPEG, .dwg, .esp) (Matt Biesecker & Kelly Lee)

   --Case studies of successful LID developments

   --Samples of LID friendly civic policies for Depts. Of City Planning

3. Why Does Anybody Care?

LID has many benefits when compared to conventional stormwater management approaches. It is a more environmentally sound and is a more economically sustainable. LID manages runoff close to its source, and enhances the environment through native plantings and water quality benefits. LID saves developers and local governments' money by using green infrastructure technology rather than traditional concrete stormwater infrastructure.

4. What Have You Done So Far?

--Shot short movie clips of watershed that will be sewn together for video
--Draft of video narrative and speaking parts (20 minute video)
--25% of LID BMP templates have been drawn in multiple digital formats.
--Identified eight successful true LID community case studies (not just "LID-type")
--Student work displayed at ADEM Non-Point Source Pollution Conference 1/20/09

Other sub-projects I'm on:

* Assess Historical Trends to Summarize Current Watershed Conditions and Identify Data Gaps for Future Scenario Analyses (Sub-project 1.2)

1.2.1 *Assess Trends in LULC, Community Planning, and Landscape Design and Identify Data Gaps* (Lead: Marzen and LeBleu). Sub-project report filed by Luke Marzen.

Sub-Project 5 Socio-Econ Study

PI: Yaoqi Zhang

1. Grad student acquisition and progress

One new graduate student (Le Wu) for Master degree has been recruited. She will start her study in the fall of 2009. Denis and I will share the cost and co-supervise the student. She will work on the water project.

Currently Suman Majumdar is mainly working on the project. Suman's Ph.D. study has made good progress. His Ph. D. proposal "Demand Side Analysis of Quantity and Quality of Residential Water Use in Alabama" was presented in March, 2009.

Bin Zheng is getting involved with the project as well. In the future, I might invite one more master degree student to get involved.

2. Sub-project status

1) Data Collection:

After persistent efforts, monthly residential water consumption and revenue data for three years has been collected from the city of Auburn. We are in the process of collecting similar data from other cities in Alabama including Prattville, Mobile, Montgomery, Alexander City and Fairhope. Socio-demographic and weather data for these cities are also being simultaneously gathered. We intend to do a demand side management analysis of residential water use in Alabama using the collected data.

One important part of the project is to conduct a household survey in Alabama. Suman has been working on that for several months, and a draft of the survey is in preparation and has been discussed r among his Ph.D. committee members (Dr. Diane Hite and Dr. Henry Kinnucan) in May.

2) Papers

Majumdar, S., Zhang,Y. 2008. Providing Water Quality Services: A New Opportunity for Forest Landowners. Alabama's Treasured Forests 27(3):14-15.

Majumdar, S., and Y. Zhang. 2009. "Is Social Welfare from Nature-Based Recreation Declining? A Study on Alabama." Submitted to *Society and Natural Resources*, 04/08/2009.

3) Meeting presentation

Majumdar, S., Zhang,Y. Is Demand For Outdoor Activities Declining? Evidence from the Southeast. Presented at Southern Forest Economics Meeting, 9-11, March, 2009, Chapel Hill, NC.

4) Grant proposal efforts

One proposal has been sent to Alabama Water Resources Research Institute . It was not funded but seems very competitive based on the reviewers' comments and evaluation. We are preparing some proposals and hopefully are able to submit some in near future

Sub-Project 6 Algae Study

PIs (List names):
Alan Wilson and Jim Stoeckel

1. Graduate Students (List Names):
   Michael Chislock

2. What Are You Doing?

Observational study – We have begun collecting biweekly to monthly water samples at several sites near the Saugahatchee embayment to document natural variability in nutrient concentrations (i.e., total phosphorus and total nitrogen) and total suspended sediments at each site – before and after rain events. During each sampling period, depth profiles for temperature, dissolved oxygen, pH, and conductivity measurements are made using a Hydrolab multisonde. Integrated whole-water samples are collected from the photic zone, stored on ice, and returned to the lab. At the lab, samples are collected and analyzed for chlorophyll, cyanobacterial toxins, total phosphorus, total nitrogen, and total suspended sediments. Phytoplankton and zooplankton in each sample are also identified.

Our sampling efforts have been productive as we have begun to understand patterns of plankton succession in Yates Reservoir. Furthermore, as we continue to develop our pool of data, observations of variability in nutrient and sediment conditions at each study site will help guide current and future field experiments as described below.

Field experiment – Several times during the year, we will conduct week-long experiments to determine the influence of phosphorus additions and the presence of zooplankton on algal abundance. Simultaneous experiments are conducted in Saugahatchee Creek and the Tallapoosa River (Yates Lake). We aim to conduct two experiments each season - one before and one after a large rain event. We will use this experimental design to take advantage of ambient nutrient and sediment pulses produced from rain runoff. We will use durable, 44-gallon garbage cans as enclosures and will fill them with water from the experimental site after being filtered through 75 um sieves to remove large zooplankton. The experimental design will be a 2 (phosphorus addition: ambient; 200 ppb P) × 2 (zooplankton: none, 2× ambient) factorial design, which will allow us to test the importance of phosphorus, zooplankton, and the interaction between these two factors on algal abundance between both primary study sites. Each treatment combination will be replicated 4 times. We will collect physical, chemical, and biological samples at the beginning and end of each experiment, using methods similar to those used in our weekly sampling scheme.

3. Why Does Anybody Care?

Urbanization and development in the Saugahatchee watershed continues to result in elevated phosphorus and sediment levels in Yates Lake. However, the relative effect of each of these major pollutants on plankton community structure and function in reservoirs is unstudied. As demonstrated in our results (See attached Appendix), our work has already begun to answer this question. Given the abundance of reservoirs in the southeastern United States (and the general importance of plankton community ecology), our research has broad significance not only to those with interests in the Tallapoosa basin, but also for a large portion of our country. We plan to share our results at future regional and national meetings. In addition, through outreach opportunities proposed for future years of the grant, we hope to teach elementary and high school students about the importance of plankton ecology while also promoting their interest in science.

4. What Have You Done So Far?

From September 2008 to April 2009, we collected monthly physical, chemical, and biological samples at several sites in Yates Lake and Saugahatchee Creek. This sampling schedule has allowed us to continue to add to the historical dataset from Saugahatchee Creek, while also

providing baseline data for our field experiments. In addition, we conducted two large-scale, field experiments in Yates Reservoir (See Appendix for a brief description of experimental design, key results, and photos).

Sub-Project 7 Catchment Study

Investigators: Chris Anderson, Eric Reutebuch, Wendy Seesock

This report details activity associated with the sediment and phosphorus loading subproject of the Tallapoosa Watershed Project. Most work in Year 1 involved establishing stream water quality sampling stations throughout the drainage basin along with preliminary work associated with channel morphology and sediment tracing. A background of the project along with its status (including tasks completed and anticipated activities in Year 2) is detailed below:

Urban land use and water quality

Background: Sediment and phosphorus have been shown to be major pollutants in the Saugahatchee Watershed by reducing water quality, ecosystem function, and aquatic habitat availability. Urbanization is a major contributor to sediment and associated P loading into streams; however, the contributing sources of sediment (bedload, channel scouring, overland flow) and P (autochthonous, sediment adsorbed, anthropogenic inputs) can vary. Complicating this matter is the dynamic nature of urbanization. As rural lands are urbanized, landscape conditions are continually changing and the contribution of sediments and associated nutrients will likely change as well. Several modeling efforts have been made to account for changes in sediment and nutrient loads in urbanizing watersheds (Bledsoe and Watson 2001), but very few have demonstrated this in the field. The objective of this research is to determine how the contribution of sediment and P from urbanizing watersheds changes over time.

Status of work in Year 1: In Year 1, we focused on evaluating and selecting stream sites for assessing sediment and phosphorus loading and its relation to urban land use intensity. We conducted several investigatory trips throughout the Saugahatchee drainage basin and selected stream sampling sites that were suitable based on a variety of conditions. We sought streams that had a range of contributing urban conditions, perennial flow, and were a suitable size for sampling. Other considerations involved gaining access from property owners. Based on all these factors, we have selected 12 tributary headwater streams leading to the Saugahatchee Creek. These streams generally have smaller watersheds (200-600 ha) under a range of urban conditions. We are currently working with Luke Marzen to delineate the watershed boundaries and quantify urban land use, however based on our assessment of upstream land use, each of the streams is dominated by one of four categorical urban land use conditions: 1) non-developed forestland (reference), 2) active development/construction, 3) newly established development, and 4) older established development. Our intent is to not only examine the spatial extent of urban land use but to also examine how the various stages of urbanization affect stream water condition.

At each stream site, we began monitoring water flow and water quality in 2009. Each stream was equipped with a pressure transducer that records water depth every 15 minutes continuously. These data will be coupled with periodic in-situ flow measurements (measured over a range of flow conditions) to establish the relationship between flow and stage at each stream. By developing these relationships, we will develop a rating curve for each stream and estimate annual discharge.

At the end of Year 1 we also selected methodologies for stream sediment pins that will be used to track changes in channel morphology and how that this might relate to urban land use. Sediment pins will be placed along stream channels in as many stream reaches as possible (based on property access) and monitored to quantify scouring in all study streams. Installation of the sediment pins will occur at the beginning of Year 2 and will be monitored for at least one year to evaluate stream channel scouring relations to storm events and urban land use.

Activities planned in Year 2: In Year 2, water sampling will continue at each site throughout the year (~16 times over the next year) with the intent of capturing varying flow conditions. During each sampling event, water will be measured in-situ for temperature, conductivity and pH. A grab sample of water will be collected, returned to the laboratory, and analyzed for 1) total phosphorous, 2) soluble

reactive phosphorous and 3) total suspended solids. Water will be analyzed for other important water constituents (e.g., total nitrogen, nitrates) as resources allow. Near the end of Year 2 we will begin to analyze data for trends related to declining water quality and urban land use. The data analyzed along with our assessment will be forwarded to modeling team members for calibration and validation of prescribed land-use and water quality models.

Other activities planned for Year 2 will include an attempt to trace sediment contributions from different sources. We will extract suspended sediments from a subset of our streams and explore using a sediment marker method. Markers such as Cesium-137 have been used in the past but are often limited due to processing time. We are currently exploring the use of a spectroscope as an alternative. This technique would provide a more rapid analysis and allow greater replication of trace sediment samples. This technique will be explored in Summer 2009 and a formal evaluation will be carried out later in the year.

To assist with work related to this subproject and to expand our analysis of urban land use effects on water quality, we will employ an M.S. graduate student (Joe D'Angelo) starting fall semester 2009. Mr. D'Angelo will assist with data collection and analyses in Year 2 while developing a thesis project related to the project. Funding for student assistantship will be provided through the Project Investigator Anderson and the Tallapoosa project (if funds are available).

Sub-Project 11 State Of Our Watershed Conference

PIs (List names):
Eric Reutebuch

1. Graduate Students (List Names): N/A

2. What Are You Doing?

Planned and coordinated the 5th *Annual State of Our Watershed Conference – The Tallapoosa River Basin*. This year's conference, at the direction of the stakeholder-driven Conference Planning Committee, focused entirely on water management policy. The conference was a success by several measures. The conference brought in people from throughout the Upper, Middle and Lower Tallapoosa basins. Attendance, about 120, was spread across a wide range of stakeholders including general public, business/industry, local and state government, education/research and regulatory agencies. A growing local support, particularly from businesses that rely on waters of the Tallapoosa, was evident through a record number of door prizes (41 items valued at ~ $1,500) donated by 19 area businesses, community groups and residents.

Speakers who participated in the Tallapoosa Watershed Conference at the Betty Carol Graham Technology Center on the Central Alabama Community College in Alexander City on May 13-14, 2009.

The morning of Day 1 consisted of a summary of the Tallapoosa River Basin Management Plan (compiled by CH2M Hill in partnership with the East Alabama Regional Planning and Development Commission and Environmental Insight, Inc. in 2005, the product of years of stakeholder involvement), as well as guidance on essential legal components for successful, comprehensive watershed management (presented by the Assistant Attorney General and Counsel at the Geological Survey of Alabama). During the afternoon of Day 1, conference participants were briefed on the pros and cons of watershed

management policy structures in Florida, Georgia and the Choctawhatchee, Pea and Yellow Rivers Watershed Management Authority (currently, the only one in Alabama). Both Day 1 and 2 contained breakout sessions during which Tallapoosa Basin stakeholders discussed conference presentations and then presented their own concerns and priorities in moving toward a watershed management structure for the Tallapoosa Basin. Conference presentations, articles and pictures have been posted on the TWP website (see http://blog.auburn.edu/twp/?p=81), and a discussion group, *talla-vision@ag.auburn.edu*, has been formed to keep stakeholders engaged in the dialog on watershed management in the Tallapoosa, and to broaden and expand the dialog to include others who live and work in the Basin. Conference proceedings will be published, and provided to the conference Keynote, Senator Kim Benefield, Chairperson, Permanent Joint Legislative Committee on Water Policy and Management, which will be a source of guidance in moving forward on statewide water policy.

3. Why Does Anybody Care?

The Conference Planning Committee believes that the conference is timely in catalyzing the discussion of formation of a more effective watershed management structure for the Tallapoosa Basin based on several recent developments:

a. A historic drought in 2006-2007 that threatened many water resource users in the Tallapoosa Basin,
b. Formation of the Permanent Joint Legislative Committee on Water Policy and Management,
c. Chairperson of the Permanent Joint Legislative Committee on Water Policy and Management, Senator Kim Benefield, resides in the Tallapoosa Basin,
d. Formation of the AU Water Resources Center in the Auburn University's Natural Resources Management & Development Institute (NRMDI),
e. Over two decades of community-based watershed stewardship in the basin, recently culminating in the establishment of an annual Tallapoosa Watershed Conference, that is in its fifth year,
f. Several decades of scientific data gathered from the streams, river and reservoirs in the Basin.

4. What Have You Done So Far? Redundant – see # 4

SUB-PROJECT SUMMARIES FOR PUBLIC RELATIONS

Members of the Outreach Team, Katie Jackson and Eve Brantley, interviewed each research sub-project team June 15 and 16 2009. The information collected was collated and transcribed into a palatable form for a general audience. These sub-project synopses developed by the Ag Communications department will be available to the researchers and the general public for use via the TWP website. Following are some examples of these documents.

Sub-Project 1 Hydrology

Hydrology and Water Quality

Puneet Srivastava, Latif Kalin, Suresh Sharma, and Rewati Niraula

Discovering sources of pollution in the Tallapoosa River watershed and developing models that can predict future water quality and quantity problems is the focus of the Tallapoosa Watershed Project Hydrology and Water Quality Sub-project research team .

Saugahatchee Creek embayment and its tributary, Pepperell Branch—both of which are part of the Tallapoosa watershed—are currently on Alabama's 303(d) list of impaired waters due to such problems as excessive nutrients, organic enrichment, and reduced dissolved oxygen levels. Knowing the sources of the pollutants that are contributing to these problems will help regulatory and conservation agencies and other stakeholders find economically viable ways to clean up and protect the basin's water supply. And that information can be used in conjunction with other data to create models that predict how future changes in land use may affect water quality and quantity.

The research team is collecting information from a variety of sources, including data generated by other TWP researchers, to use in the development of hydrologic and water quality models for the Saugahatchee watershed. These models can be calibrated to accurately predict future responses of the watershed to land use and land cover changes and to help stakeholders develop and adopt mitigation measures.

The researchers are plugging this local data into SWAT (Soil Water Assessment Tool; a hydrology model used to predict long-term impacts of management and agricultural practices on a watershed) and GWLF (Generalized Watershed Loading Functions; a model that simulates mixed land use watersheds to evaluate the effect of land uses on sediment and nutrient loads in streams) models. Using such information as past and current land use, water flow, point and non-point pollution sources, and weather data, these models can be specifically designed to predict future problems and potential "hot spots" in the watershed.

Once the models are fully developed, they can be applied to various land use scenarios and, ultimately, may help identify optimal best management practices for the watershed.

Sub-Project 2 Land Use Land Cover and Sub Project 3 Historical Trends

Land Use/Land Cover (LULC) and Historical Change

Luke Marzen and Charlene LeBlue

Land use has a huge impact on the quality and quantity of water in the Tallapoosa River basin. The Tallapoosa Watershed Project Land Use/Land Cover and Historical Change research team is looking at land use past and present to help predict—and possibly protect—the watershed in the future.

One part of the project focuses on gathering historical information about land use by mining statistics collected through satellite imagery, parcel data, and other public records. This existing data will be used to develop a broad historical picture of the watershed's land use history.

In addition, the team is zooming in on specific sites that will be case studies on how low-impact development strategies affect water resources. For this part of the study, researchers are working at four sites in the Tallapoosa River basin—including sites in Lee, Tallapoosa, and Chambers counties—where they are demonstrating low-impact development practices and also monitoring the effects of these practices on the quality and quantity of water in the basin.

Using this information, the team will develop possible scenarios of how changes in land use might affect best management practices. Models will then be developed that predict future land use changes. Land use information and predictive models done by this team will then be used by another TWP team that is developing models to predict how that future land use will affect water resources.

Eventually this can help landowners, developers, and city officials better manage urban growth and protect water resources.

In addition to the research, this team is also developing outreach tools, such as a "Tool Box" that can be used by municipal planners to adopt low-impact development strategies for their communities.

Sub-Project 6

Aquatic Ecology Sub-Project

Michael Chislock, Alan Wilson, and Jim Stoeckel

Planktons—microscopic plants and animals found in fresh and salt water that are valuable indicators of water quality—are one focus of the Tallapoosa Watershed Project grant that is helping lay the foundation for future action plans to protect water quality in the Tallapoosa watershed.

Phytoplankton (plant plankton, which live on sunlight and nutrients in the water) and zooplankton (animal plankton, which graze on phytoplankton) both affect water quality. Because phytoplankton are at the base of the food web, controlling them is a major factor in controlling water quality. For example the fewer the phytoplankton in a water body, the clearer water. In fact, heavy phytoplankton blooms turn waters green and slimy and can even cause toxic algal blooms. In addition, when heavy blooms of phytoplankton die and settle to the bottom of a water body, they deplete the oxygen content of water and can make huge sections of a water body uninhabitable for fish, especially those that live in deeper, cooler levels of a lake. This can cause fish kills and can reduce populations of popular sport fish species.

Because phytoplankton have such a profound impact on water quality, TWP scientists are focusing on these organisms in an attempt to establish the current water quality status of Saugahatchee Creek and Yates Lake where the Saugahatchee feeds into the Tallapoosa River system.

For the study, the team takes monthly samples at two sites—one on Saugahatchee Creek and another at the point where the creek enters Yates Lake. The samples are tested for the presence and levels of phosphorous—both soluble and insoluble—nitrogen, sediments, and plankton population levels.

The team also conducts monitoring studies using a unique system of barrels or buckets placed in the lake. These containers are filled with water from the two sampling sites, some of which are then treated with either high levels of phosphorous or zooplankton. The containers are placed into Yates Lake on a floating PVC pipe frame and monitored for a week to see what differences occur among the treatments. By placing them back into the lake water itself, the scientists can see if such issues as rainfall, sunlight, and water and air temperature affect the levels of nutrients and planktons in each treatment, which gives a more real-world view of the treatment reactions that would not impossible if the tests were conducted on land or in a laboratory.

The goal is to see if any of the treatments differ from each other based on the sampling sites and the various treatments. So far two such monitoring activities have been conducted, one in the winter and another in the spring, and more will be conducted this summer, which will help the team determine if seasonal changes in the water have an effect on the phytoplankton.

Results thus far indicate that there are distinct differences among the sites and treatments. The good news is that both water bodies seem to be relatively clean and clear, especially with regard to phosphorous content. However, this can change as the human population in the Tallapoosa Watershed continues to grow.

As the population grows, more water will run through sewage treatment plants and into feeder creeks such as the Saugahatchee (there is at least one sewage treatment plant that already empties into the Saugahatchee), which means that more and more phosphorous will enter those streams and eventually can enter rivers such as the Tallapoosa.

The next step for the research team is to run additional experiments and collect enough data to understand the natural variability in the Saugahatchee and Yates Lake. The goal is to track what is happening over time and make that baseline information available to other scientists on the TWP grant and throughout the scientific world.

Eventually this information may help improve water monitoring and protection guidelines for the Tallapoosa watershed and, ultimately, for the many other watersheds in the Southeast. And, of equal

importance, it will show residents of the Tallapoosa watershed what's really happening in their own back yards and why they should care about phytoplankton and water quality issues.

Sub-Project 7 Catchment Study

Monitor Physical, Chemical, and Biological Attributes of the Watersheds

Chris Anderson

As more and more people move into the Tallapoosa River watershed, more and more land is likely to be urbanized. What effect will such growth and development have on our water resources a few years or even a few decades from now? One Tallapoosa Watershed Project grant research team that is focusing on monitoring various physical, chemical, and biological aspects of the watershed project is trying to help predict just that.

This project is focusing on the Saugahatchee Creek as a representative basin to look at water quality as it relates to surrounding land use, the idea being that urbanization has potential to degrade water quality. The research team working on this project is specifically looking at sediments and phosphorous, which have been identified at key pollutants in the Saugahatchee basin, that might eventually affect the entire Tallapoosa basin.

The team is to look at several specific urban conditions that may contribute in different ways to water quality decline. As an area becomes more urban, it goes through phases of development and transitions over time, producing a variety of effects related to runoff, erosion, and water hydrology. All can degrade water quality in streams, but they may do so in different ways.

For example, sediment runoff may be the greatest problem when a forested area is cleared for development. However, as roads, sidewalks, and other impervious surfaces are installed, the type or intensity of runoff changes. And, once a new development or neighborhood is fully established, sediments in runoff may be less of an issue than are nutrients from lawn and garden chemicals, or the issue may be that water flow into and through a stream is adversely altered.

To see how these changes in the landscape and the maturing of developed sites affect water quality, the team is focusing on smaller headwater streams that feed into the Saugahatchee. They are working at 15-18 sites in the Auburn-Opelika area of Saugahatchee's basin that represent four different phases of development that capture the spectrum of development.

Those four phases include: undisturbed forested areas; active construction areas where grading is occurring and soils are exposed; younger developments (less than five years old) where the buildings and infrastructure are completed; and older subdivisions or neighborhoods that have been in place for decades.

The team is collecting samples from streams and tributaries near these sites to see what sediments and nutrients are contained in the stream's water over time as well as measuring water levels and flow. They also will look at channel morphology to see if heavy water flow into a stream is eroding (scouring) stream beds, which can affect downstream water quality over time. They also hope to trace the sources of some of the sediments in a stream.

The goal is to be able to forecast what the implications of increasing urbanization will be for the Saugahatchee and the Tallapoosa River basin. This may also help developers, landowners, and regulatory agencies develop more targeted guidelines and best management practices.

MEETINGS, PUBLICATIONS AND CONFERENCES

Meetings

2008

1. May 28th Canoe Trip Middle Tallapoosa

2. June 6th TWP Team Update Meeting (1)

3. June16th-17th Water Workshop Permanent Joint Legislature on Water Policy and Management (2)

4. September 11th TWP Team Update Meeting (3)

   October 31st City of Auburn Preliminary Meeting

5. November 4th TWP Team Meeting with City of Auburn for City Water Usage Data Requisition (4)

6. November 25th Canoe Trip Saugahatchee Embayment

2009

7. January 15th State of Our Water Conference Planning Meeting

8. January 27th TWP Outreach Team Meeting (5)

9. January 28th TWP Website Meeting

10. February 4th State of Our Watershed Conference Survey Meeting

11. February 5th TWP Research Team Meeting

12. February 6th TWP Budget meeting with WRC

13. March 1st Sub-Project Annual report template sent to PIs

14. April 1st Sub-Project Annual reports submitted by PIs

15. June 15th and 16th Sub-Project Team Interviews conducted by Katie Jackson and Eve Brantley (6)

16. June 26th Canoe Trip Lower Tallapoosa

17. July 1st Year One Annual Report submitted to AU WRC

**Numbers in parenthesis denote document numbered on the following pages.

1.

Tallapoosa Watershed Project
Update Meeting
June 6, 2008 1 pm
Comer 109

Agenda

1. Slides of Outing #1: Tallapoosa Float Trip May 28, 2008

2. Review Project Update email sent by Bill on May 1, 2008

3. TWP Budget meeting 5/29

Fiscal Year June 1, 2008 – May 31, 2009

Quarter 1	June 08 – August -08
Quarter 2	September 08 – November 08
Quarter 3	December 08 – February 09
Quarter 4	March 09 – May 09

4. WRC Steering Committee Meeting 5/29
   - EPA Center of Excellence
   - June 3 at 4pm Frank Young, China
   - June 16-17 Workshop for the Alabama Permanent Joint Legislative Committee on Water Policy and Management
   - September 3-5 Water Resource Conference
   - Water Lab

5. 2 page Project Descriptions
   - Revisions
6. Schedule
   - Puneet and Charlene meet with Bill and Jayme
   - Research and Outreach Teams meet to finalize Year 1 budgets and Work Plans
   - Sub-contracts set up by June 30 for Year 1

8. Project Guidelines
   - Leveraging by Project Teams or smaller groups
   - Publishing Proposals
   - Participation via meetings, outings, intranet, etc.
   - Presentations via conferences, meetings, etc.
   - Quarterly Reporting
   - Outreach
9. Input from the Group-----IDEAS?

10.Graduate Student Meeting and Other Ways to Connect the Team

2.

Briefing legislators

Jayme Oates, center, of Alabama Water Watch and the AU Department of Fisheries and Allied Aquacultures, uses an "enviroscape" table to illustrate land use and current development practices to State Sen. Kim Benefield, left, and Rep. Greg Canfield. The AU Water Resources Center hosted a water workshop June 16-17 for members of the Alabama joint legislative committee on water policy and management.

3.

Tallapoosa Watershed Project
September 11, 2008
Comer Hall room 109
10am-12pm

Agenda

1. Introductions

2. Projects, PIs, and budgets

3. Progress and Plans (Auburn/Opelika Scale and Basin Scale)

    a. Data Needs

4. Dates to meet with Auburn/Opelika Water Authorities

5. Water Resource Conference (Ideas for TWP?)

6. Water Management Authority and the Tallapoosa Basin (Sam Fowler; etc)

7. Autumn Float trip (Dates to Jayme)

8. Graduate Student Meet and Greet (Dates to Jayme)

9. Other Items?

4.

Tallapoosa Watershed Project
Auburn Water Works Meeting
Bailey Alexander Complex
10:00am November 4, 2008

AGENDA

10:00 am	Welcome and Introductions	Bill Deutsch
10:10 am	Auburn Water Works	Laura Koon
10:35 am	AU Water Resources Center	Sam Fowler
10:45 am	Tallapoosa Watershed Project Introduction	Jayme Oates
10:55 am	Sub-Project Synopses (2-3 minutes each) Introduction of sub-project Data needs Q&A	
11:45 am	Closing Comments and Adjourn	

6.

Tallapoosa Watershed Project
Annual Report
Sub-project Meeting Schedule

Katie Jackson and Eve Brantley

Monday June 15, 2009

10:30 am Alan Wilson and Jim Stoeckel

Tuesday June 16, 2009

11:00 am Chris Anderson

1:00 pm Luke Marzen and Charlene LeBleu

3:30 pm Puneet Srivastava and Latif Kalin

Yaoqi Zhang is in China/Germany

Denis Nadolnyak is in Africa

These meetings will allow the Outreach Team insight into the current and projected progress of the Research sub-projects.

Publications

Refereed Journals

1. Bhattarai, Gandhi, Puneet Srivastava, Luke Marzen, Diane Hite, and Upton Hatch. 2008. Assessment of Economic and Water Quality Impacts of Land Use Change Using a Simple Bioeconomic Model. Environmental Management 42(1):122-131.
2. Styers, D.M., A.H. Chappelka, L.J. Marzen, and G.L. Somers. (in review). Developing a Land Cover Classification to Select Indicators of Forest Ecostystem Health in a Rapidly Urbanizing Landscape. *Landscape and Urban Planning.*

Conference Proceedings

1. Charlene LeBleu. Bridging theGap Between Science and Design: A Transdiciplinary Approach." 2009 CELA Conference (Council of Educators for Landscape Architecture), Tucson, AZ. Peer Review. Conference Proceedings.
2. Eric Reutebuch, Luke Marzen and Mack Martin. 2008. *Impact of Urbanization on Water Quality in the Saugahatchee Watershed*. Abstract at the Alabama Water Resources Conference: September 4, 2008, Orange Beach, Al.
3. Luke Marzen, Eric Reutebuch, William Deutsch and Mac Martin. 2009. *Anthropogenic Stresses on Water Quality in a Rapidly Urbanizing Alabama Watershed and the Case for Best Management Practices*. Abstract at the Association of American Geographers Annual Meeting: March 25, 2009, Las Vegas, NV.

Additional water related publications that do not fall within the scope of the TWP may be denoted in the following individual reports.

Conferences

1. Kreps, T. L. and L. Marzen. 2008. Estimating Surface Moisture with Remote Sensing as an Indicator of Drought in the Southeast US. Alabama Water Resources Conference. Orange Beach, Al. September.
2. Reutebuch, E., L. Marzen and M. Martin. 2008. Impact of Urbanization on Water Quality in the Saugahatchee Watershed. Alabama Water Resource Conference. Orange Beach, AL. September.
3. Kreps, T., L. Marzen. 2008. Estimating Regional Scale Surface Moisture in the Southeast with MODIS Data. Applied Geography Conference. Wilmington, DE. October 2008.
4. Luke Marzen, Eric Reutebuch, William Deutsch and Mac Martin. 2009. *Anthropogenic Stresses on Water Quality in a Rapidly Urbanizing Alabama Watershed and the Case for Best Management Practices*. AAG, Las Vegas. March 2009.
5. Charlene LeBleu. Bridging the Gap Between Science and Design: A Transdiciplinary Approach." 2009 CELA Conference (Council of Educators for Landscape Architecture), Tucson, AZ. Peer Review.

Additional water related Conferences and Professional Meetings that do not fall within the scope of the TWP may be denoted in the following individual reports .

RELATED PROJECTS AND FUNDING

Related Projects

1. Title: Fostering Environmental Stewardship of the Gulf of Mexico: A Trans-Boundary Network of Water Education and Monitoring for Animal Producers, Classrooms and Community Volunteers
   Source: US-EPA Gulf of Mexico Program
   PI: W. Deutsch, W.F. Owsley, L. Yokel, M Ramos-Escobedo
   Date submitted: March 2008
   Grant period: 1/1/09-12/31/2011
   Amount: $299,999 ($57,740 in-kind)
   Project Total: $357,739
   Status: Funded

2. *Title*: StateView Research Program Development and Operations for the State of Alabama
   Source: USGS
   PI: L.J. Marzen and J.M. Wersinger
   Date submitted: June 2008
   Grant period: 7/1/08-6/30/09
   Amount: $24,000
   Status: Funded

3. *Title*: Estimating Regional and Local Scale Surface Moisture as an Indicator Of Drought And Crop Yield Using Thermal IR Remote Sensing
   Source: AWRRI/USGS
   PI: L.J. Marzen, D. Hite and W. Tadesse
   Date submitted: November 2007
   Grant period: 3/1/08-2/28/09
   Amount: $45,894
   Status: Funded

4. *Title*: Economic Development in Alexander City, Alabama
   Source: CADC
   PI: C. Lebleu, E. Swindell
   Date submitted:
   Grant period: 7/1/08-6/30/09
   Amount: $12,000 (in-kind)
   Status: Funded

5. *Title*: Tallapoosa Watershed Travel
   Source: CADC
   PI: C. Lebleu
   Date submitted:
   Grant period:
   Amount: $237
   Status: Funded

6. *Title*: State of Our Watershed Conference
   Source: Central Alabama Community College

PI: E. Reutebuch
Date submitted:
Grant period:
Amount: discount of $2,000 on Betty Carol Graham Technology Center
Status: Funded

7. *Title*: State of Our Watershed Conference
   Source: Middle Tallapoosa Clean Water Partnership
   PI: E. Reutebuch
   Date submitted:
   Grant period:
   Amount: $2,000
   Status: Funded

8. *Title*: State of Our Watershed Conference
   Source: Montgomery Water Works and Sanitary Sewer Board
   PI: E. Reutebuch
   Date submitted:
   Grant period:
   Amount: $1500
   Status: Funded

9. *Title*: 2009 Lake Martin Water Quality Study
   Source: Alabama Power Company
   PI: W. Deutsch, E. Reutebuch, W. Seesock, J. Glasier
   Date submitted: April 2009
   Grant period: April 2009-February 2010
   Amount: $39,072
   Status: Funded

10. *Title*: Use of ALOS Imagery in the development of a toolbox for resource managers in the Tallapoosa Watershed Project: Bridging the Gap between Science, People, and Policy
    Source: Americas ALOS Data Node's (AADN) Announcement of Opportunity (AO)
    PI: L. Marzen, E. Reutebuch
    Date submitted: April 2009
    Grant period: N/A
    Amount: $2,500
    Status: Funded

Related Proposals

In Review

1. *Title*: Assessing Vulnerabilities of Surface Water Supply in Streams And Reservoirs of the Tallapoosa River Basin Due to Climate Variability, Climate Change, and Human Activities
   Source: USGS
   PI: X. Fang, L. Marzen, K. Odum
   Date submitted: February 2009
   Grant period: 9/1/2009-8/31/2011
   Amount: $158,234
   Status: In review

2. *Title*: Reducing Drought Risks in the Southeast USA: Quantification of Drought Information Value, Development of Drought Indices, and Communication of Drought Information
   Source: NOAA-SARP
   PI: P. Srivastava; Co-PIs: D. Nadolnyak, L. Kalin, N. Breuer, K. Ingram, R. Marcus, D. Stooksbury, and M. Chelliah
   Date submitted: October 2008
   Grant period: August 2009 - July, 2011
   Amount: $291,199
   Status: In review

Not Funded

1. *Title*: Building Green Communities: A Hands-on Educational Approach—Green for Life!
   Source: AU VPO Outreach Grant
   PI: C. Lebleu
   Date submitted: March 2009
   Grant period:
   Amount: $19,983 ($14,562 in-kind) Project Total $34,545
   Status: Not funded

3. *Title*: Documentation of Stakeholder Evaluations of Water Governance Models for the Tallapoosa River Basin, Alabama
   Source: AU VPO Outreach Grant
   PI: W. Deutsch, D. Rouse, E. Reutebuch and J. Oates
   Date submitted: March 2009
   Grant period: May 2009-October 2009
   Amount: $16,750
   Status: Not funded

4. *Title*: Assessing Impacts And Vulnerabilities Of Surface Water in Streams And Reservoirs Of The Tallapoosa River Basin Due to Climate Variations, Droughts, and Global Climate Change
   Source: AWRRI/USGS
   PI: X. Fang and L. Marzen
   Date submitted: Nov. 2008
   Grant period: 3/01/09-2/28/10
   Amount: $71,000
   Status: Not Funded

5. *Title:* A Comprehensive Assessment of Drought and Population Growth Induced Stress on Water Supply and Demand
   Source: AWRRI/USGS
   PI: L. Kalin, P. Srivastava
   Date Submitted: Nov. 2008
   Amount: $25,000
   Grant period: March 1, 2009 – February 28, 2010
   Status: Not Funded

6. *Title:* Impacts of Installed BMPs and Current Lawn Care Practices on Nutrient Loading from Stormwater Run-off into Saugahatchee Creek
   Source: AWRRI/USGS
   PI: W. Deutsch, W. Seesock and E. Reutebuch
   Date Submitted: Nov. 2008
   Amount: $25,000
   Grant period: March 1, 2009 – February 28, 2010
   Status: Not Funded