



Grade 9 – Water Quality Survey

Curriculum Connection

- Grade 9 Science- Environmental Chemistry
 - Outcomes for STS and Knowledge #1, 2

Objectives

- Students will measure the quantity of various chemicals and determine the effect that they have on water quality.
- Students will identify the interactions between chemical, physical and biological characteristics and how they influence the distribution of living organisms.

Lesson/Activity Duration

- Introduction and explanation of various tests- 20 minutes
- Data collection- 2 hours
- Macroinvertebrate sorting and identification- 1 hour

Materials Needed

Thermometers	Dissolved oxygen content kit
Measuring tapes	Turbidity meter
pH meter	Nitrate concentration kit
Conductivity tester	Water hardness kit
Nets	Brushes (various sizes)
Buckets and/or trays (for sorting)	Magnifying glasses/Dissecting microscopes
Identification keys (wildlife and macroinvertebrates)	

* The supplies needed for the chemical tests should be available from the chemistry lab or from a chemical supply company.

* Materials for macroinvertebrate sampling can be obtained from a dollar store

Important Vocabulary

Turbidity- amount of sediment suspended in water

Hardness- concentration of magnesium and calcium ions dissolved in water

Riparian Zone- the green areas around a body of water, including grasses, shrubs and trees

Background Information

All equipment and safety issues should be reviewed prior to departure.

The vocabulary and concepts should have already been covered so that this activity can be used as an application of those concepts.

Procedure

- When choosing a body of water, depth should be considered as students will need to collect data from the bottom.
- Students should be divided into groups of 3 or 4



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- *If you are short on time, the groups could be further subdivided so that each student in the group is responsible for one section.*
- It is generally easier to collect the macro invertebrates and bring them back to the classroom for identification, where keys can be used

PHYSICAL

- When determining temperature, the thermometer should be left in either the water or air for several minutes before recording the temperature.
- Most of the physical data can be obtained by observing the water.
- When calculating flow, a distance needs to be measured off. 10 metres usually works well, unless the body of water is flowing very quickly. A stick or something else that floats should be dropped where you started measuring. Time how long it takes to cross the finish line. Calculate the flow by dividing the distance by time. Do this several times and then calculate the average flow.

CHEMICAL

- The chemical data can be obtained using various testing kits, which will each come with their own instructions.

BIOLOGICAL

- Students should collect macro invertebrates from three different areas of the body of water. For collecting at the surface or mid-column, the net should rest in the water and then be lifted out. The net should be emptied into either a bucket or a tray for sorting at a later time.
- When collecting insects from the bottom of the body of water, a student will need to enter the water. The net will rest on the bottom and the student will pick up rocks and other debris and gently scrape the surface of the rocks in front of the net with the brush. The net should be emptied into another tray.
- Be sure to keep the samples from each area separated.
- If time permits, students could do sampling in more than one area. For example, they could get samples along the riverbank, as well as halfway across the river.
- Back in the classroom, the sorting can begin by removing any larger particles. Once those have been removed, the rest of the materials can be added to a sieve and rinsed until you are left with only macro invertebrates.
- Using a dichotomous key, the invertebrates can then be sorted and identified.
- If you would like to save the samples for future reference, they can be stored in glass bottles preserved in alcohol.

Extension

Using the information that students have acquired in the classroom, as well as in the field, they should be able to make conclusions on the quality of water. Students should look at ways that humans are impacting this body of water and what they can do decrease the impact.

***For more information on Alberta-Pacific's aquatic research programs or the Water / Effluent treatment process, [click here](#).*

**WATERSHED MONITORING SITE SURVEY
DATA SHEET**

Date: _____

Group Members: _____

Recorder's Name: _____

Name of Monitoring Site: _____

Name of Nearest Town: _____

PHYSICAL DATA

Put a check mark beside the answer that describes your monitoring site.

1. The monitoring site is a

river
 pond

stream
 dugout

lake
 other

2. The body of water is connected to other water bodies by

water flowing into it
 groundwater

water flowing out of it
 don't know

3. Is your monitoring site

natural

human-made

changed by humans

4. If the land beside the water is not covered with plants, then the soil can wash away. This is called bank or shore erosion. Do you see signs of erosion?

none

some

a great deal

5. What is the soil type beside the water?

dark mud

brown soil

sand

no soil, just rocks

WEATHER

clear

partly cloudy

cloudy

overcast

drizzle

rain

snow

sleet

other

Weather last 48 hours: _____

Air Temperature:

Water Temperature:

COLOUR	<input type="checkbox"/> clear	<input type="checkbox"/> very light tea	<input type="checkbox"/> light tea
	<input type="checkbox"/> tea	<input type="checkbox"/> dark tea	
SURFACE	<input type="checkbox"/> thick foam	<input type="checkbox"/> an oily sheen	<input type="checkbox"/> nothing
ODOR	<input type="checkbox"/> none	<input type="checkbox"/> rotten eggs	<input type="checkbox"/> musty
	<input type="checkbox"/> fishy	<input type="checkbox"/> oil	<input type="checkbox"/> ammonia
	<input type="checkbox"/> other: _____		
FLOW	Distance traveled: _____		
	Time (Seconds): _____		
	Average Velocity: _____		

CHEMICAL DATA

pH: _____	CONDUCTIVITY _____
DISSOLVED OXYGEN: _____	TURBIDITY _____
NITRATE: _____	HARDNESS _____

BIOLOGICAL DATA

- What types of plants are growing in the riparian area?

<input type="checkbox"/> grassy plants	<input type="checkbox"/> shrubs	<input type="checkbox"/> trees
<input type="checkbox"/> crops	<input type="checkbox"/> lawn	<input type="checkbox"/> no plants
- What is the percentage cover in the riparian area? _____
- What types of plants are growing in the aquatic habitats?

<input type="checkbox"/> underwater plants	<input type="checkbox"/> floating plants	<input type="checkbox"/> no plants
<input type="checkbox"/> plants growing out of the water	<input type="checkbox"/> algae	
- What is the percentage cover in the water? _____

Wildlife Observed

Signs of Wildlife Observed

AQUATIC MACROINVERTEBRATES

List all of the macro invertebrates that you have collected. Tally up the number of each species that you have found. Indicate the life cycle stage as well.

Phylum Mollusca:	Mayfly
Worms	Stonefly
Diptera	True Bugs
Caddisfly	Other

Comments/Observations: _____
