

8th Grade Water Quality Class

Objective: Students explore water quality using scientific water quality tests and geographic technology to understand watersheds.

Grade level science competency objectives:

3.05 Analyze hydrospheric data over time to predict the health of a water system including:

- Temperature.
- Dissolved oxygen.
- pH.
- Nitrates.
- Turbidity.
- Bio-indicators.

3.06 Evaluate technologies and information systems used to monitor the hydrosphere.

3.07 Describe how humans affect the quality of water:

- Point and non-point sources of water pollution in North Carolina.
- Possible effects of excess nutrients in North Carolina waters.
- Economic trade-offs.
- Local water issues.

3.08 Recognize that the good health of environments and organisms requires:

- Monitoring of the hydrosphere.
- Water quality standards.
- Methods of water treatment.
- Maintaining safe water quality.
- Stewardship.

Before your RENCi Rover visit

Your students should be familiar with the properties of water and the basic structure of the hydrosphere. The visit is best used as an in-depth investigation, but can serve as an introduction or review. Please let the Outreach Coordinator know if your class has not started the hydrosphere unit. Since students will be visiting stations in groups, please divide your class into four groups before the visit. Stations can be set up outside, weather permitting, or in a classroom.

On-Site Activity (50 minute visit)

The RENCi educator will start with an introduction to watershed and water pollution which will include a short video segment after which instructions and worksheets will be distributed to the four groups.

Students will travel to each of four stations for about 5-10 minutes each.

Station 1: Physical water quality properties: students measure temperature, pH, turbidity and dissolved oxygen

Station 2: Common pollutants: Students measure nitrate and phosphorus

Station 3: Students see bacteria and BOD (biological oxygen demand) test results

Station 4: Students locate their watershed on electronic maps and record water flow by remote sensing.

There will be a short wrap up to activity. Activity sheets can be completed in class.

Note: Water can be collected by the class (or individuals) prior to the visit or can be supplied by the RENCi Outreach Educator. The planned time frame is 50 minutes, but can be extended for greater in-depth experiences or divided into subunits. Call 252-737-1773 or email covim@ecu.edu to talk to the educator about your specific needs.

Pre-lesson Activity# 1 Vocabulary Matching

Match the Terms with their meaning

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|-------------------------------|---|
| 1. Hydrosphere | a. amount of oxygen in water measured in milligrams per liter (mg/L) |
| 2. Water Quality | b. nitrogen-oxygen chemical units found in water due to soils or fertilizer |
| 3. Point source pollution | c. the measure of the acidity or alkalinity of a solution |
| 4. Non-point source pollution | d. cloudiness of water due to tiny particles |
| 5. Watershed/river basin | e. refers to the water in all forms found on the Earth |
| 6. pH | f. contamination in water due to a single identifiable source |
| 7. Dissolved Oxygen | g. a type of water pollution from a salt used in detergents and fertilizers |
| 8. Turbidity | h. the characteristics of water as compared to healthy standards |
| 9. Nitrate | i. the area of land that drains into a river or other water body |
| 10. Phosphate | j. contamination in water due to run-off from land |

Extension Activity #2: Make a Watershed Model

This activity can be done before or after the RENCi ROVER visit to demonstrate the watershed concept.

Objective: Students create a watershed and will be able to explain how pollution within a watershed will affect water quality.

Materials:

- sheet of white paper
- shallow pan
- water-based colored markers
- spray bottle of water

Engagement: Ask students if they know what a watershed is? Write definition on the board and give further explanation of what a watershed is. Show pictures of the watershed where the school is or where most students live. Explain that we get our drinking and household water from a watershed.

Directions:

1. Take the sheet of paper and crumple it. Next, partially smooth it out, leaving some ridges.
2. Use the markers to color along the edge of the creases. You may want to use different colors to represent a variety of pollutants, such as fertilizer, oil, pesticides, litter, etc.
3. Lay the paper out on the shallow pan and shape it so that it looks like a watershed. Use the creased lines to show elevated land areas.
4. Use the bottle of water and gently spray the top of the watershed. Keep spraying the paper until the colors begin to flow.
5. Describe what happened at the lowest point of the watershed. Did the different pollutants mix together? If so, where did this happen in the watershed?
6. This is an example of a watershed in action, so let's keep it clean!

Extension: Use modeling clay to create a watershed that you can map:

<http://www.darylscience.com/Demos/WatershedActivity.html>

Comments: This activity is adapted from Activity 3: What is a Watershed? from the DEP, www.nyc.gov/dep) and Watershed Excursion from the Southwest Florida Water Management District (<http://www.swfwmd.state.fl.us/education/interactive/watershed/pdf/teachguide.pdf>)

Activity #3 – Local Water Lookup

This activity can be done before or after the RENCI ROVER visit to investigate local waterways.

Objective: Students will learn about their local waterways and local water quality.

Preparation: Students should understand pollution sources. Review terms: point source pollution and non-point source pollution. The term **Impaired Water** is a legal term used at the US Environmental Protection Agency that indicates that the water does not meet water quality standards.

Materials:

- Computers with internet access

Directions:

1. Go to the United States Environmental Protection Agency (EPA) Web site at <http://www.epa.gov/surf/>
2. Locate your watershed by entering your zip code in the space labeled “Your geographical information.” Click submit.
3. If your zip code is in more than one watershed, you can choose one of these to view a map to determine which is your watershed.
4. Click “Impaired Water for this watershed” to read about any parts of your watershed that are polluted. You can see which pollutants are detected and what causes the pollution.
5. You can click on “Stream Flow” to see real time data on the height and speed of the waterway.
6. You can determine which watersheds are upstream and which are downstream.