

**River Outdoor Learning Experience:
Hazardous Waste and Water Quality
Grade 9, Science**

**Developed by Barbara Shelton and Kim McHenry
Tahoma Junior High School, Ravensdale, Washington**

OBJECTIVES:

To give students an understanding of how development and the ensuing actions by homeowners and businesses affect water quality in the Cedar River. To pilot a project and approach that will become part of the ninth grade River Unit, making it more relevant to students.

ACCOMPLISH:

Step One- Students understand and discuss potential impacts to the river, both chemical and biological.

Step Two- Students learn concept of a watershed with a focus on the Cedar River.

Step Three- Students gain understanding of how the river has changed over time and what the impacts have been on the habitat, water quality, salmon, and the food chain of the river.

Step Four- Students review and learn the differences in impact from the source of the river in the Cascades to where the river reaches the Puget Sound.

Step Five- Students learn the types of household hazardous products and safer alternatives.

Step Six- Students test water quality collected from sites upstream and downstream of the river to compare/contrast water quality.

Step Seven- Students conduct Lesson 3, Routes to the Environment, to see how common household products affect water quality.

Step Eight- Students increase awareness that we ALL affect water quality by participating in the lesson and experiment “Who Dirtied the Water?” and “Clean Water-Is it drinkable?”

Step Nine- Students demonstrate some aspect of water quality and hazardous waste that they have learned during the lesson by selecting and presenting a project to the class.

Step Ten- Students choose construction scenario that could occur near Cedar River - for example, a new golf course or cattle pasture being created. Students research possible effects and solutions of the development on water quality. Present proposal to the City Commission.

PRODUCT OUTCOME:

See attached outline. Main outcomes are:

- Students gain understanding of the impacts of development on water quality.
- Students gain understanding of what we do at home as individuals impacts the environment and our health.
- Ninth grade teachers gain a usable science unit that can be reused year after year.

STUDENTS INVOLVED:

There were 145 plus students involved in the water monitoring unit. (About 500 ninth graders did a river unit of some sort. We are hoping to add 180 students to this lesson next year.) The goal for next year is to add the same unit with similar scenarios to the other ninth grade teachers' lessons. Students participated in water quality testing, assessment, analysis of individual choices and their impacts, project selection and presentation.

OTHER EDUCATORS, SERVICES, RESOURCES INVOLVED:

- Other ninth grade teachers
- Internet resources providing data and ideas for water quality and testing
- Resources from King County HHW and accessexcellence.org.
- Students involved their families in some aspects of their projects by asking them questions and suggesting changes to their living habits.

PERMISSION:

None needed as our collection sites are both public properties and we have already worked with the Cedar River Steward in the past.

EVALUATION:

Students' projects will demonstrate learning and understanding of the targeted objectives. We conducted an evaluation of approach to curriculum and how it aligns with the Washington State GLE document.

FUNDS:

Grant for Ms. McHenry:

Travel Expenses: Gas

Supplies:

- *Testing the Waters*-resource book
- Living Waters-Benthic Macro Invertebrates
- Video: *Life on the edge: Improving Riparian Function*
- Video: *We All Live Downstream*
- Water Monitoring Kit, Complete GREEN, LaMotte
- Freshwater Aquatic Macro Invertebrate: Insect Identification Flashcards

Grant for Ms. Shelton:

Supplies:

- Kick Net- mesh nets to catch invertebrates
- ColiQuant EZ- test kits
- Water Monitoring Testing Reagents
- Protecting Our Watershed-Green Action package
- *The Water Quality Educator*- book and CD ROM
- Virtual Watershed Tour- CD
- *Our Environment Battles Water Pollution*- book

Lesson Plan Outline

Key Questions/Themes	Hazards on the Homefront and Access Excellence Activities	Tahoma Junior High River Unit Labs and Activities
Make the program more relevant to students. What is hazardous waste and how do I fit in?	1. Hazards on the Homefront Speaker Presentation on household hazardous waste products and safer alternatives.	
What is the quality of the Cedar River? What impacts have occurred on habit, water quality and the food chain in the river?		2. Water Quality Test- Measure and discuss a water quality sample of the Cedar River at school.
Hazardous waste and water quality general concepts- where does it go?	3. Routes to the Environment- Hazards on the Homefront Activity Collect data around home. How much household waste is present? Types? What locations? Routes to ground water? Routes to surface runoff? Review group data on map as class.	
Increase awareness that EVERYONE has a part in affecting water quality. Who affects water quality and who is at fault?	4. Who Dirtied the Water?- Access Excellence Activity Show what common activities can do to water quality if poor choices are made.	
Increase awareness that EVERYONE has a part in affecting water quality.	5. Clean Water, Is it Drinkable?- Access Excellence Activity	
What is the difference in impacts in other areas of the river? How does the water quality differ downstream from the first testing?		6. Water Quality Test: Measure and discuss a water quality sample downstream from the first test area.
Demonstrate aspects of water quality and hazardous waste that were gained during this lesson.		7. Student Project and Presentation Select and present a project demonstrating water quality issues.
What building and urban growth can affect water quality? What can be done to prevent or lessen these problems?		8. Student Group Project Research current or possible construction project near the River and present proposal to the City Commission.