Ecosystems

Background

Being alive is not easy. Living things have to take in food, water, minerals and air from their environment. If the environment is too hot or too cold or too wet or too dry, living things cannot survive. Living things cannot escape from their environment. Living plants and animals in their environment are called ecosystems.

Materials Needed

- Computer with internet access
- Photographs of endangered animals
- Photographs of human activities that might affect animals' habitat
- Drawing materials

Objectives

Students will:

- describe the things animals need to survive and the ways in which animals depend on other animals and plants;
- perform a simulation to demonstrate the interdependencies within an ecosystem;
- look at pictures of endangered animals and explain what they think might happen to other animals and plants if these animals became extinct; and
- draw a picture of an animal in their natural habitat, and write a story about that animal describing what it needs to survive.

Procedure

Opening

Ask students to think of some animals that they are familiar with, such as their pets or animals that live outdoors near their homes. Ask them to state the things these animals need to survive, such as water, food, a place to make their home, and enough room to run and roam.

Ask the students to think more carefully about the animals they have described. Discuss the following questions with the class.

Ecosystems (cont'd)

Questions

1. What do the animals eat?
2. Where do they live?
3. How do they depend on the plants and other animals around them?
4. What would happen to these animals if their main food source no longer existed?

Simulation

Assign each student the role of a local plant of animal. Ask everyone to stand on one side of the classroom. Then ask one "plant" or "animal" to step out of the picture. For example, you could say, "Will the oak trees please sit down?" The children taking their seats would represent the dying out oak trees in your area.

Ask student is any other species depend on the oak tree. Give them hints if they are unsure (e.g. the squirrel eats acorns). If any species depends on the species you have asked to sit down, those students will have to sit down as well. Continue until there are no (or very few) students left standing.

Discuss the implications of the simulation with the class. What happens to the plants and animals in an area when one type of plant or animal dies out. Make sure students understand that all plants and animals in an area (an ecosystem) depend on one another. Can they think of other examples of dependence, such as in their families, with their friends, or at school?

Student Activity

Have students look at pictures of animals living in their natural habitats. Choose some pictures beforehand, either from books, magazines, or website. Have the students pick an animal. Next, have the students research what things the animal they chose needs to survive in their ecosystem.

The students will present their information on a poster, complete with pictures that they have either drawn, or from magazines or the internet. Have them include reasons why they think their animal may or may not be in trouble. Have them tell ways in which human activities might affect the life of their animal. The following links have excellent resources.

www.nationalgeographic.com/animals/creature_feature/archive/

www.nationalgeographic.com/geographyaction/habitats/

Where Does Your Water Come From?

Background

Everyday the average Canadian uses 340 litres of water for drinking, bathing, cooking and maintenance. Most people however, are unaware of the source of their water. Water is supplied by community water systems in cities and towns, and in rural areas, water is supplied by private wells. Ground water often has a slightly metallic taste and may contain high amounts of minerals. Surface water on the other hand usually has a musty taste and looks cloudy. Treatment techniques aim to produce water that is safe for human consumption, appealing and good tasting to the consumer and conforms with applicable Provincial and Federal regulations.

Objective

This taste test will illustrate the differences between groundwater and surface water. Some of the common contaminants in natural water will be highlighted.

Materials Needed:

- 2 litres of distilled water
- 2 litres of tap water (identify the source)
- 2 litres of mineral water (or private well water, if available)
- 2 litres of filtered tap water
- Cups for the class

Procedure

1. Mark a set of 4 cups for each student. Label each cup 1 through 4 and fill them with the different types of water. Make sure that similarly labeled cups contain the same type of water.

2. Indicate on the board the different types of water present in the four cups. Have the students work together in groups to try to identify different tastes, smells and appearances in the water. Have each group write down their observations on each water sample, and identify which cup has which type of water.

3. After everyone has completed their observations, have the students mark their guesses on the board. Ask the students what types of impurities they would expect to find in the different types of water and if their senses confirmed their intuitions. Record these observations on the board.

Where Does Your Water Come From?

Procedure (cont'd)

4. Reveal to the students which samples contained which type of water. Discuss with the students their observations and what other impurities might be found in these waters. Also discuss the source of water for the community. If anyone in the class lives in a location supplies by a private well, ask him/her to describe the water at their home, and how it compares to other water he/she drinks in the community.

Follow-up Questions

1. What are some possible sources of water in your community?

2. Which type of water tasted best? Why?

3. Which type of water would you consider safe to drink, groundwater from a spring, or surface water from a stream?

The Power of Water

Background

Water is used for power. The way people do this is by aiming a stream of water onto the paddles of a huge wheel that is attached to an axle. The axle is connected to machinery, so when it turns, it turns gears and parts of the machinery.

Materials

- Aluminum pie plate cut into a circle about four inches in diameter
- Pencil
- Nail
- String cut into eighteen-inch lengths
- Old scissors
- Small metal nut

Procedure

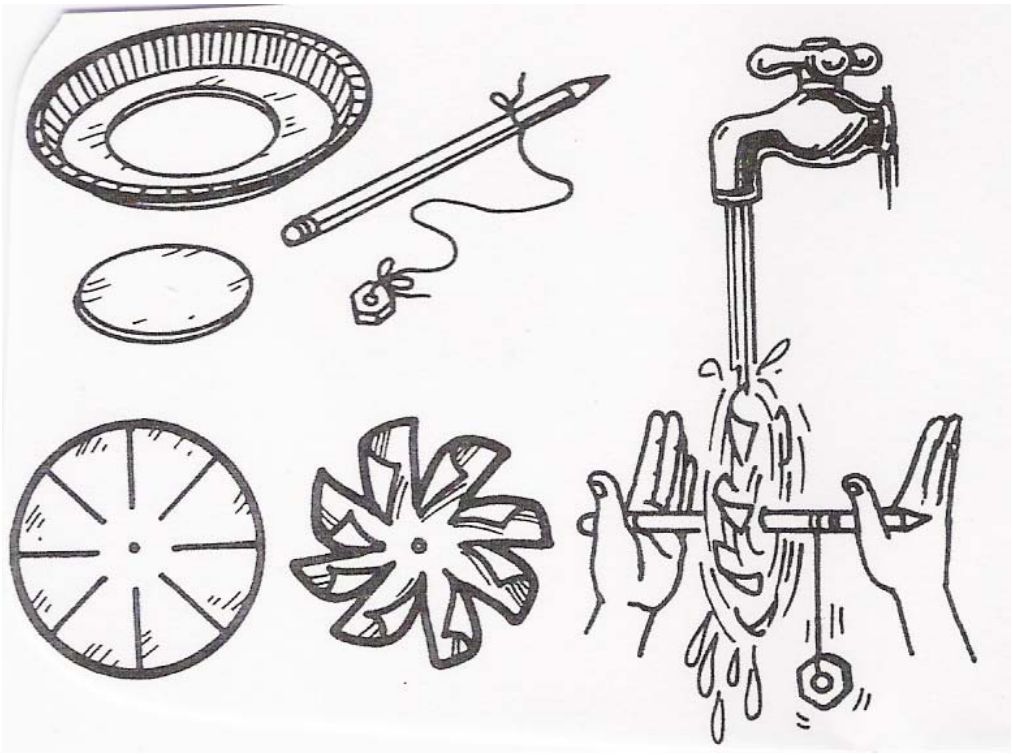
1. Give each student a disk of aluminum that you cut from a pie tin. Ask the students to make eight cuts in their disks. The cuts should be about one and a half inches across. There should be at least a half-inch after each slit to the centre of the tin.
2. Tell the students to bend or twist the sections like airplane propellers. Each blade should be bent in the direction of the others (like a pinwheel).
3. Let the students use the nails to punch holes in the centers of the disks. Then ask them to slide their pencils through the holes.
4. Have each student tie one end of the string to the pencil and one end to the metal nut.
5. Allow the students to take turns at a sink, or have them work in pairs and give each a squirt bottle to use instead of a faucet. Have the students hold the pencils so they rest lightly between their upturned thumbs and forefingers. This will allow the pencils to turn in their hands (the pencil is like the axle). The water should hit the blades and cause the wheels to turn. The pencils will also turn, and as they do, they will wind the string. This lifts the load, which in this case is the nut (see example).

Question

1. Where can this knowledge be used (or is used)?

   Electricity is made using this concept. Huge streams of water shoot through pipes at a reservoir's dam. The water hits panels on wheels, like your students' water wheel paddles. These wheels turn hundreds of times per minute, generating hydroelectric power.

The Power of Water
Example of Water Wheel



Water Everywhere, Everyday

Your body is 65% water. The Earth's surface is 70% water. Can you imagine a whale out of water? Could you boil an egg without water? Could you live without water? Could you cry or sweat without water?

The average person needs to take in about 2.4 litres of water every day. You also need water for cooking, bathing and lawn care.

Think about your personal use of water.

List 10 Ways You Use Water Everyday

1. _____ 2. _____

3. _____ 4. _____

5. _____ 6. _____

7. _____ 8. _____

9. _____ 10. _____

Think about the pioneer's use of water.

List 10 Ways the Pioneers Used Water

1. _____ 2. _____

3. _____ 4. _____

5. _____ 6. _____

7. _____ 8. _____

9. _____ 10. _____

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The average person needs to take in about 2.4 litres of water every day. You also need water for cooking, bathing and lawn care.

Think about your personal use of water.

List 10 Ways You Use Water Everyday

1. brushing my teeth
2. taking a bath or shower
3. cooking
4. washing clothes
5. watering the garden/lawn
6. washing the car
7. cleaning the dishes
8. drinking
9. water for pets/animals
10. cleaning the house

Think about the pioneer's use of water.

List 10 Ways the Pioneers Used Water

1. brushing my teeth
2. taking a bath or shower
3. cooking
4. washing clothes
5. watering the garden/lawn
6. washing the car
7. cleaning the dishes
8. drinking
9. water for pets/animals
10. grist mill

Ecosystems Information Sheet

An ecosystem is an area on the Earth that is a community of living organisms and their surrounding environment. Every person, animal, plant, rock, stream, and piece of land belongs to one or more ecosystems.

For example:

Imagine an ecosystem made up of a freshwater pond that serves as home for frogs, lily pads, fish, cattails, dragonflies, algae, and protozoa. Each of these organisms, along with it sources of food, sediments, nutrients, and the water itself, is a part of the pond ecosystem, which functions as a unit or a single community. Imagine, also, that this pond lies deep inside a forest. The pond and its inhabitants belong to the larger forest ecosystem, which also contains several rivers, other ponds, many kinds of wildlife, flowering plants, and trees. Ecosystems on Earth are incredibly diverse, both in size and in form—a large city that contains millions of people, their homes, and a built-up landscape is an urban ecosystem, while a small wildlife preserve within that city serves as a natural ecosystem.

Much like a person, an ecosystem has a given level of health. A healthy ecosystem performs many valuable functions, such as flood control, water purification, seed dispersal, pollination, pollutant removal, nutrient cycling, and habitat provision. These functions are beneficial to both humans and other inhabitants of ecosystems. Consider the value of one wetland ecosystem that helps remove toxic substances from drinking water, provides a nursery for baby fish, and supplies shelter for clams and mussels—and these are only a few of the services provided by this ecosystem.

Many ecosystems experience the effects of disturbances. These disturbances can be caused by human actions, such as bulldozing a forest to build a highway, or they can be a result of natural events, such as soil erosion from heavy rains. Disturbances often decrease the ability of an ecosystem to provide valuable function, and thereby decrease the health of an ecosystem. A feature of ecosystems, from the smallest backyard to the entire globe, is that they tend to be resilient. Given time, ecosystems can often recover from disturbances, maintain their health, and continue to provide the functions necessary to sustain life on Earth.

Ontario Power Generation

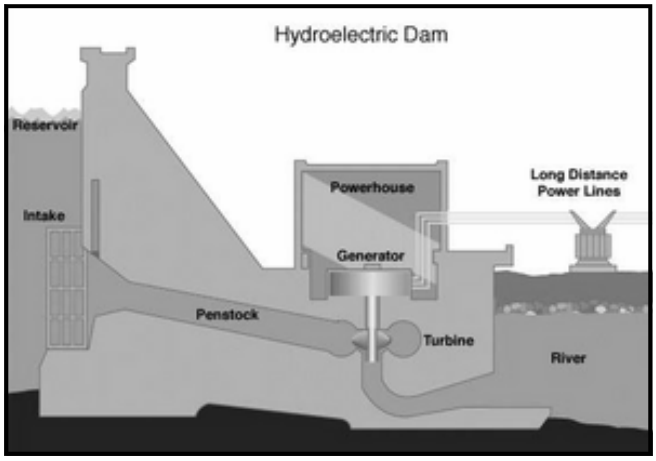
Ontario Power Generation operates:

- 64 hydroelectric stations
- 29 of those are small hydroelectric plants designated green power
- 240 dams on 26 river systems

Most of these facilities are remotely controlled. As demand for electricity rises and falls throughout each day, operators stationed many kilometers away open and close dams, and start and stop generating units as needed. This results in frequent and rapid changes in water levels and flows around our facilities.

How Hydroelectricity is Made

1. Water is stored in head ponds upstream.
2. The water goes through intakes.
3. The water goes from the intakes into tubes where the water gathers speed as it goes downhill.
4. The water then passes through turbines that spin shafts connected to giant electromagnets.
5. The water is then released in the outflows to join the river downstream.
6. The end result is clean renewable electricity.



Large volumes of fast moving water possess incredible raw power. Outflows can exit at speeds of up to 100 kilometres per hour creating violent turbulence on the surface and even stronger currents below the surface. That volume of water can weigh as much as a transport truck every second.

Waterways upstream and downstream are affected by hydroelectricity plants and dams, even if you cannot see them. It is important that you respect all hazards, barriers, buoys and signs. Stay Clear, Stay Safe.

Water Distribution on Earth

Earth's Total Water Supply

Oceans (salt water)	97.2 %
Freshwater	2.8 %
Total Water on Earth	**100.0 %**

Earth's Total Fresh Water Supply

Icecaps, glaciers	2.38 %
Groundwater	0.39 %
Surface Water (lakes, rivers)	0.029 %
Air and Soil	0.001 %
Total Fresh Water	**2.8 %**