



CHIPOLA AREA GROUND WATER OUTREACH PROJECT

Volume 1, Issue 1

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Produced by: Chipola College Science Department

College Professors Visit Carr Middle School

Chipola College professors ask area school students:

- What is ground water?
- Why is it important?
- Can it become polluted?
- How can we prevent ground water pollution?



Read more about the Chipola Area Ground Water Outreach Project:

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The purpose of Science Night was to stimulate an interest in science among the students of Carr Middle School and their parents. FCAT has a science portion that impacts the overall grade for the school.

The Ground Water Outreach station was one of five student stations. The students rotated from one station to the next in groups of 10 to 15.

The other stations were used for various science demonstrations. The five stations were manned by the two instructors and the three teacher candidates.

The soil percolation demonstration made the audience aware of the permeability of different soil types (sand, clay, and loam).

The sandy soil is the most permeable and allows water and possible pollutants to reach the ground water in the shortest time. The connection was made between this and the fact that there is an abundance of sandy soil and porous limestone, and the near surface water table that exists in our area. All of these are factors that increase the possibility and rate of ground water contamination.

Attention was directed toward the Northwest Florida Water Management District posters and brochures. Students and parents also participated in a discussion about caverns and sinkholes and how they form.

Each participant received a total of six brochures on water-related issues. They were instructed to read each and then give the brochures to their parents so they could become more aware of ground water and its importance.

The school's science teacher agreed to do an extra reading assignment using the brochures. The students were to provide a written report on a topic covered in the brochures.

Everyone was encouraged to Think About Personal Pollution (TAPP).

The audience was engaged in discussion regarding the following:

- What is ground water?
- Why is it important?
- Can it become polluted? How?

Nitrate pollution in Merritt's Mill Pond in Marianna, FL, and EDB contamination of well water were used as examples.

Some ways the students and parents can help prevent ground water pollution:

- 1) Minimize fertilizer use on lawns.
- 2) Use fertilizer with 0% phosphorus. (The three letters [N-P-K] found on fertilizer bags were explained.)
- 3) Dispose of used motor oil properly.
- 4) Maintain septic tanks properly.



Components of Science Night

Those Involved:

Allan Tidwell, MS
Santine Cuccio, Ph.D.
Three students from Chipola's Bachelor of Science program

Demonstration:

Percolation rates of water through soil types and implications for contamination of water.

Date of Activity:

January 23, 2007

Audience:

150 (Grades 5-8) and parents

Location:

Carr Middle School

Materials:

TAPP video clips
Dell Inspiron laptop
Portable LCD Projector
NFWMD brochures and posters
Three different soil samples
Three ring stands
Three clamps
Three 60cc syringes

Hours of Preparation and Effort:

Prep Time	2 hours
Activity Length	3 hours (5 p.m. to 8 p.m.)
Set-up/Take-down	1 hour
Travel Time	1 hour
Total Time	7 hours

B.E.S. Students Learn About Ground Water Issues

Chipola science instructors presented a ground water seminar to Blountstown Elementary School students and their parents during a Science and Reading Night on Nov. 6, 2006.

Professors Santine Cuccio and Allan Tidwell presented a video on the topic of pollutants and how they find their way into ground water. Students and parents were provided related brochures from the Northwest Florida Water Management District and posters on water preservation.

The professors also presented a hands-on demonstration on the effects of varying soil particle size/type on water filtration and how to be good stewards in preserving our water resources.

The ground water lesson implemented the following Sunshine State Standards:

- ◆ The student understands the consequences of using limited natural resources.
- ◆ The student uses the scientific processes and habits of mind to solve problems.
- ◆ The student understands that science, technology, and society are interwoven and interdependent.
- ◆ The student understands that all matter has observable measurable properties.
- ◆ The student knows that using, recycling, and reducing the use of natural resources improve and protect the quality of life.



Professor Allan Tidwell explains about water filtration and the Florida aquifer.



Students learn about filtration rates of different soil types.



Students collect data on the filtration rates of the different soil types.



Dr. Santine Cuccio demonstrates the use of a pipette to Blountstown Elementary students.

Components of Science and Reading Night

Those Involved:
Santine Cuccio, Ph.D.
Allan Tidwell, MS

Demonstration:
Percolation rates of water through soil types and implications for contamination of water.

Date of Activity:
November 6, 2006

Audience:
Elementary school students

Location:
Blountstown Elementary School

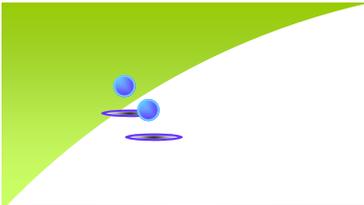
Materials:
TAPP video clips
Dell Inspiron laptop
Portable LCD Projector
NFWMD brochures and posters
Three different soil samples
Three ring stands
Three clamps
Three 60cc syringes

Hours of Preparation and Effort:
7 hours

Expenses Incurred:
Travel from Marianna to Blountstown
Syringes



Funding for the Chipola Area Ground Water Outreach Project provided by the Florida Department of Environmental Protection.



Details about this expedition and others can be found at www.karstproductions.com.



Expedition divers struggle through tight spots as they navigate the cave systems in the Floridan aquifer.



Divers illuminate the underground river system as they follow its path.



The cave survey team tracks the divers through the aquifer maze.



The divers find various human debris, such as the tires shown here, in the Floridan aquifer system.

Chipola Students View Water's Journey

Chipola students enrolled in Chipola College's Earth Science classes had the opportunity on Feb. 13 to view the documentary *Water's Journey -- The Hidden Rivers of Florida*. Twenty-two students earned five extra credit points by attending the 2 p.m. viewing.

The purpose of the film was to provide a better understanding of how people affect ground water and streams and to discuss best management practices.

The film focuses on a diving expedition into the Floridan aquifer. It follows two professional cave divers who enter the aquifer system through a disappearing stream and navigate more than 10 miles under the earth's surface. A cave survey team on the surface tracks them in real time using a GPS tracking system — a process never done before.

Professor Allan Tidwell expressed how interesting it was to watch the divers' progress as they swam under golf courses, restaurants, bowling alleys, interstate roads, etc., and to see how the surface team was able to track them.

As the divers navigated the Floridan aquifer, the negative effects of humans were very obvious. Some of the debris dumped into sink holes and cave entrances had been carried into the aquifer.

Also visible was the ground water contamination near entrances where there was significant runoff into the aquifer.

The point was well made that water cycles from the earth's surface to below the surface and back to the surface. And ground water conservation was emphasized.

During the past 40 years, Florida's population has quadrupled. For this reason, ground water quality and quantity should be everyone's concern.

Students viewing the film were invited to attend a discussion session on Wednesday, Feb. 14, at 10 a.m. The 35-minute session provided a forum for the exchange of ideas and information regarding the film's topics. The six students attending received five extra credit points.



Instructors Allan Tidwell and Steve Shimmel join the Earth Science students during the viewing of the documentary film *Water's Journey -- The Hidden Rivers of Florida*.

More information about Florida's ground water is offered by the Florida Department of Environmental Protection at www.dep.state.fl.us/water/ground_water.

Components of Film Viewing

Those Involved:
Allan Tidwell, MS

Topic:
Florida's springs and Floridan aquifer

Date of Activity:
February 13 and 14, 2007

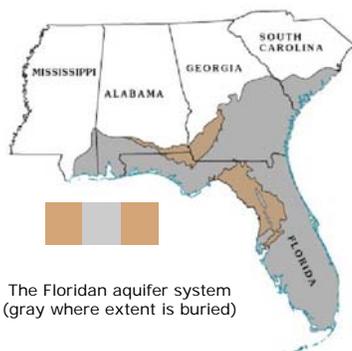
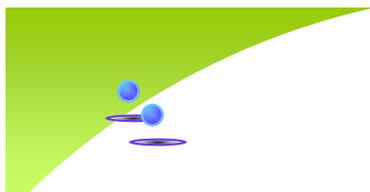
Audience:
22 Earth Science college students (GLY 1001)

Location:
Chipola College

Materials:
Documentary on DVD: *Water's Journey -- The Hidden Rivers of Florida*

Hours of Preparation and Effort:

Film Preview/Troubleshooting	1.5 hours
Film length	1.0 hours
Discussion session	.5 hour
Total Time	3.0 hours



The Floridan aquifer system
(gray where extent is buried)

The Floridan aquifer system is one of the most productive aquifers in the world. It underlies an area that is about 100,000 square miles. It provides water for several large cities, including Savannah, GA, and Jacksonville, Tallahassee, Orlando and St. Petersburg, FL.



According to the USGS, "over 700 sinkholes formed in response to developing a well with air in the highly karstified Upper Floridan aquifer at the Pasco/Citrus County line in west-central Florida, February 1998.

The well had been drilled about 20 feet into a cavity (no circulation), then air lift methods were used to develop the well.

Immediately after air-lift methods began, small sinkholes started appearing all over the 20 acre area. The well development was abandoned and the crew tried to move equipment and themselves off site as trees toppled around them. Subsidence continued for several hours and the initial sinkholes, closest to the well, expanded to become the largest in the area."



In Indiana, this artesian "blue-hole" spring is 60 feet in diameter.

Earth Science Classes Study Ground Water

Earth Science students at Chipola College focused on ground water and its importance to humans during recent class lectures. Professor Allan Tidwell presented the students with these and other related topics, highlighted by an accompanying PowerPoint presentation and brochures on the prevention of personal pollution.

The class lectures explored the source of ground water and its vital role above and below the surface of the earth. Students learned that ground water is the source of approximately 40 percent of all water that humans use.

Ground water serves as the drinking water for more than 50 percent of the population and is utilized as 40 percent of the water used for irrigation.

Overuse has caused streamflow depletion and land subsidence and has increased pumping costs.

Students learned about:

- Ground water distribution (belt of moisture, zones of saturation, the water table, and zones of aeration).
- Ground water movement (porosity and permeability).
- Water features (hot springs, wells, and artesian wells).
- Environmental problems affecting ground water (mining ground water, contamination, and land subsidence).

- The geologic effects of ground water (caverns, stalactites, stalagmites, and Karst formations).

Students were quizzed on the material that was presented during the class lectures.



The Stone Forest in Yunnan, China (shown above) is a typical karst formation. It covers more than 300 square kilometers. Scientists say that this area was an immense expanse of water 270 million years ago.



Shown above are examples of stalagmites and stalactites in the Florida Caverns in Marianna, Florida. Rimstone, like that shown below, appears only in dry caves.



Components of Earth Science Class Lectures

Those Involved:

Allan Tidwell, MS - Instructor

Topic:

Ground water and its importance to humans, environmental problems affecting ground water, and measures to protect ground water.

Date of Activity:

January 31 through February 5, 2007

Audience:

70 Chipola College students enrolled in Earth Science (GLY 1001)

Location:

Chipola College

Materials:

[Foundations of Earth Science](#) (textbook)
PowerPoint presentation
Brochures about personal pollution (non-point source pollution, septic tanks, fertilizers, and pesticides)

Hours of Preparation and Effort:

Prep Time	2 hours
Activity Length	9 hours (3 hrs per section)
Total Time	11 hours

Earth Science Students Tour Florida Caverns State Park



In March of 1937, government surveyor Oliver A. Chalifoux and his assistant, Mr. Colston, discovered an entrance to the cave system that is now the Florida Caverns. The caverns and surrounding land were initially purchased for a private tourist attraction. The cave system and land later became Florida's seventh state park.

The Florida Caverns were developed during the 1930's by the Civilian Conservation Corps (CCC). Due to the CCC program and the men who excavated the floor and walls, the dry cave was opened to the public in 1941. It is the only developed tour cave in the Florida State Park System.

More than a dozen caves exist within the park with the Florida Cavern being the main tour cave.

Forty-three of Chipola College's Earth Science students toured the Florida Caverns on Tuesday, Feb. 20. The students viewed various types of cave formations called speleothems, such as soda straws, rimstone, stalactites, stalagmites, draperies, flowstone, and scallops.



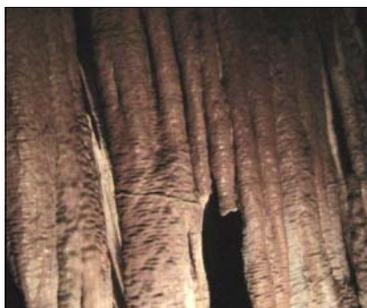
Students learned that the formation of the cave system began 38 million years ago with the deposit of calcium carbonate sediments on the floor of a warm, shallow Eocene sea, which covered much of what is today the southeastern United States.

Over time the carbonate sediments solidified into rock named the Ocala Limestone, which now comprises the bedrock in which the caves are formed. Because the rock is close to land surface, the carbonates have been exposed to dissolution by slightly acidic rain and ground water.

The water dissolves the rock, forming karst terrain, which is characterized by features such as sinkholes, disappearing streams, and caves.

Sea level remained at or below present level for most of the past 20,000 years, during which time the upper portion of the Ocala

Limestone was perched above the water table. Over thousands of years, ground water percolating through the rock dissolved the carbonate bedrock, creating the caves.



Components of Caverns Tour

Those Involved:
Allan Tidwell, MS - Instructor
Santine Cuccio, Ph.D.

Topic:
The effects of ground water and karst topography.

Date of Activity:
February 19, 2007

Audience:
Three sections of GLY 1001, with a total enrollment of 70 students, were given the opportunity to take a cave tour at Florida Caverns State Park.

Two tours were arranged at 10 a.m. and 12 noon. A total of 43 students participated. The cave tour

allowed the students to view dripstone, flowstone, rimstone and other cave formations, karst terrain, and to learn the significance of groundwater to this environment and some of the geologic history of this area.

Location:
Florida Caverns State Park, Marianna, FL

Materials:
None. Park admission was waived and the group rate for the cave tour at \$4.00 per student.

Hours of Preparation and Effort:

Prep Time	.5 hours
Activity Length	1.5 hours (.75 hours per tour)
Travel Time	.75 hours (2 round trips)
Total Time	2.75 hours

Chipola Students Visit Marianna's Wastewater Facility



Do you know from where your drinking water comes in Marianna? Or how our ground water is protected from sewage?

To answer these questions and to prepare for a research project to study ground water with Marianna High School, five Chipola student teachers embarked on a tour of Marianna's Water and Wastewater Facility on Feb. 20.

Marianna's Wastewater Facility

The tour was guided by Rick Harrell, superintendent of the facility. Highlights of the tour included source and treatment of ground water for drinking purposes and treatment of wastewater for the protection of ground water. The newest feature to be completed in the next several months is a sprayfield. Currently, the treated water is dispersed into the Chipola River.

Treatment of Wastewater

The tour began with a brand new headworks, which contains a screen mechanism to trap solids. A degritter is housed in this unit which allows sand to settle. The sand is taken to the landfill. The clear water effluent is transported for biological treatment. This consists of aeration and bacterial feeding. The byproduct is sludge which is transported to the landfill, too. In approximately six months, the water will be dispersed over a sprayfield in lieu of the Chipola River.



Drinking Water

Students had the following questions:

- how many wells are in use
- what are the depths of the wells
- from which aquifer is the water drawn
- what is the source of the water to be treated
- where is the source intake located
- what is the capacity of the drinking water treatment plant
- what is the maximum use on an average day
- what is the typical analysis of the water before and after treatment
- how many pollutants in the raw water are monitored
- how many miles of pipeline are part of the system
- how many homes and businesses are served by the drinking water treatment plant

The students were given the City of Marianna Annual Water Report, which included a list of potential contaminants. The report shows that the water's contaminants are substantially below the allowed level.

Marianna residents are able to enjoy a more "natural" drinking water because pipe distances are shorter and there is less time for anaerobic bacterial growth. Only a small amount of chlorine is added.



Components of Water and Wastewater Facility Tour

Those Involved:

Santine Cuccio, Ph.D., Science Education
Allan Tidwell, MS

Activity:

Tour of Marianna's Water and Wastewater Facility

Date of Activity:

February 20, 2007

Audience:

5 students of Chipola's Secondary Science Methods Course

Location:

Water and Wastewater Facility, Marianna, FL

Chipola College and Chipley High Students Examine Wells



Chipola's secondary education science students in a college ecology class implemented a well water study with three classes of high school chemistry students, under the direction of high school and college teachers.

Over the course of three class periods the biology students worked cooperatively to design and execute a quasi-experiment. The project consisted of several parts:

- 1) Collaboratively, the college students designed a field experience in which high school students would construct a researchable question and use a scientific method to study the well water quality in Washington County.
- 2) Individually, the college students researched various measures of water quality (see title), and reported on techniques for measurement, implications for environmental quality and human health.
- 3) Individually, the college students wrote lesson plans and taught high school classes on scientific methods, including a "hands-on demonstration" of good experimental design, and introduced the upcoming field trip to the three wells in Washington County.
- 4) Collaboratively, the college students collected supplies and equipment and took three classes of high school students on one field trip each (three different wells) to sample water quality at different sites in Washington County.
- 5) Individually, the college students returned to the high school to share data from all the field trips, teach the high school students how to organize the data in tables and graphs, and lead the high school students in a discussion of the results.
- 6) Individually, the college students designed assessment instruments to test the high school student's knowledge of scientific methods, water quality and the results of the field trip.

Student Involvement, Reactions and Benefits

The students' cooperative learning opportunities were inquiry based. Therefore, critical thinking and problem solving were the basis for integrating science concepts to solve an authentic or real world problem.

The following process skills were practiced: observing, measuring, communicating, inferring, predicting, identifying variables constructing data tables and graphs, describing relationships between variables, acquiring and processing data, analyzing investigations, constructing hypotheses, defining variables operationally, designing investigations, and experimenting.

Moreover, it gave the student teachers an opportunity to reflect on their teaching of science, technology and critical thinking in accordance with the Florida Educator Accomplished Practices (4.1, 4.2, 4.3, 4.8, 4.9). Instructors were able to integrate the science education methods course with ecology lab, environmental science and marine biology. The students were enthusiastic as they took ownership of the problem which they designed through the construction of the researchable question.

Plans for Future Continuation and Modification

The project may be repeated biannually and the statistics added to the research literature. The results will be compared to assess any change in water quality.

Students may present the data to a visiting member of the environmental protection agency who may be interested in recording this data. Students may write a paper summarizing their results for submission to a journal. Further questioning and experimenting will ensue as students discuss reasons for changes in water quality.

Components of Well Water Examination

Those Involved:

Stephen Shimmel, Ph.D., Ecology
Santine Cuccio, Ph.D., Science Education
Caren Prichard, MS, Chipley High School
Three Chipola College students
75 Chipley High School students

Project Title:

Well Water Quality in Washington County, Florida:
Effect of well location (cattle ranch, vegetable farm and Falling Waters State Park) on water quality parameters (temperature, dissolved oxygen, pH, calcium, nitrate, ammonia, phosphorus, iron)

Date of Activity:

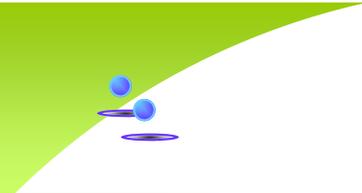
October 1-3 and 6-7, 2006

Audience:

75 Chipley High School chemistry students

Location:

Washington County sites: cattle ranch, vegetable farm, Falling Waters State Park



Project Info

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On the Web

More details regarding the Chipola Area Ground Water Outreach Project can be found on the Chipola College website or by visiting:

<http://www.chipola.edu/grants>

Visit Florida's Department of Environmental Protection website for more info on water resources.

<http://www.dep.state.fl.us/water/>

Newsletter Credits

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Chipola Focuses on Ground Water

Chipola College has recently received funding for a Department of Environmental Protection grant, titled the *Chipola Area Ground Water Outreach Project*. This project is designed to provide Chipola's science students and Chipola's pre-service science teachers with opportunities to engage in learning activities with middle and high school students, focusing on the value of ground water to all users.

This project will introduce ground water as a valuable resource to the Chipola College district students and communities in the counties of Calhoun, Holmes, Jackson, Liberty and Washington. Ground water is a valuable and immediate resource, which, when misused, has immediate repercussions for the land, animals, and residents of a region.

Further, Learning in Florida's Environment (LIFE) is an initiative to establish a series of field-based, environmental-science, education programs around the state.

The initiative includes a focus on:

- alignment with Florida Sunshine State standards
- emphasis on observation and inference as critical components of the scientific method
- integration of all subject areas by connecting field experiences with pre- and post-classroom lessons, in addition to other guiding principles.

An educator group consisting of middle and high school science instructors, and Chipola's Science faculty and B.S. Science Education majors will be developed. This group will promote, develop and implement hands-on learning activities to understand ground water value and will disseminate information to our stakeholders.

Stakeholders consist of our children, who are long-term learners, college and young adults who are mid-term learners, and short term learners who are adults in the community.

Contacts for Water Quality and Septic Tank Issues

Calhoun County Health Department	850-674-5645
Holmes County Health Department	850-547-8500
Jackson County Health Department	850-482-9227
Liberty County Health Department	850-643-2415
Washington County Health Department	850-638-6260

Five District School Partners**Calhoun County**

Bonnie Fagen, Juan Lima, Shannon Romer, Sally Sims

Holmes County

Janice Andrews, Dawn Barone

Jackson County

Rebecca Beasley, Amanda Bloomer, Amanda Clark, Karen Pannell, Paulat Wright

Liberty County**Washington County**

Greta Draayom, Cindy Padgett, Gail Porter, Caren Prichard, Jackie Stokes-Taylor

Other Partners

Greg Ira - Florida Department of Environmental Protection, Learning In Florida's Environment (LIFE) Program, 850-245-2132

James Dodson - Florida DEP Ground Water Protection Section, 850-245-8230