PRE/POST SITE TEACHER MATERIALS

AQUATIC ECOSYSTEMS

Forest Preserve District
OF WILL COUNTY
Bringing People and Nature Together

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Pre/Post Site Teacher Materials
Program: Wetland Wonders
Plum Creek Nature Center Field Trip

Integrate these resources into your classroom to maximize student learning from your educational program.

Resource: Education Resource Loan Kits: Water & Wetlands
Source: Forest Preserve District of Will County
Contact Sugar Creek Administration Center for availability.
815.727.8700

Reference Book: Pond Life, a Guide to Common Plants and Animals of North American Ponds and Lakes. Reid, George. 2001.

Reference: Wetland Glossary of Terms
Source: Forest Preserve District of Will County

Activity: Role of Plants in Water Filtration
Source: Environmental Protection Agency- Environmental Education
http://water.epa.gov/learn/kids/drinkingwater/kids_4-8.cfm

Reference Sheet: Stream Insects and Crustaceans ID Card
Source: VA Save Our Streams, Izaak Walton League of America.
http://www.vasos.org/images/stories/docs/ModifiedBugIDCardoct2004.pdf

Correlated State Standards
Source: Forest Preserve District of Will County, the Council of Chief Sate School Officers (Common Core), and the National Research Council (NGSS)

Forest Preserve District of Will County
Environmental Education Resource Loan Kits
Water and Wetlands Kit - Contents Checklist

Equipment
____Five 2-Way Magnifying Viewers (5)
____Five 4" Dip Nets (5)
____Five 3.5-Gallon Buckets (5)
____Five Aluminum Pans (5)
____Five Heavy-Duty Collecting Nets (5)
____Five Plastic Eye Droppers (5)
____Thermometer

Field Guides
____Five *Benthic Macro Invertebrate Cards* - Indicator Species (5)
____Five *Pondwatcher* Foldout Guides (5)

Books
____*Animal Lives, The Frog*
____*Conservation Water Educator's Guide* - Water Conservation Activities
____*Discover Nature in Water & Wetlands* - *Things to Know and Things to Do*
____*Look Closer - Pondlife*
____*River Ran Wild*
____*Wading into Wetlands* (Songs, Games, Crafts)
____*Water Dance - The Story of the Water Cycle*
____*Watershed Pollution* Teacher's Guide
____*Where Does Your Water Come From?*
____*WOW! The Wonder of Wetlands*

Educational Materials
____Dragonfly Puppet
____*Eyewitness Pond and River* Video
____*Frogs and Toads of the Chicago Region* CD
____Frog Puppet
____Turtle Puppet

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17540 W. Laraway Road
Joliet, IL 60433
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ReconnectWithNature.org

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Pre/Post Site Teacher Materials

Program: Wetland Wonders
Plum Creek Nature Center Field Trip

Reference: Wetland Glossary of Terms
Source: Forest Preserve District of Will County

Adaptation- A unique trait or characteristic that makes a species separate from each other. Usually something that helps species survive in specific habitat.

Biotic Index- Simplest measure of aquatic environmental quality. Calculated by giving values to three classes of aquatic macro-invertebrates based on their tolerance to pollution.

Community- A group of interacting plants and animals inhabiting a given area.

Ecosystem- All the living and non-living things working together in a certain environment.

Emergent Vegetation- Plants that are rooted in an aquatic environment with their leaves emerging above the surface of the water (cattails).

Indicator Species- Organisms whose presence or absence and abundance are used to identify the ecological conditions of the environment (water, air, land). Ex: macro-invertebrates.

Macro-invertebrate- Organism that lack a backbone and are big enough to be seen with the naked eye.

Microhabitat- The part of the general habitat utilized by an organism.

Niche- A functional role of a species in the community, including its activities and relationships.

Wetland- A natural area, that for all or part of the year is naturally wet. Can be called by many names: swamp, marsh, estuary, tidal pool, bog, bay, bayou, bottomland, wet prairie.

Forest Preserve District
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Pre/Post Site Teacher Materials

Program: Wetland Wonders
Plum Creek Nature Center Field Trip

Activity: Role of Plants in Water Filtration
Source: Environmental Protection Agency- Environmental Education

GRADES: 4th – 7th

BACKGROUND:
Experiments can be done to show how a plume of dissolved materials can move through soil and enter a groundwater aquifer. But soil and plants have something of a dual role in this process. Depending on whether materials are dissolved or suspended in the water, soils and plant roots can remove some or all of this material as the water moves down through soil.

Most suspended materials will adhere to soil. These then break down and used as food by the plants. Dissolved nutrients, such as nitrogen or phosphorus, chemically bond with soil particles. They are taken up by plants, thus removing them from the soil before they can enter an aquifer. For the plants, these elements are food, for an aquifer, they are pollution.

Not all materials are absorbed by plants and not all water pollutants are food for plants. However, sediments from eroding soil, nutrients in human and animal wastes, and some components of household wastewater ("graywater") are excellent plant nutrients. Plants also use different nutrients at different rates, so that the amount of material they take up will depend on how much is dissolved in the water and how fast the water moves through. This experiment is a very simplified way to show whether plants will take up certain kinds of materials from water moving relatively quickly through their root systems.

OBJECTIVE:
To understand the role of plants in filtering water moving through a watershed.

MATERIALS NEEDED:
- 6 potted plants
  roughly six to eight inches in diameter, and holes in bottom. Plants need to be moderately dry, as if they had not been watered for a couple days.
- 6 clear containers
  such as cups, which will support the plants and allow drainage to be viewed. You will need separate plants and cups for each of the materials in the water.
- Soil from outside (anywhere). The best soil is loamy, with smaller particles than sand.
- Unsweetened powdered drink mix, preferably grape or cherry for color
- Vegetable oil
- 1 or 2 different household cleaners
  such as Comet/Ajax and Dish or Laundry soap. One should be liquid and the other powder

PREPARATION: Set up the potted plants, each in its own cup. Slowly pour six to eight ounces of clean water through the pot, and check the percolation rate through the pot. Loosen or tighten the soil so that water percolates at about one ounce per minute. The rate should be fast enough to prevent long waiting periods, but slow enough not to carry very much soil through the pot.

PROCEDURE:

1. Place the potted plants into the top of their cups. Pour clean water slowly through one of the pots and watch it percolate through the bottom of the pot. The water should look as clean as what was poured.

2. Add a gram or so of soil to 6-8 ounces of water and stir so that the soil is well suspended and distributed in the water. Pour slowly into another flower pot. The water percolating through should look *much* cleaner than the dirty water poured.

3. Add about one ounce of vegetable oil to 6-8 ounces of water, stir (they won't mix completely) and pour into a third pot. See if the vegetable oil percolates through or is caught up by the plant roots.

4. Add some powdered drink mix to 6-8 oz. of water and pour through a fourth pot. See if the water percolating through retains the color.

5. Add some powdered cleanser to 6-8 oz. of water and pour through a fifth pot. Is the cleanser retained in the soil?

6. Add some liquid soap to the water (an ounce or so in 6-8 oz. water). Does the soap percolate through the soil?

7. Using the "contaminated" plants, pour some clean water at the same rate through each one (simulating a rain shower). Is more of the "pollutant" rinsed away from the soil by the clean water?

FOLLOW-UP QUESTIONS:

1. In what ways can plants and soil benefit drinking water quality?

2. We saw plants and soil remove some types of impurities from water. How might the plants remove larger quantities?

3. Can plants and soil remove any type of impurity from water?

4. What other organisms in the soil-plant system might aid the uptake of water pollutants?

5. What is the role of rainwater moving through contaminated soil?

Stream Insects and Crustaceans ID Card

Lines under picture indicate the relative size of organisms

Aquatic Worm:
Class Oligocheata
¼" – 2", can be very tiny; thin, wormlike body, tolerant of impairment

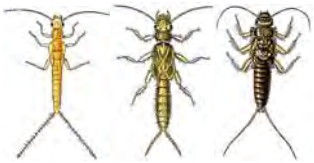
Flat Worm:
Family Planaridae
Up to ¼", soft body, may have distinct head with eyespots, tolerant of impairment

Leech:
Order Hirudinea
¼" – 2", segmented body, suction cups on both ends, tolerant of impairment

Crayfish: Order Decapoda
Up to 6", 2 large claws, 8 legs, resembles a small lobster, somewhat tolerant of impairment

Sowbug: Order Isopoda
¼" – ¾", gray oblong body wider than it is high, more than 6 legs, long antennae, somewhat tolerant of impairment

Scud: Order Amphipoda
¼", white to gray, body higher than it is wide, swims sideways, more than 6 legs, resembles small shrimp, somewhat tolerant of impairment



Stonefly: Order Plecoptera
½" – 1 ½", 6 legs with hooked tips, antennae, 2 hair-like tails, no gills on abdomen, very intolerant of impairment

Mayfly:
Order Emphemeroptera
¼" – 1", plate-like or feathery gills on abdomen, 6 hooked legs, 2 or 3 long hair-like tails, tails may be webbed together, very intolerant of impairment

Dragonfly and Damselfly:
Order Odonata
½ " – 2", large eyes, 6 hooked legs, large protracting lower jaw, 3 broad oar-shaped tails OR wide oval to round abdomen, somewhat tolerant of impairment

Hellgrammite, Fishfly, and Alderfly:
Order Megaloptera
¾" – 4", 6 legs, large pinching jaws, 8 pairs of feelers along abdomen, 2 hooks on tail end OR 1 single spiky tail, somewhat tolerant of impairment

Common Netspinners:
Family Hydropsychidae
Up to ¾", 6 hooked legs on upper 1/3 of body, 2 hooks at back end, underside of abdomen with white tufts of gills, somewhat tolerant of impairment

Most Caddisfly:
Order Trichoptera
Up to 1", 6 hooked legs on upper 1/3 of body, may be in stick, rock or leaf case, no gill tufts on abdomen, intolerant of impairment

Illustrations from: Voshell, J. R., Jr. 2001. Guide to the Common Freshwater Invertebrates of North America. MacDonald and Woodward Publishing Co. With permission of the author.

Stream Insects and Crustaceans ID Card

Lines under picture indicate the relative size of organisms

Beetles: Order Coleoptera

¼" – 1", disk-like oval body with 6 small legs and gill tufts on underside OR small black beetle crawling on streambed OR comma-like brown "crunchy" body with 6 legs on upper 1/3 and possibly gill tuft on back end, OR (miscellaneous body form – rare), somewhat tolerant of impairment

Midges:
Family Chironomidae

Up to ¼", distinct head, worm-like segmented body, 2 leg-like projections on each side, often whitish to clear, occasionally bright red, tolerant of impairment

Black Fly: Family Simuliidae

Up to ¼", end of body wider (like bowling pin), distinctive head, sucker on end, tolerant of impairment

Most True Flies:
Order Diptera

¼" – 2", bodies plump and maggot-like, may have caterpillar like "legs" along body, may have lobes or conical tails on end, tolerant of impairment

Gilled Snails:
Class Gastropoda

Up to ¾", shell opening covered by a thin plate called an operculum, with helix pointed up shell opens to the right, intolerant of impairment

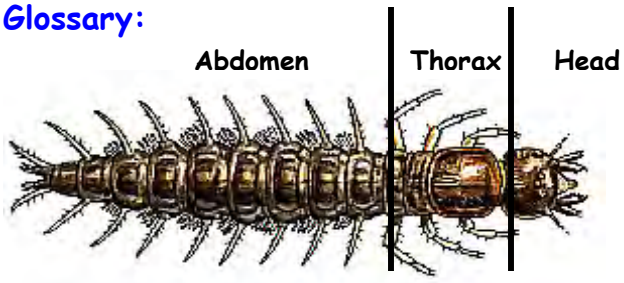
Lunged Snails:
Class Gastropoda

Up to ¾", no operculum, with helix pointed up shell opens to the left, tolerant of impairment

Clams:
Class Bivalvia

Up to ¾", fleshy body enclosed between two clamped together shells (if clam is alive, shells cannot be pried apart without harming clam), somewhat tolerant of impairment

Glossary:



Tails: There are many different kinds of macroinvertebrate tails. The thin thread-like tails found on stoneflies and mayflies are called cerci. The oar-shaped tails found on a damselfly are not really tails - they are actually gills called caudal lamellae!

VA Save Our Streams Program
VA Division of the Izaak Walton League of America
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Richmond, VA 23226
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These sheets are modified from the National Izaak Walton League of America SOS Program Stream Insects & Crustaceans ID Card.
http://www.iwla.org/SOS/index.html

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Pre/Post Site Teacher Materials

Program: Wetland Wonders
Plum Creek Nature Center Field Trip

Correlated Common Core State Standards
Source: Forest Preserve District of Will County and the Council of Chief Sate School Officers (CCSSO)

Identified ELA and Math Standards are detailed below specific to this education program.

ELA Standards

Subject Code	Grade 3	Grade 4	Grade 5	Grade 6
Reading for Information (RI)	RI.3.1, I.3.3, RI.3.4, RI.3.7	RI.4.1, RI.4.3, RI.4.4, RI.4.5, RI.4.7	RI.5.1, RI.5.3, RI.5.4	RI.6.4, RI6.7
Writing (W)	W.3.7	W.4.7	W.5.7	W.6.7
Language (L)		L.4.1, L.4.4	L.5.1, L.5.4	L.6.1, L.6.4

Correlated Next Generation of Science Standards
Source: Forest Preserve District of Will County and the National Research Council (NRC)

Identified Science Standards are detailed below specific to this education program.

NGSS Standards

Disciplinary Idea	Grade 3	Grade 4	Grade 5	Grade 6
Life Science 1, Structure and Processes		4.LS1.1,		MS.LS1.4
Life Science 2, Ecosystems	3.LS2.1			MS.LS2.5
Life Science 3, Heredity	3.LS3.2			
Life Science 4, Evolution	3.LS4.2,			
Earth and Spice Sciences 2, Earth's Systems			5.ESS2.2	MS.ESS2.4
Earth and Space Sciences 3, Earth and Human Activity				MS.ESS3.3