Doctors for the Rouge River

Submitted by: Connie Atkisson  
Teacher’s Email: conniecoolest@aol.com  
Teacher’s School: O W Holmes  
Date submitted: July 2011

Target Grade/Subject  Combined Grades 4-6, science, social studies

Duration  three 45 minute classroom periods, plus 4-hour field trip.

Lesson Overview  Students will apply classroom learning to field work at the Rouge River. Groups will be divided into grade levels and focus areas: 4th grade will concentrate on benthos sampling; 5th grade students will conduct physical stream survey, river velocity and if water levels permit, river profiling; 6th grade students will perform basic chemical test protocols to determine water quality and overall health of site location. This activity provides field experience to students who have already covered topics in the classroom. Fourth grade students are learning about aquatic wildlife and how certain benthic organisms act as indicator species; fifth graders are learning basic geomorphology skills and can put them into practice at the sampling site; sixth grade students have been discussing human impact on earth and local environmental issues that affect our particular region. This field trip culminates what has been taught in the classroom. The sampling site is next to a large CSO containment area that the city is attempting to utilize for treatment of illegal affluent entering the Rouge River. This site will also be visited after sampling. The purpose is to provide students with hands on experience that will assist in protecting the Rouge River and allow students to see the cost of recovery when human impact destroys such a natural and important waterway. Career opportunities will also be viewed.


Student Learning Objectives

4th SWBAT
- Identify various benthic macroinvertebrates.
- Determine which are invertebrates and which are not.
- Observe various habitats and the living organisms which inhabit them.
- Identify basic physical characteristics of benthics examined and record them in journal

5th SWBAT
- Properly perform each chemical test used in the field.
- Use proper scientific equipment while performing tests such as goggles, gloves, and contamination control.
- Gather data and record information collected into journals and on report sheets.
- Discuss purpose of each test and what the results might mean.

6th SWBAT
- Properly use various scientific tools in the field such as IRT, gps units, thermometers, stopwatches, and cameras.
- Gather data and record such in journals
- Recognize geomorphology items such as erosion, river banks, velocity and turbidity.
- Correctly perform velocity tests and turbidity tests.

**Grade Level Content Expectations addressed:**
Please see attached sheet

**Materials Needed:**
*Grade four:* 6 lifejackets, 12 white dishpans, 12 white ice cube trays, tarp for placing dishpans on ground, large benthic indicator identification key, tweezers, pipettes, spoons (1 per child), several bug viewers and hand lenses, paper towels, 2 D nets for sampling, one pair of goggles per child, disposable gloves for each child, waders for adults in the water. *Grade five:* mosquito spray for each child, clip boards and list per child, gps unit and either thermometer or IRT for the group, hand held kestrel for wind speed, air temperature and velocity, camera, six oranges per group, stop watches (one per group), measuring tape for distance, secchi tube. *Grade Six:* Two sets of the following LaMotte test kits: dissolved oxygen, pH, copper, nitrates/nitrogen, phosphates, turbidity, (optional, but preferred: meters for DO, pH, conductivity and TDS) *For all grades:* notebook, pencils/pens for drawing and journaling thoughts, pictures of benthics, science fair ideas, questions to ask upon return to class, paper towels, disposable gloves, cameras, first aid kit, bottled water for drinking, cleaning test materials, and eye wash prevention.

**New Vocabulary:** for all grades: benthos, macroinvertebrates, watershed, groundwater, protocols, accuracy, secchi, combined sewer overflow, environmental, sampling, scientific process, water quality, velocity, mass, turbidity, affluent, discharge.

**Focus Question(s)**
What kinds of benthos live in this stream?
How do benthic organisms tell us the health of the stream?
How will chemical tests help us to determine the health of the river?
Why is monitoring the river important?
How can these activities tell us what human impact has had, or is having on the river?
What has happened to the aquatic life in the river?
Why is observing the physical conditions of the river important?

**Classroom or Field Trip Activities:**
1. All activities should occur simultaneously.
2. One adult should head up each grade level in the field. (Fourth Grade)
3. Adults or high school students can be in the water wearing waders BUT all other students in grade four who are bringing up the dishpans with water samples MUST wear life jackets! This group will also bring water samples up for the sixth grade chemical testing)
4. Organize macroinvertebrate stations so that all students are engaged. Each station has pipette, spoon, tweezers and bug viewer and/or hand lens present. Organize stations on a picnic table where students will place anything they find into ice cube trays. Only place like invertebrates into the same cube space!
5. Identification stations are on another table with the Identification Key and hand lenses for each station. Clip boards with chart and pencil are there to be marked.
6. (Grade Five) Spray all students with mosquito spray since they will be walking through brush to identify stream banks and type of human erosion control. Group leader has a camera and assigns members to carry equipment.
7. Students write down observations of stream banks, anything in the river that doesn’t belong there, uses gps for location, elevation, air temp. This group is responsible for water temperature, air
temperature, GPS coordinates, physical conditions, velocity and clarity. Temperature must be taken one mile apart to determine any affluent entering the river.

8. Grade Six Chemical Stations must have goggles, disposable gloves, paper towels and fresh water at each site. Each student member must also have their notebook or clipboard to record their results.

9. (Grade six) Adult leader will organize students into pairs for each chemical test. These will have been practiced in the classroom; now they will be testing the water in the field. While it is important to test the Dissolved Oxygen within ten minutes, the others can be done slower. If you have the meters, have student pairs for this as well. Organize test kits into stations so that students can move readily from one to the next.

10. Once each test is performed, students will clean up their test area and dump contaminated water into disposal container. This can be either an old water bottle or milk jug that teacher will properly dispose of later. Student pairs will then move to next test station.

11. Repeat procedures for each test and move to the next station until all have been completed.

12. When final testing has been completed, clean up all test materials carefully and return everything to its proper container. All students should then wash hands and use sanitizer.

Assessment: Visual observation of students engaged in activities, student journals and drawings, student PowerPoint presentations or posters, properly completed charts and data collection sheets, oral quiz of vocabulary and/or picture identification using slides from the Rouge Education website.

Special Comments or Tips
If possible, have a group that acts as your news reporters. They are responsible for taking pictures, interviewing students while working, and managing your news articles for school or local paper.

Try to select your site for this activity so that you can have shelter, bathrooms, and running water.

It is also great to finish up this activity with lunch. I have ordered pizza and had it delivered there. It makes a wonderful end to a day of hard work. It takes a lot of organizing but the more you prepare ahead of time, the easier it will be and more rewarding the day of the fieldwork. Many of the charts are available on the rouge website for gathering data and logging it. They are found in the REP Resource guide and can be downloaded.

In addition to having a lot of fun, students accomplish the following:

- Learn about watersheds and ecosystems
- Develop field and laboratory skills needed to measure biological, chemical and physical parameters of water quality
- Collect, analyze and interpret data.
- Examine ecological and social factors that influence water quality
- Develop and utilize computer and Internet skills while communicating and exchanging data with other students in the project
- Develop group problem-solving and action-taking skills
- Provide a service to the watershed communities
Grade Level Content Expectations addressed

S.IP.M.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.
S.IP.M.1.1 Generate scientific questions based on observations, investigations, and research.
S.IP.M.1.2 Design and conduct scientific investigations.
S.IP.M.1.3 Use tools and equipment appropriate to scientific investigations.
S.IP.M.1.4 Use metric measurement devices in an investigation.
S.IP.M.1.5 Construct charts and graphs from data and observations.
S.IP.M.1.6 Identify patterns in data.
S.IA.M.1 Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.
S.IA.M.1.1 Analyze information from data table and graphs to answer scientific questions.
S.IA.M.1.2 Evaluate data, claims, and personal knowledge through collaborative science discourse.
S.IA.M.1.3 Communicate and defend findings of observations and investigations using evidence.
S.IA.M.1.4 Draw conclusions from sets of data from multiple trials of a scientific investigation.
S.IA.M.1.5 Use multiple sources of information to evaluate strengths and weaknesses of claims, arguments, or data.
S.RS.M1 Reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision-making and the application of science throughout history and within society.
S.RS.M1.1 Evaluate the strengths and weaknesses of claims, arguments, and data.
S.RS.M1.2 Describe limitations in personal and scientific knowledge.
S.RS.M1.3 Identify the need for evidence in making scientific decisions.
S.RS.M1.4 Evaluate scientific explanations based on current evidence and scientific principles.
S.RS.M1.5 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.
S.RS.M1.6 Design solutions to problems through technology (e.g. best management practices)
S.RS.M1.7 Describe the effect humans and other organisms have on the balance of the natural world.
S.RS.M1.9 Describe how science and technology have advanced because of the contributions of many people throughout history and across cultures.
L.0L.M.5 Life Science - Organization of Living Things
L.0L.06.51 Classify organisms (producers, consumers, and decomposers) based on their source of energy for growth and development.
L.EC.M.1 Life Science - Ecosystems
L.EC.06.11 List examples of populations, communities, and ecosystems including the Great Lakes region.
Science
L.EC.06.21 Describe common patterns of relationships between and among populations