Lesson 21

Water Studies

How can streams and rivers be monitored?
How can water characteristics, riparian banks and watershed habitats indicate stream health?

GOAL To examine and record physical characteristics of specific body of water and surrounding land to assess a more complete picture of overall health of water body.

OBJECTIVES Students will:

- ✓ examine and record observations of riparian banks
- ✓ measure velocity, take temperature, measure depth of water body
- ✓ determine human impact

MATERIALS **data recording sheets, clipboards, pencils, plastic containers, stop watch, meter sticks or another type of measuring stick, measuring tape, water thermometer**

CORE CURRICULUM CONTENT STANDARDS

- **Language Arts 2(4)**
- **Science 3(4), 8(2), 11(6), 14(1)**
- **Social Studies 10(1,2)**

VOCABULARY **velocity, riffle, pool, run**

PROCEDURES

1. Prior to lesson, choose three sites students will study. Group students into three teams. Each team will be responsible for collecting data that will later be shared with classmates. Have students design a presentation based on the data collected. Have them determine the health of the stream through their observations.
2. The three data collecting teams include:
   A. General Water Characteristics
   B. Bank and Sediment Characteristics
   C. Watershed Habitats and Human Impact
3. Distribute appropriate forms and equipment (forms located at the end of lesson).
4. Teams will examine the three sites and use the data to compare the areas.
5. After data is collected, discuss results with students.

EXTENSIONS

1. Have students join and participate in an adopt-a-stream or stream watch program and monitor certain sections of the river. Local monitoring programs are offered through Project Search and FRWA.

RESOURCES

Rosselet, Dale A., *New Jersey WATERS, A Watershed Approach to Teaching The Ecology of Regional Systems,* New Jersey Audubon Society, 1999, Bernardsville, New Jersey 07924.

GLOSSARY

pool - a deep or still place in a stream
riffle - a shallow, gravelly area of a streambed with a swift current; used by spawning of trout or other fish
run - straight course of a river
velocity - rapidity or speed of motion; swiftness

FRESHWATER STREAM OR RIVER
Group A Data Collection Form
Water Characteristics

Water body Name _____

Watershed Name _____

Team Members:

1. **Circle stream habitats present (more than one may be applicable)**

   Riffle pool run

2. **Water Appearance (Circle the best description)**

   Clear foamy oily brown

   Other color, describe _____

3. **Odor** ____yes ____no

   If yes, describe_____

4. **Water Temperature**

   Sunny area_____degrees Fahrenheit or Celcius

   Shady area_____degrees Fahrenheit or Celcius

5. Volume

a. Measure a length of a stream (stream reach) to calculate volume. _____ft

b. Calculate the average width of the stream reach

Width at upstream end of test site _____ft.
Width at midpoint of the test site _____ft.
Width at downstream end of test site _____ft.
Average = _____ft.

c. Calculate the average depth of the stream reach. Take three measurements.

Depth at upstream end of test site _____in.
Depth at midpoint of test site _____in.
Depth at the downstream _____in.
Average depth _____in.
Convert average depth to feet. _____ft.

d. Multiply **length** x **average width** x **average depth** to determine volume of water in test section.

Volume = _____cu.ft.

d. Convert cubic feet to gallons. One cubic foot equals eight gallons of water:

_____gallons of water in test section

6. Water Velocity

Measure a 50 foot section of the stream.
Select a small object that will float (stick, leaf, tennis ball)
Measure the time it takes the object to float to the selected section.
Repeat the process three times and average times.

Time #1_____
Time #2_____
Time #3_____
Average_____ (add the times together and divide by 3)

Divide the distance (50 ft.) by the average time to determine the velocity (in feet per second)

Stream velocity = _____ft./sec.

FRESHWATER STREAM OR RIVER
Group B Data Collection Form
Valley Profile, Stream Bank, Channel and Sediment Characteristics

Water body Name _____

Watershed Name _____

Team Members:

1. From the furthest area downstream in your study area, look upstream to the left and to the right to determine the stream valley's profile. Circle the letter that best describes the profile.

   a. U - shaped – glacially scoured
   b. V – shaped – young stream
   c. floodplain valley – mature stream

2. From the same point, pick the description that best fits the stream and stream channel.

   a. stream bank

	left bank	right bank
vertical cut	?	?
steeply sloping (more than 30 degrees)	?	?
gradual, no slope (less than 30 degrees)	?	?

   b. stream channel (width - bank to bank; depth - top of bank to bottom of channel)

   narrow, deep (width less than 6 ft.; depth more than 3 ft.)

   narrow, shallow (width less than 6 ft.; depth less than 3 ft.

   wide, deep (width more than 6 ft.; depth more than 3 ft.)

   wide, shallow (width more than 6 ft.; depth less than 3 ft.)

5. Describe the stream side cover. Circle the one that fits the best.

   a. Along the stream's edge and bank

	not present	present	plentiful
trees	?	?	?
bushes, shrubs	?	?	?
grasses, ferns	?	?	?
lawn	?	?	?
rocks/boulders	?	?	?
gravel/sand	?	?	?
bare soil	?	?	?
pavement, structures	?	?	?

   b.Measure out 25 yards from stream bank.

	not present	present	plentiful
trees	?	?	?
bushes, shrubs	?	?	?
grasses, ferns	?	?	?
lawn	?	?	?
rocks/boulders	?	?	?
gravel/sand	?	?	?
bare soil	?	?	?
pavement, structures	?	?	?

6. Circle the category that best describes the percentage of shde that the stream provides

   0% 25% 50% 75% 100%

7. From the same point in the study site, look upstream and check if the following conditions are present. Circle if applicable to site area.

Plant cover degraded	Bank collapsed, eroded	garbage
Foam on bank	yard waste	livestock
Discharging pipes	ditches	other pipes

8. Are there any logs or large woody debris in the stream?

9. Are there organic materials in the stream? (leaves, twigs etc.)

FRESHWATER STREAM OR RIVER
Group C Data Collection Form
Watershed, Habitat, and Human Impact Characteristics

Water body Name _____

Watershed Name _____

Team Members:

1. Describe the visible impact on the stream.

Present		Impact
☐	Single family housing	_____
☐	Multifamily housing	_____
☐	Lawns	_____
☐	Commercial	_____
☐	Other	_____
☐	Paved roads/bridges	_____
☐	Unpaved roads	_____
☐	Housing development	_____
☐	Commercial development	_____
☐	Road construction	_____
☐	Grazing land	_____
☐	Cropland	_____
☐	Boating	_____
☐	Golfing	_____
☐	Camping	_____

- ☐ Swimming_____
- ☐ Hiking_____
- ☐ Logging_____
- ☐ Landfill_____
- ☐ Industry_____

2. Note the types and number of structures that alter the natural flow of the stream.

_____none _____dams _____bridges

_____waterfalls _____beaver dams

3. Any evidence of:

_____litter _____erosion

4. Any special problems?

_____chemical spills _____flooding _____fish kills

_____periods of no flow _____wildlife kills

5. wildlife

a. wildlife around water body ☐
amphibians ☐
waterfowl ☐
reptiles ☐
mammals ☐
invertebrates ☐

b. fish ☐
barriers to fish ☐

c. aquatic plants ☐