Lessons in a Backpack

United Nations Educational, Scientific and Cultural Organization

GEORGIAN BAY BIOSPHERE MNIDOO GAMII Spirit of the Water

Intro to Biodiversity

More than the Spice of Life

Description of Lesson

The Georgian Bay Biosphere is home to over 1009 species of plants, 225 species of birds, 87 species of fish, 43 species of mammals, 18 reptiles, 17 amphibians and zillions of insects!! In this introductory lesson, students learn what biodiversity is, the three levels of biodiversity, its importance, and about the biodiversity found in the Georgian Bay Biosphere.

Connect with the Georgian Bay Biosphere

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At a Glance

Grade Level: 6

Learning Environment: Classroom and Outdoors

Prep Time: 15 minutes

Length of Lesson: 1 Hour and 40 minutes

Key Vocabulary: Biodiversity, Species

Staffing: 1 educator

Materials:
Object Association props: puzzle piece, cage, toy car, stuffed raccoon, bottle with poison symbol, money, thermometer
Internet access

Groupings: Whole class

Teaching/Learning Strategies: Object Association

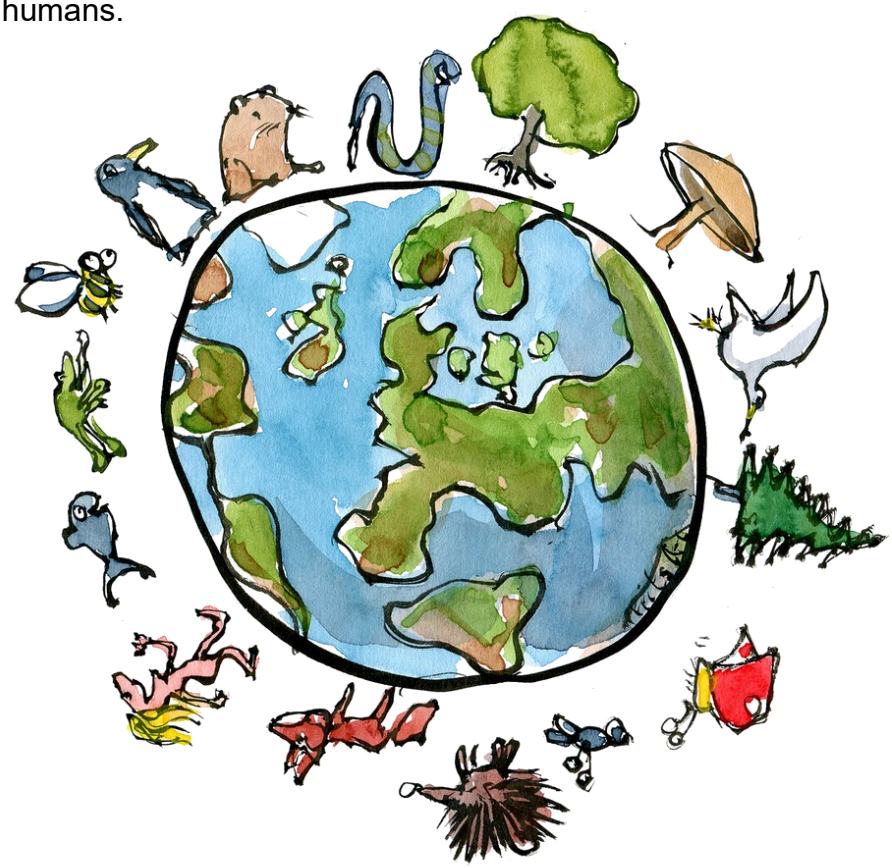
Lesson Outline

TIME	ACTIVITY	LOCATION	MATERIALS
30 minutes	Object Association	Classroom	Object Association props: puzzle piece, cage, toy car, stuffed raccoon, bottle with poison symbol, money, thermometer
30 minutes	Research Threats to Local Species	Classroom	Internet access Class set of ipads or computers

Curriculum Expectations
Grade 6 Science and Technology

Understanding Life Systems: Biodiversity

Overall Expectations
1. Assess human impacts on biodiversity and identify ways of preserving biodiversity.
3. Demonstrate an understanding of biodiversity its contributions to the stability of natural systems and its benefits to humans.



Background

The Georgian Bay Biosphere is rich in biodiversity. It is home to over 1009 species of plants, 225 species of birds, 87 species of fish, 43 species of mammals, 18 reptiles, 17 amphibians and zillions of insects!!

What is biodiversity?

Biodiversity is life. Biodiversity is our life. Biodiversity is the spice of life; it literally means the "variety of life" and includes all of the species of living things in a region or on the earth. The word biodiversity reflects this: Bio = life; Diversity = variety; therefore, Biodiversity = the variety of life on Earth.

Researchers generally agree that there are three different levels of biodiversity: genetic, species and ecosystem.

The Three levels:

1. Species Level – the numbers and kinds of organisms (i.e. lake trout, Massasauga rattlesnake)
2. Ecosystem Level – the different types of ecosystems (i.e. wetlands, rock barrens, Georgian Bay aquatic, hardwood forest, cedar swamp, etc.)
3. Genetic Level – the differences in genes between members of the same species (i.e. differences between two individual people)

What good is biodiversity?

It is BEAUTIFUL! Biodiversity can be beautiful and can give us aesthetic pleasure: we like seeing wild animals, strange plants, or pretty flowers. All humans have a right to exist; shouldn't all animals and plants have the same right? We are all products of a complex, miraculous system that created life on earth. Humans should respect other forms of life and make sure our actions don't destroy them. The plants and animals with which we share this planet have a right to exist - whether or not they are useful to humans. Do you think it is fair for humans to make another species become extinct?

Biodiversity helps us heal ourselves! Many animals and plants may hold the key to some marvelous new invention or medicine. Over a hundred different species of plants are known to provide medicine for humans. 40% of the medicines found in pharmacies are derived from plants. For example, willow trees gave us Acetylsalicylic acid, or ASA, the active ingredient in Aspirin. Without the Rosy Periwinkle, many more children would die from Childhood Leukemia. Does the cure for cancer or the common cold lie in a local plant? Perhaps – that's why it's important to preserve plant biodiversity.

Biodiversity keeps natural areas together! The loss of animals or plants from an ecosystem affects other species in the food chain – breaking up the natural functions of the ecosystem. This may eventually lead to negative impacts on surrounding natural areas and to the human

population. Natural areas (ecosystems) also provide us with essential services like clean air and fresh water. Every time we lose a species from an ecosystem, we change the way the whole system works. If this goes on for too long, the area loses its ability to provide us with ecosystem services.

Biodiversity attracts tourists! Ecotourism may well be the best hope for the survival of protected areas, as it offers a positive economic argument for the preservation of nature. Tourism is the most rapidly growing industry in the world; ecotourism (which helps people enjoy nature and ecosystems) is the most rapidly growing kind of tourism! All kinds of places - from Canmore to Costa Rica - need to preserve biodiversity to keep their economy strong.

Biodiversity helps life to continue on earth! The more species there are, the more adaptability there will be to changing conditions like global climate change. There were little warm-blooded rat-like mammals scurrying around at the time of the dinosaurs; this diversity may have contributed to their survival while all the dinosaurs became extinct. Evolutionary expansion or 'radiant evolution' into the vacant niches left by the dinosaurs allowed mammal biodiversity to soar. Another way to think of it is that biodiversity is life's insurance policy and helps evolution to take place. For example, biodiversity helped usher in the Age of Mammals 65 million years ago, when the dinosaurs became extinct!

Biodiversity gives us food! Since humans need a variety of different plants and animals to breed crops and animals suitable for use on farms, a decrease in biodiversity means that scientists have fewer species to choose from when they try to develop new food sources. For example, when a fungus wiped out 15% of the American corn crop in 1970, biologists bred resistant hybrids from a species of Mexican wild corn. The loss of animals or plants from an ecosystem will affect other species in the food chain, which may in turn affect humans. Twenty species of plants (wheat, rice, corn, potatoes, barley, cassava, sorghum, etc.) gives us 80% of the food we eat. If disease or insect pests attack these crops, we'll need the more resistant varieties of these plants that are currently growing wild.

Biodiversity helps us preserve OUR diversity! The large number of human cultures that exist, complete with their own languages and customs, add to the diversity of the human experience and enrich us as a species. The loss of biodiversity threatens these cultures, particularly those that live close the land, whether it be in Alberta or in the forests of the Amazon.

<u>Threats to Biodiversity</u>

In the Parry Sound/Muskoka area there are over 50 species at risk. Of these:

- 12 are endangered
- 18 are threatened
- 22 are of special concern

Photo credit: Scott Gillingwater

The tiny Spotted Turtle fits in the palm of your hand. It is an endangered species that depends on wetland habitat for its survival.

Background

Why Are They At Risk?

Habitat Loss and Fragmentation *(puzzle piece)*
Think of your neighbourhood and the changes that have occurred since you have lived there. Imagine the changes that have occurred over the past 100 years. Numerous forests and wetlands in southern Ontario have been altered or destroyed. This affects many species of wildlife. Eighty percent of Canada's species at risk are due to loss of habitat.
As development increases, habitat shrinks into smaller pieces. The distance between the pockets of habitat can be too far for some wildlife to safely travel. This, combined with development of nearby land and the building of roads, leads to isolated and potentially doomed populations. For example, the Eastern Foxsnake hibernates communally. The destruction of just one hibernation site may seriously impact a local population.

Direct Exploitation/Persecution *(cage)*
Some of our native reptiles are collected to be sold as pets. This can have devastating effects on a population and is an illegal practice. For these populations to exist, they need opportunities to reproduce. Animals, such as wolves and snakes are sometimes killed because of unwarranted fears. The range of the Massasauga has likely been reduced as a result of persecution.

Traffic Mortality *(toy car)*
Cars, boats, and ATV's kill thousands of animals every year on our roads and waterways and are especially hard on reptiles and amphibians. Cars frequently kill turtles, especially in early summer when adult females are looking for areas to lay their eggs. Depending on the species, a female turtle may start reproducing at 10-20 years of age and continue laying eggs for 50 or more years. As these females are killed on our roads, the eventual result is the extirpation of the entire population. Wake action from boats can swamp the nests of Least Bitterns, Black Terns and other birds such as the Common Loon.

"Subsidized Predators" *(stuffed raccoon)*
Some species have adapted and thrived near people. Fewer larger predators and an abundance of food waste from humans have benefited species such as skunks and raccoons. In many places their populations are higher now than ever before. These animals are efficient nest predators and can have devastating effects on the hatching rate of turtles' eggs.

Chemical Contaminants *(bottle with poison symbol)*
Pollution such as polychlorinated biphenyls (PCBs), dioxins, and furans are absorbed by animals in the food they eat. Animals such as Bald Eagles that are higher up the food chain often accumulate high levels of contaminants. The use of DDT in the mid 1900's almost led to the extinction of the Bald Eagle and significantly impacted other fish eating birds such as the Osprey. Both bird populations are now slowly recovering.

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Invasive Species *(picture of purple loosestrife)*

There are now more than 160 non-native species in the Great Lakes. Invasive species lack natural predators and may displace some native species. Invasive species can also bring foreign diseases that negatively impact native species. Be careful with live bait and clean your boat when you move between different waterbodies. Once established, invasive species can be very expensive to control.

Overuse of plant and animal species *(money)*

Species with economic value can become at risk if used unsustainably. The sturgeon, a species at risk in Ontario, is no longer allowed to be harvested after science showed it was being over-fished and was suffering habitat loss due to dams on rivers.

Global climate change - changes in climate affect living things *(thermometer)*

Weather patterns are becoming more erratic. This can affect the timing of some species of migratory birds return to breeding grounds, perhaps causing them to return earlier, and then making them more susceptible to poor weather conditions on their return.

In the case of the Whip-poor-will, the earlier return can also mean that hatching eggs may no longer coincide with the peak insect hatches that they rely on to feed their young.

Many people are surprised to learn that the common snapping turtle is a species at risk. But because it takes these turtles 15-20 years before they are able to reproduce, every adult death greatly affects this species' survival. Snapping turtles are often hit on the road as they cross them in search of mates, food or nest sites.

Teaching and Learning

Part A. Object Association

Divide class into eight groups. Explain that each group will be given something that represents a threat to local biodiversity. (Hand out puzzle piece, cage, toy car, stuffed raccoon, bottle with poison symbol, money, thermometer). Have groups come up with ideas on what the threat might be.

Write eight threats to biodiversity on the board, giving examples of how these threats impact local wildlife.

Ask students what is the common cause of all these threats. It is people!

Part B. Research Threats to Local Species

Introduce the concept of Species at Risk, including COSEWIC's designation of extinct, extirpated, endangered, threatened, and special concern.

In pairs, have students research threats to local species at risk. Information on the species can be found at: www.gbbr.ca/species-at-risk

Give pairs five minutes to present on their species.

SPECIES AT RISK IN CANADA

In Canada, **COSEWIC** (Committee on the Status of Endangered Wildlife in Canada) determines the national status of native species that are thought to be at risk of disappearing from Canada. Members of COSEWIC are university academics, independent specialists, Aboriginal people or government, independent biologists who volunteer their time and efforts.

WHAT DOES IT MEAN TO BE "AT RISK"?

EXTINCT
A species that no longer exists.
e.g. Passenger Pigeon

EXTIRPATED
A species that no longer exists in the wild in Canada, but occurs elsewhere.
e.g. Timber Rattlesnake

ENDANGERED
A species facing imminent extirpation or extinction.
e.g. Eastern Foxsnake

THREATENED
A species that is likely to become endangered if limiting factors are not reversed.
e.g. Massasauga Rattlesnake

SPECIAL CONCERN
A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
e.g. Evening Grosbeak

NOT AT RISK
A species that has been evaluated and found to be not at risk.