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HUMAN BEINGS AND THEIR ENVIRONMENTS

LEARNING INTENTION:

Students will investigate and describe relationships between humans and their environments, and identify related issues and scientific questions.

SUCCESS CRITERIA:

- illustrate how life-supporting environments meet the needs of living things for nutrients, energy sources, moisture, suitable habitat, and exchange of gases
- describe examples of interaction and interdependency within an ecosystem
- identify examples of human impacts on ecosystems, and investigate and analyze the link between these impacts and the human wants and needs that give rise to them
- analyze personal and public decisions that involve consideration of environmental impacts, and identify needs for scientific knowledge that can form those decisions

MATERIALS NEEDED:

- a copy of ***Living Things and their Environments*** Worksheets 1 and 2 for each student
- a copy of ***Relationships in the Ecosystem*** Worksheets 3 and 4 for each student
- a copy of ***Human Beings and Their Environments Questions*** Worksheets 5 and 6 for each student
- pencils, pencil crayons
- internet access, video equipment

PROCEDURE:

***This lesson can be done as one long lesson or divided into shorter lessons.**

1. Introduce the idea of relationships with other living things and with non-living things in the environment. Give students Worksheets

1 and 2. Read as a class or have students read independently. Check for understanding and assign work. Review as needed when work is complete.

2. Write out the definitions of the three relationships from Worksheet 3 but without the terms (*when two different organisms benefit from the relationship as partners, when one organism benefits from a relationship but the other organism is not affected, when one organism benefits from a relationship but the other organism is harmed by the relationships*). Lead a discussion about the types of relationships and give examples of each one. Ask students why they think these different kinds of relationships develop, which ones are healthy and which ones are not. Ask students about what they need to survive. List examples of needs and wants and how we meet them, to further distinguish the two concepts.
3. Give students Worksheets 3 and 4. Read as a group or have students read independently. Monitor their progress and check for understanding.
4. Give students Worksheets 5 and 6. Read assigned questions as a group. Check for understanding and assign work. Review as needed when work is complete.

DIFFERENTIATION:

Slower learners or students in need of accommodations may benefit from verbal presentation of the material on the worksheets or more time to process the work. Start these students before of the rest of the class with a small group so they can contribute in later discussions and complete work on time.

For enrichment or extension, faster learners can research and report on some of the more interesting mutual, commensal and parasite relationships found so far in the world.

ANSWER KEY

Most questions in the worksheets may be answered in sentences or paragraphs. For brevity, the answer key may be reduced to point-form notes.

Worksheet 2

- Mosquito: animal blood; pond water; Wetlands; air (as adult) or siphon tubes as larva
- Ant: leaves and seeds; rain, droplets or puddles; colonies in spaces dug underground; air through tiny holes in body)
- Moose: vegetation; streams, lakes and ponds, forest; air with lungs
- Orca Whale: sea creatures; sea water; ocean water; air with lungs and blow hole
- Aspen Tree: photosynthesis; rain water; forest areas; carbon dioxide through leaves

Worksheet 5

1. a) Biotic means the living things in a physical environment or habitat, like an otter.
b) Abiotic means the non-living things in a physical environment or habitat, like water.
2. a small ecosystem – a pond – a medium-sized ecosystem – a lake – a large ecosystem – an ocean
3. population
4. A species of organism has a niche when that species finds a way to survive and function as part of the biotic community.
5. Butterflies drinking nectar and pollinating plants - mutual
A tick biting and embedding itself in the leg of a deer - parasite
Remora (or suckerfish) following a manta ray - commensal
A bird standing on the back of cattle and eating flies – mutual
6. Answers will vary.
7. Answers will vary

Living Things and their Environments

Ecology is the study of the relationships between non-living things and living things that make up an environment. An ecosystem can be a small place like under a rock or a larger place like a marsh or schoolyard, or even a vast region such as the Great Plains. Each ecosystem had abiotic and biotic components.

Abiotic means the non-living things in a physical environment or habitat. This includes the soil, mineral nutrients, water sources, air. It also includes how the land is arranged and formed, or what is called its **physiography**. The climate is also one of the abiotic components of an ecosystem.

Biotic means the living things in a physical environment or habitat. This includes plant communities, animal communities and microbe communities, all working in the food webs of the ecosystem.

A **community** is a term used to describe the groups or populations of living organisms in an ecosystem. A community can have decomposers, consumers and producers together. A **population** is the number of individuals of a particular organism or species. For example, researchers may study the Canada Geese population or beaver population. A **species** within an ecosystem refers to a living thing that can reproduce and have young that will reproduce as well.

What Do Living Things Need?

Living things have 4 basic needs:



Food for energy



Water for body functioning



Space, or a suitable habitat



An exchange of gases, such as oxygen and carbon dioxide

Living things respond to their environments in search of these needs. Living things have adapted to their surroundings in order to fit into an ecosystem. When they find a way to survive and function as part of the biotic community, it is said that they have a **niche**. An adaptation is inherited from one generation to the next through reproduction in its environment. However, some adaptations are learned, such as changes in behaviour, over the course of an organism's lifetime.

For each living thing in the following list, identity how it would satisfy its basic needs. Think of the ecosystem it would live in, what it would eat and what it would need for a home.



Mosquito

Food _____

Water _____

Space / Habitat _____

Breath _____



Ant

Food _____

Water _____

Space / Habitat _____

Breath _____



Moose

Food _____

Water _____

Space / Habitat _____

Breath _____



Orca Whale

Food _____

Water _____

Space / Habitat _____

Breath _____



Aspen Tree

Food _____

Water _____

Space / Habitat _____

Breath _____

Relationships in the Environment

When two or more species live closely together in a relationship that lasts over time, we call that relationship a **symbiosis**. This symbiosis can take many forms. For example, a beaver may build a lodge to live in. However, muskrats have been found to use beaver lodges for shelter too, even though they didn't build the home. Another example of symbiosis can be found in the beaver's digestive system. The wood beavers chew can be very tough to digest. Beavers have a pouch at the beginning of their intestine which releases special microorganisms or bacteria. This bacteria eats the wood fibre and helps make the nutrients from the wood digestible for the beaver.

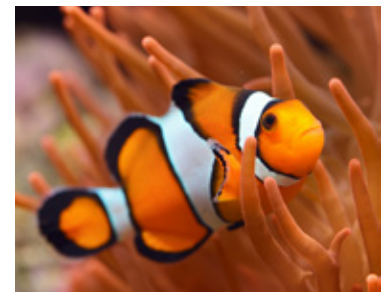


Three Kinds of Relationships



Mutualism: when two different organisms benefit from the relationship as partners, we call it mutualism. Flowering plants depend on bees for pollination and reproduction, but bees depend on plants for making honey. They both benefit from the relationship.

Commensalism: when one organism benefits from a relationship but the other organism is not affected, we call it commensalism. A clownfish has a special coating which protects it from the stinging tentacles of sea anemones. The clownfish can make a home in the tentacles. The anemone, however, is not affected by the presence of the clownfish.



Parasitism: when one organism benefits from a relationship but the other organism is harmed by the relationship, we call it parasitism. Fleas can live and feed off a dog, but they can be painful and annoying to the dog.

Organisms interact with each other in many different ways. Other relationships come from physical changes to the ecosystem and the natural resources of an area. When beavers build a dam, it changes the level of water in a wetlands area. This in turn gives small fish a chance to increase their population. Birds such as Great Blue Herons then find those wetlands better places to fish and raise their own young. Human beings can benefit from the beaver's work as well. The wetlands become natural flood-breakers, holding extra water after a winter's thaw. This slows down the flow of large amounts of water, all thanks to the busy beaver.

What Do Human Beings Need from the Environment?

What would you say is the difference between a need and a want?

Needs are basic to survival in an ecosystem but wants make survival more interesting, more comfortable and more enjoyable. In some ecosystems, where natural resources are scarce, living things compete for survival. Each time a need or a want is satisfied, natural resources or energy are used to satisfy it.



When beavers build a dam, the flow of water below the dam changes. If the water in the ecosystem below the dam is scarce, organisms living there may not satisfy their basic need for water. For everything that happens in an ecosystem there is a resulting effect and reaction which will change the make-up of the ecosystem in some way.

The relationship between human beings and the environment has changed a lot through our history. In the past, people depended on the local natural resources. Today, through technology and transportation, people depend on the natural resources from distant places. Fruit like bananas may be grown thousands of miles away and then shipped or delivered to many places across the world. Products are made and packaged on different continents but then shipped to stores for us to purchase.

Like any change in an ecosystem, technology and transportation have resulting effects and reactions in the environment. Before and during the 1800s, very few people in Europe, Canada and the US ate bananas. Today, it is possible in Canada for a person to eat a banana every day even if we don't grow the fruit in Canada.

Banana farming and production grew by 30 percent in the 1990s and it continues to grow. This means more land is cleared or used for growing bananas and more sea ships or transport trucks are used to deliver bananas across the globe. This affects the wildlife and ecosystems because the banana plant, which had a niche, now takes over most of an ecosystem.

Transporting foods from around the world gives us choice in the foods we eat, but it also puts pollution in our air. Packaging material from used products takes up space in landfills or takes energy and more transportation to recycle.

Sometimes what we want and need can actually create problems, even if we don't mean to create those problems. When we realize that our choices may threaten the health of our own ecosystem and other ecosystems, we have an opportunity to find more responsible choices. We can decide what is important and what kind of relationship we want to have with the ecosystem.

What kind of relationship or role would you like with your environment?

Mutual, commensal or parasite? And what choices can you make to manage that relationship?

Human Beings and Their Environments Questions

Use information from the worksheets and other sources to answer the following questions. If you need more space, use a separate piece of paper.

1. An ecosystem has biotic and abiotic parts. In your own words, describe what the two terms mean. Give an example for each as well.

biotic _____

abiotic _____

2. Give an example of:

a small ecosystem _____

a medium-sized ecosystem _____

a large ecosystem _____

3. A number of individuals of the same species living together in the same area is called what? _____

4. Explain in your own words what is meant by a niche.

5. Label each of the following relationships as parasite, mutual or commensal.

Butterflies drinking nectar and pollinating plants _____

A tick biting and embedding itself in the leg of a deer _____

Remora (or suckerfish) following a manta ray _____

A bird standing on the back of cattle and eating flies _____

- Investigate either the animal tunnels or the use of road signs or some other method of solving these animal problems. Do you think they are effective ways to solve the problems? Write about 5 to 6 sentences in your report.

[illegible]

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Alberta Grade 7 Science Curriculum Map

The lessons and experiments in this book fall under 5 main topics that relate to the Alberta curriculum for Grade 7 Science.

Unit A: Interactions and Ecosystems

Unit B: Plants for Food and Fibre

Unit C: Heat and Temperature

Unit D: Structures and Forces

Unit E: Planet Earth.

In each lesson, you will find teacher notes designed to provide guidance with the learning intentions, the success criteria, materials needed, and a lesson outline. As well, the notes will provide some insights on what results to expect when the experiments are conducted.

Suggestions for differentiation or accommodation are also included so that all students can be successful in the learning environment.

The lessons are designed to involve tactile participation and knowledge application while providing opportunities to connect ideas between topics and school subjects.

Unit Introduction & Assessments

- Introduction
- At A Glance – List of Learning Expectations
- Teacher Assessment
- Student Assessment

Unit Topics and Contents:

Unit A: Interactions and Ecosystems

A-1 Key Concepts

A-2 Human Beings and Their Environments

A-3 Energy in an Ecosystem

A-4 Into the Ecosystem!

Unit B: Plants for Food and Fibre

B-1 Key Concepts

B-2 Plants and Their Uses

B-3 Plants: Processes and Structures

B-4 What Impacts a Plant Environment?

B-5 Building Relationships with our Food, Fibre and Surroundings

Unit C: Heat and Temperature

C-1 Key Concepts

C-2 Increasing Needs, Increasing Energy

C-3 How Does Heat Affect Matter?

C-4 Thermal Technology and Energy Use

Unit D: Structures and Forces

D-1 Key Concepts

D-2 Introduction to Structures

D-3 Forces, Loads and Locating the Centre of Gravity

D-4 Structural Strength and Flexibility – Properties of Materials

D-5 Construction Projects

Unit E: Planet Earth

E-1 Key Concepts

E-2 How We Study Powerful Forces Inside the Earth

E-3 The Language of Geology, The Cycle of Rocks

E-4 Mountain Formation

E-5 Digging Into the Fossil Record