

Exploring the Water Atlas *Teacher's Guide*

Students learn how to use the Watershed Atlas through a four-part series of activities.

ACTIVITIES INCLUDED:

- Part 1: Explore Your Watershed
- Part 2: Explore a River and Two Lakes
- Part 3: Explore Dissolved Oxygen
- Part 4: Explore Website and Research

GRADE LEVEL: 6th – 12th

SUBJECT AREA/COURSE: Science

SUNSHINE STATE STANDARDS:

- The student knows that conditions that exist in one system influence the conditions that exist in another system. SC.D.1.3.3
- The student knows that the interactions of organisms with each other and with the non-living parts of their environmental result in the flow of energy and the cycling of matter throughout the system. SC.G.1.4.1
- The student knows that accurate record keeping, openness, and replication are essential to maintaining an investigator's credibility with other scientists and society. SC.H.1.3.4
- The student knows that no matter who does science and mathematics or invents things, or when or where they do it, the knowledge and technology that result can eventually become available to everyone. SC.H.3.3.6
- The student knows that computers speed up and extend people's ability to collect, sort, and analyze data; prepare research reports; and share data and ideas with others. SC.H.3.3.7

ACADEMIC OUTCOMES/LESSON OBJECTIVES:

- Students will be able to search a document and determine relevant information.
- Students will read a graph and show relationships between variables.
- Students will be able to report data in the form of a data table.
- Students will be able to download data and make a graph using the data.
- Students will be able to use a search engine to find information.

BACKGROUND INFORMATION: The Seminole WaterAtlas, also known as the Watershed Atlas, is a depository of scientific data and documents on the surface waters of Seminole County, Florida. This set of four student sheets guides both teachers and students into familiarity with this rich website. Students may work at their own pace, or in pairs. The teacher may plan one Student Sheet per class period. Data is continually updated, so the information will change from year-to-year.

The teacher can gain a working knowledge of how to use the Seminole WaterAtlas website as well as a site-specific answer key by working through the activities in preparation for class. Students will use Excel or another spreadsheet program to set up a data table and will search the web for information.

DURATION: Four class periods

MATERIALS NEEDED: Computers connected to the Internet (Internet Explorer, Netscape, Safari, etc.) with www.Seminole.WaterAtlas.org bookmarked, access to a printer, paper, student handouts, highlighters.

SAFETY: N/A

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VOCABULARY: Watershed, dissolved oxygen (DO), exotic plants, trophic state index, nutrient chemistry, macroinvertebrate

EVALUATION:

- The student will complete the student handouts.
- The student will complete a data table with the information on Water Quality.
- The student will define the vocabulary words and use each correctly in a paragraph written about the activity.

STUDENT HANDOUT ANSWER KEY:

Many topics will be site-specific or subject to change over time, so can't be answered in a key.

Part One: Explore Your Watershed

4. A watershed (also called a drainage basin) is an area on the land surface from which water flows or has the potential to flow into a stream or lake. Watersheds are naturally separated from adjacent basins by topographic divides.
5. e. Water Quality Trend shows how the quality of the water is changing over time. Water Quality Status is like a snapshot of water quality at a given time.
5. i. When the sun is shining, readings for both U.V. exposure and temperature increase.
5. k. south, north
5. l. Florida LAKEWATCH

Part Two: Explore a River and Two Lakes

12. An exotic plant is one that is not native to Florida. People brought it here. Because it does not have the same "enemies" as it had in its home country, such as diseases and things that eat it, the exotic can out-compete native plants and change the habitat. Animals in the area can't find food and die or move away. Aquatic exotic plants can clog the waterways so boats and even fish can't get through. Floating exotic plants can shade the plants living on the lake or river bottom that are homes and food to aquatic animals.
14. Digital photos can be submitted by clicking on "Submit a Photo" under the Photo tab and following directions.

Part Three: Explore Dissolved Oxygen

9. Both aquatic animals and aquatic plants depend on dissolved oxygen in the water. They can't use the oxygen in the H₂O molecules, but there are other atoms and molecules (such as oxygen) tucked in among the water molecules. Animals need to be able to take in oxygen and get rid of carbon dioxide during respiration, when they use their food for energy. Plants in the water put oxygen into the

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water during photosynthesis, but they use up oxygen during respiration. Decomposing organic matter uses up oxygen in the water. If the level is too low there may be a fish kill. Macroinvertebrates (invertebrates one can see with the eye) have different tolerances for available oxygen.

10. Cold liquids including water can hold more gas such as oxygen than can warm water. When a cold soda gets warmer, the gas (carbon dioxide) bubbles out of the liquid.

11. Summer

13. Fish that live in warm water generally require dissolved oxygen concentrations of at least 5 parts per million also expressed as 5 milligrams per liter or 5 mg/L. Just like humans, fish can endure brief periods of reduced oxygen. However, if DO levels drop below 2 mg/L, they aren't always able to recover. When concentrations fall below 1 mg/L fish begin to die. Dissolved oxygen values vary naturally throughout the day directly related to photosynthetic activity.
14. Daily fluctuations of oxygen levels are related to photosynthesis of aquatic plants. They give off oxygen during the daylight hours. Plants use oxygen for respiration and give off carbon dioxide, just like animals do. Respiration is occurring all the time, but at night the oxygen isn't replaced by photosynthesis so the level of dissolved oxygen drops.

Part Four: Explore Website and Internet Search

2. The Trophic State level was 5.4 (good) in 1977.
5. a. 1968
6. Aquatic macroinvertebrates are critters that fish and birds feed on. Some species are indicative of poor water quality and others indicate good or excellent water quality. Other species in Florida are threatened or endangered. Some species such as mussels and crayfish are fairly reliable indicators of habitat quality. Macro means you can see it with your eye.

AUTHORS: Polly Wilson and Pat Burkett