

# EDUCATING PUBLIC SCHOOL TEACHERS ON THE IMPORTANCE OF GEORGIA'S WATER RESOURCES

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**Abstract.** The Mountains to the Sea Program was designed to expose public school teachers to the diversity and importance of life in Georgia's aquatic ecosystems from the mountains to the waters around St. Catherines Island. Participants joined educators and researchers for ten days of intensive field experience. They learned how landscape and land management affect the flow pathways and chemistry of water and the dependant aquatic organisms. Twelve teachers traveled to and sampled in several river basins within Georgia's major ecoregions. They learned how inland waters and their personal actions could impact coastal organisms and examined many of these species on a Georgia Coastal Resources Division trawler. Teachers participated in an ongoing study (since 1996) examining the fishes of St. Catherines Island. Participants were certified to teach materials from Project Wet and Project Learning Tree, collect data for Georgia's Adopt-A-Stream Program, and use these tools to support teaching strategies mandated by the Georgia Performance Standards (GPS) and in adherence to the National Science Education Standards (NSES). This project was funded by Georgia's Improving Teacher Quality Program.

## INTRODUCTION

"Georgia manages water resources in a sustainable manner to support the state's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens." This policy statement from the Comprehensive Statewide Water Management Act was signed by Governor Sonny Perdue in May 2004. This important bill states that all citizens have a stewardship responsibility to conserve and protect the water resources of Georgia. In order to affect the citizenry of our state, we should start with educating children about water resources and the life it supports. This process can begin by empowering our teachers to disseminate current scientific knowledge and aquatic wildlife observation techniques.

Practical hands-on activities, field experience, and classroom learning will be combined to provide teachers with tools for disseminating information to their students.

Each participant will receive materials for use in their classroom. Participants will be able to register for 4 hours graduate or undergraduate credit through Augusta State University.

## OBJECTIVES

This program should expose teachers to a continuum of impacted and non-impacted ecosystems from the mountains to the sea, in order to gain a better understanding of the following:

- 1) ecosystem variation along a continuum, including variability in stream size and longitudinal location.
- 2) physical, chemical, and biological differences associated with each ecosystem.
- 3) relationship between physical and chemical differences and how they influence biological communities.
- 4) changes in ecosystems due to anthropogenic impacts (students can gain a better understanding of their contribution to water quality issues and ecosystem health by incorporating the role of humans).
- 5) scientific terminology related to the study of streams and surrounding landscapes and basic methods for quantitatively analyzing water resource problems.
- 6) hands-on activities for classroom learning that correlate to state curriculum guidelines.
- 7) environmental literature for improving basic reading skills while reinforcing new knowledge of natural resources.

## METHODS

The program began with a two-day session at Augusta State University, in which participants were introduced to field collection methodology and certified to teach activities included in two nationally recognized environmental education programs, PLT and Project Wet. These environmental education programs were used as the vehicle to teach their students about Georgia's water resources, while meeting requirements of Georgia's Performance Standards. The ten-day summer field intensive portion

began in North Georgia with an aquatic ecology program presentation by GA Department of Natural Resources (DNR). From there teachers were exposed to continuum of impacted and non-impacted streams in each of the following ecoregions of Georgia:

Blue Ridge: Smithgall Woods

Piedmont:

Southern inner piedmont – Gainesville area

Southern outer piedmont – Athens area

Southeastern Plain: Sand Hills – Augusta

Floodplain low terrace: Augusta (black water creeks)

Southern Coastal Plain:

Floodplain low terrace – Brunswick area

Sea Islands/Coastal Marsh – St. Catherine’s Island

In Brunswick, the GA DNR Coastal Resources Division took the group on their Research Vessel Anna to show and discuss the types of organisms collected in their trawls. Finally, the group visited St. Catherine’s Island and participated in an ongoing research project that involves studying the fishes occurring along the beaches. While staying on the island, they learned about fragile sea island ecosystems and how upstream pollution could impact them.

Basic water chemistry measurements (i.e. dissolved oxygen, pH, temperature, conductivity, turbidity, flow etc.) were collected at each location. These measurements were compared to expected values for each ecoregion and state standards. Teachers learned why each parameter is important to survival of organisms and ecosystem health.

Fishes and aquatic insects were collected and identified to determine the health, sensitivity, and importance of each organism within its ecosystem. Comparisons were made to distinguish differences in number, type, and diversity of each sample. Differences were used to evaluate relationships between fishes and aquatic insects at each location and the associated geology, flow characteristics and habitat conditions.

## RESULTS AND DISCUSSION

### Evaluation:

- 1) Participants were given a pre- and posttest to evaluate the impact of this program on teacher knowledge. Pretest scores reflected a weakness in knowledge of aquatic ecosystems and no teachers answered the questions correctly. Following completion of the course, all teachers received a “B” or better on the posttest.
- 2) Individuals were required to pass the Adopt-A-Stream (AAS) chemical analysis test for certification in the AAS Chemical analysis program.

### Incorporation of material into lesson plans:

- 1) Teachers developed a PowerPoint presentation linked to their lesson plans, which they could use in their individual classrooms.
- 2) Each participant selected three Project Wet and/or Project Learning Tree activities for use in conjunction with the above presentation, and described how the activity correlated with state curriculum guidelines.
- 3) At the end of the class, all presentations and lesson plans were shared and distributed.

### Unexpected Results:

- 1) Participants gained a better understanding of their influence on water quality issues. During presentations, each teacher reflected that they were made aware of their individual impacts on Georgia’s delicate aquatic resources, including coastal systems.
- 2) Participants learned about available recreational and professional opportunities in natural resources.

### Project Status:

Currently, the program is being expanded to include 14 teachers, provide more information on local educational resources and describe the implications of reservoir releases on the ecology of the whole stream ecosystem.

## CONCLUSIONS

This workshop provided educators with background knowledge on Georgia’s water resources. Teachers have a better understanding of quantitative methodology, proper sequence of data collection, and importance of repeatability when conducting scientific experiments. By comparing scientific-based methodology with inexpensive qualitative techniques, which can be used in low-budget districts, they have tools to use in their own classroom.

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