

Interview a Lake Lesson Plan

Students investigate scientists' collection and use of data.

Lesson Summary: What are some of the ways a lake gets polluted? What kinds of data do scientists look at in determining whether a lake or river is healthy? How is that data collected? Students investigate using the Water Atlas, then brainstorm their own creative ideas for judging a lake's quality.

Grade Level: 4-6

Time Allotted:

Four class periods: one to do the FCAT exercise, one to explore the data on the Water Atlas and answer questions about it, one to describe a sensor and prepare for the "expert" visit, and one to interview the expert.

Performance Objectives

References are to the Next Generation Sunshine Standards (2007).

Science

- SC.4.N.1.1 Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
- SC.4.N.1.2 Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.
- SC.4.N.1.7 Recognize and explain that scientists base their explanations on evidence.
- SC.4.N.1.8 Recognize that science involves creativity in designing experiments.
- SC.4.E.6.5 Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.
- SC.5.N.1.3 Recognize and explain the need for repeated experimental trials.

Language Arts

- LA.4.5.2 The student effectively applies listening and speaking strategies.
- LA.5.5.2.1 Listen and speak to gain and share information for a variety of purposes, including personal interviews, dramatic and poetic recitations, and formal presentations.
- LA.A.1.2.3 The student uses simple strategies to determine meaning and increase vocabulary for reading, including the use of prefixes, suffixes, root words, multiple meanings, antonyms, synonyms, and word relationships.
- LA.5.2.2.2 The student will use information from the text to answer questions related to explicitly stated main ideas or relevant details.

Interview a Lake Lesson Plan

Students investigate scientists' collection and use of data.

- LA.5.1.7.2 The student will identify the author's purpose (e.g., to persuade, inform, entertain, explain) and how an author's perspective influences text.
- LA.A.4.2.2.3 The student will organize information to show an understanding of main ideas within a text through charting, mapping, or summarizing.
- LA.A.4.2.2.2 The student will use information from the text to answer questions related to explicitly stated main ideas or relevant details.

Math

- MA.3.S.7.1 Construct and analyze frequency tables, bar graphs, pictographs, and line plots from data, including data collected through observations, surveys, and experiments.
- MA.6.A.1.3 Solve real-world problems involving multiplication and division of fractions and decimals.

Prior Knowledge None.

Topic Overview

This lesson is based on the historical timeline located on the Friends of Lake Apopka website, and on fact sheets about Lake Apopka created by the St. Johns River Water Management District. Lake Apopka became infamous for its dismal water quality after a pesticide spill in 1980. It asks students to think about the kinds of data scientists use to judge the health of environmental systems, and how it is collected.

Key Vocabulary

Benchmark

A standard or point of reference against which something can be compared.

Dike

An embankment built on the edge of a lake, river or sea to hold back water and prevent flooding. *Synonym: levee.*

Hydrology

The science that deals with water as it occurs in the atmosphere, on the surface of the ground, and underground.

Mean sea level

A benchmark that approximates the average height of the ocean's surface.

Parameter

A measurement that helps to define or evaluate the condition of an object or system.

Property

A quality or trait belonging to an individual or thing.

Interview a Lake Lesson Plan

Students investigate scientists' collection and use of data.

Sensor

A device that detects or measures a physical property and responds by recording or indicating its state, or by initiating a predefined action .

Total Nitrogen

A measurement of the amount of the element nitrogen, in all its forms, in a body of water which is used as one measure of water quality. Nitrogen is a component of nutrient pollution found in fertilizers, human and animal wastes, and in organic debris.

Total Phosphorus

A measurement of the amount of the element phosphorus, in all its forms, in a body of water which is used as one measure of water quality. Phosphorus is a component of nutrient pollution found in fertilizers, human and animal wastes, and in organic debris.

Vegetation

Plants considered collectively, especially those found in a particular area or habitat.

Materials

- Computer with internet connection.

References

These references may be found in the Water Atlas Digital Library:

[Homeowner's Guide to Stormwater Runoff](#)

Source: St. Johns River Water Management District. 2002.

[Lake Apopka: A decade of improvement now accelerating](#) (Fact Sheet). 2006. St. Johns River Water Management District.

[Lake Apopka: Water quality improvements, north shore restoration](#) (Fact Sheet). 2006. St. Johns River Water Management District.

Other references:

[Friends of Lake Apopka website](#). Accessed June 2011.

Interview a Lake Lesson Plan

Students investigate scientists' collection and use of data.

Procedure

Engage/Elicit

1. Have students read the Interview with Lake Apopka and answer the questions on the handout.

Explore

1. Guide students to the [Orange County Water Atlas](#). Find the pages for Lake Apopka by typing its name into the Water Resource Search tool. Point out the sampling points displayed on the map of the lake. Explain to the students that each of them represents a place where scientists are collecting data about the lake.
2. Have students visit the Water Quality page for Lake Apopka by clicking on the tab. Point out to them the different kinds of information that is displayed related to water quality: phosphorus, nitrogen, chlorophyll, turbidity, dissolved oxygen, bacteria levels, etc. Tell them that this data was collected using the sampling points shown on the map. Explain what the different parameters measure in terms that they can understand. Encourage them to explore the page and click on the links to view data graphs and read the Learn More pages.
3. Lead the class in a discussion of these questions:
 - a. How does the information that is being collected help scientists know whether the lake is healthy or not?
 - b. Why might scientists want sensors in a lot of different places around the lake, instead of just one (or a few) in a single spot?
 - c. Why would it be useful to a scientist to have data about a single parameter that has been collected periodically over many years?
 - d. What do you want to know about this lake that the collected data do not tell you? (This can be anything measurable, not just physical/chemical parameters. For example, students might want to know how many alligators or fish are in the lake, how many people use the lake, how many and what kind of wildlife use it, etc. They may want to know physical properties, too, like air quality or the amount of water in the lake. Help them to understand which of the qualities/properties they propose are measurable, and which are not.)

Explain

Tell students: Suppose you had the ability to create a sensor that could report any measurable property related to Lake Apopka. What would you design, and how would your sensor help scientists to better understand the lake? Make an illustration of your sensor showing it in operation and create a sample chart showing the kind of data it would generate. Explain, in a few sentences, what scientists might learn from examining the data from your sensor.

Extend

1. Invite an "expert," e.g., a hydrologist, field scientist or natural resource manager, to visit your class. Before the visit, help the class to develop a list of questions about his/her work that they'd like to ask. Instruct them to take notes during the visit so they will remember the

Interview a Lake *Lesson Plan*

Students investigate scientists' collection and use of data.

answers later. After the visit, have students write a story reporting on the visit and what they learned.

Exchange/Evaluate

1. The sensor definitions that students create should demonstrate their understanding of the concept of “measurable” properties, as well as the importance to science of measuring, collecting and comparing observations.
2. Students’ reports on the interview can be used to gauge their ability to take notes, and should be an accurate reflection of events.

Curriculum developed for Orange County Environmental Protection Division by USF’s Florida Center for Community Design & Research. This material is based upon work supported by the Department of Energy under Award Number DE-EE0000791.

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.