

Important Concepts . . .

Preview Review



Science

Grade 8 TEACHER KEY

***W3 - Lesson 4: Adaptations to Aquatic
Ecosystems***

Important Concepts of Grade 8 Science

Materials Required

W1 - Lesson 1	Mass, Volume, and Density
W1 - Lesson 2	Solubility and Saturation Points
W1 - Lesson 3A.....	Viscosity, Flow Rate, and Buoyancy
W1 - Lesson 3B.....	Simple Machines
W1 - Lesson 4	Gears, Mechanical Advantage, Speed Ratios, and Efficiency
W1 - Lesson 5	Hydraulics and Pneumatics
W1- Quiz	
W2 - Lesson 1	The Role of Cells within Living Things, Cells-Tissue-Organ System
W2 - Lesson 2	The Microscope
W2 - Lesson 3	Body Systems Part 1
W2 - Lesson 4	Body Systems Part 2
W2 - Lesson 5	Problems Associated with Body Systems
W2 - Quiz	
W3 - Lesson 1	Transmission and Absorption of Light
W3 - Lesson 2	Reflection and Refraction of Light
W3 - Lesson 3A.....	Vision and Lenses
W3 - Lesson 3B..	Water in its Various States Affects Earth's Landforms and Climate
W3 - Lesson 4	Adaptations to Aquatic Ecosystems
W3 - Lesson 5	Water Quality
W3 - Quiz	

Textbook:
*Science in
Action 8*

Science Grade 8

Version 5

Preview/Review W3 - Lesson 4 TEACHER KEY

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Preview/Review Concepts for Grade Eight Science

TEACHER KEY



*W3 - Lesson 4:
Adaptations to Aquatic
Ecosystems*

OBJECTIVES

By the end of this lesson, you should

- explain the concept of Natural Selection
- describe some adaptations of organisms living in aquatic ecosystems
- list and describe factors that cause adaptations in aquatic organisms
- describe how humans have influenced the adaptation of aquatic organisms

GLOSSARY

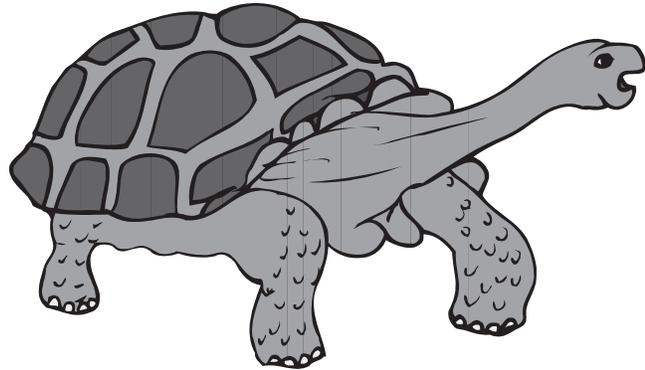
adaptation - a feature that gives an organism a better chance of surviving in a particular environment

evolution - change in a species over time

natural selection - the process where individuals well suited to their environment survive and pass on their advantageous traits (Others not suited to the environment die.)

W3 - Lesson 4: Adaptations to Aquatic Ecosystems

Welcome to W3 - Lesson 4. This lesson is designed to teach you about **adaptations to aquatic ecosystems**. It should take about 1.5 hours to complete this lesson; there will be a small homework assignment at the end.

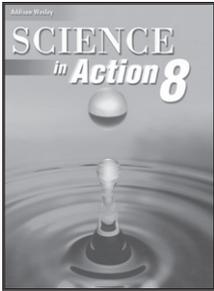


Adaptations to Aquatic Ecosystems.

The term **aquatic life** refers to organisms that live in water. **Ecosystems** are a network of interactions linking living (biotic) and non-living (abiotic) things. Therefore, **aquatic ecosystems** are areas of water where organisms live.

The role an organism plays in its environment is called a **niche**. Ecosystems are as diverse in the different kinds of species as people within a town. The more complex the ecosystem, the more diversity is shown.

The more **adaptative** a species is to changes in an environment, the greater its chances of survival within that habitat. Therefore, adaptation to aquatic ecosystems means **survival of the fittest**. Organisms that fail to adapt to changes in their environment become extinct. Organisms who have adjusted to the new environment and survive are able to pass these distinctive characteristics on through generations. This is more commonly known as **natural selection**. This natural selection process over time allows those organisms to evolve into more adaptable species, which is called **evolution**.



Activity 1

Read and understand pages 374 to 377 in *Science in Action 8*. Then, answer the following questions.

1. Adaptation is a physical characteristic or behaviour of a species developed through time.
2. List and describe three different adaptations that aquatic animals possess.

Answers will vary. Snails developed hard shells so they are not eaten by predators. Suckers have developed mouths that are on the bottoms of their heads so that they can eat plant material from the bottom of riverbeds. Catfish, sturgeon, ling cod, and Atlantic cod have developed barbels (small whisker-like projections on their chins) for feeling and finding food.

3. Define diversity in an ecosystem.

Diversity in an ecosystem refers to the variety of different species living there.

4. How is the ocean able to support a great diversity of living things?

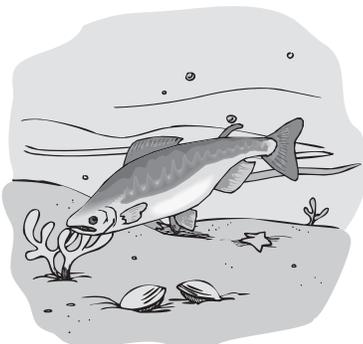
Many more and different kinds of organisms can live in salt water because the oceans have more and different kinds of environments.

5. Page 375 discusses lake diversity. A freshwater lake has three zones. Why are very few organisms living in the lowest zone? Why do most of the aquatic animals live in the upper zone?

Lowest zone is dark; therefore, few plants grow at the bottom of a lake and there is not much for fish to eat. The upper zone has many aquatic animals because it has more light, more plants, more food for a variety of organisms.

6. Pages 376 to 377 discuss ocean diversity. Briefly list and summarize the four different ocean zones in which animals can live.

a) Estuary is most diverse and richest; fresh and saltwater mix to form brackish water. Many marshes, many plants, many birds. b) Intertidal zone is the shallows of the ocean. Animals must withstand the pounding of the waves. Animal species have developed special adaptations to live in this zone. c) Continental shelf extends out from the edge of a continent below the Earth's surface It is warmer than the open ocean with much light. It is a rich area with warm water, light, and nutrients. d) The Oceanic Zone is beyond the continental shelf. This is the deepest part with no light and little oxygen. Many different kinds of animals live here, from microscopic to whales, different kinds of fish, jelly fish, shellfish, squid, octopus, shrimp, and others.



Factors that Cause Adaptations

Organisms in water adapt for several reasons. **Temperature** is an important factor. Each species has a temperature range in which it can survive. Tropical fish are not able to survive and reproduce in Alberta's cold mountain lakes. Similarly, some species of fish cannot survive in warm water year round. For example, Arctic char cannot survive in water at the equator because some of their life processes requires very cold water for part of the year.

Light is another factor. Most organisms thrive in light. Plants need light for photosynthesis so they can grow and reproduce. However, some organisms have adapted to low light conditions. In the deep ocean, certain species of crab do not need light to survive.

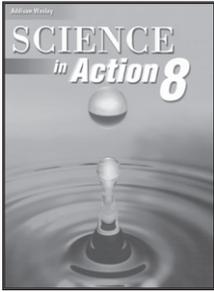
Pressure is a third factor. Deep water has great pressure, but certain animals can survive and thrive. A fish from extremely deep water will not survive when brought to the surface because the lower pressure will damage it.

The fourth factor is **salinity**. Salinity refers to the amounts of minerals and salts in water. Ocean water has high salinity because it is very salty. Some inland lakes have high salinity because the rivers and streams feeding them flow through soil and/or rock containing salt and pick up more of the salts and minerals from the riverbed. This higher concentration gets even higher when it is deposited into one place such as a lake.

Most freshwater organisms cannot live in salt water. The salt in the water actually draws fluid out of their organs and kills them. Some species have adapted. Certain salmon species spend part of their lives in the ocean and part in freshwater rivers. The explanation of this adaptation goes back to the time when there were continental glaciers in North America. These glaciers covered the lakes and rivers causing the fish to move, in this case, to the ocean such as the Bering Strait Refuga (a refuge for fish). Those fish that survived adapted back to fresh water, such as many of the trout species did, and some adapted to using both fresh and salt water as part of their life cycles.



Water movement is also a factor for adaptation. Some plants and animals prefer fast wave action water and thrive there. Some plants and animals prefer very still water, such as in a swamp.



Activity 2

Read and understand pages 378 to 380 in *Science in Action 8*. Then, answer the following questions.

1. The textbook lists five factors that lead to the development of adaptations by species. List them and explain the main cause of animals adapting for each.

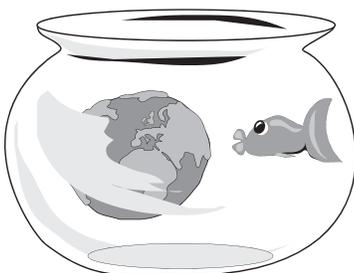
a) Temperature - Some fish live in cold or warm water. Each species is different. They must adapt to the variations in the seasons, such as ice on northern lakes in the wintertime.

b) Light - Lack of light at lower depths does not allow for plants to grow; therefore, fewer animals live at lower depths.

c) Pressure - Animals cannot survive sudden changes in pressure, therefore, they tend to stay at certain elevations or they move to different elevations slowly.

d) Salinity - Organisms that survive in fresh water tend not to survive in saltwater because the salt draws fluid out of their organs. Some species of salmon spend part of their life cycle in both types of water.

e) Water movement - Some shallow areas are very rich in life. Animals have developed "hanging on" features (to rocks and such) due to the wave action.



- Choose an adaptation an aquatic animal has developed and describe how the animal has changed physically or behaviourally.

Answers will vary

- What other factors may cause aquatic species to adapt?

Answers may vary, one may be physical or behavioural

adaptations to avoid being consumed by predators.

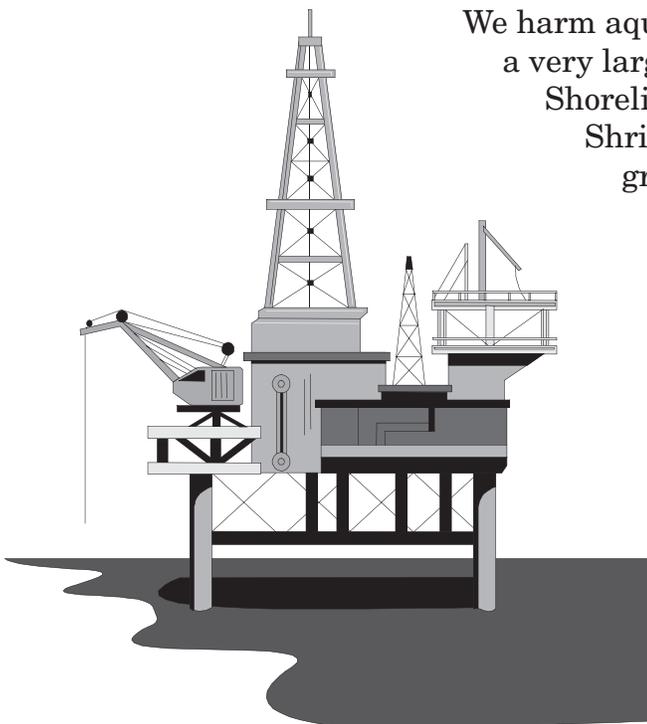
Aquatic Adaptations with Human Interaction

Organisms have adapted to the natural environment over long periods of time. Although organisms have the ability to evolve in an ever-changing environment, the most difficult task is to adapt to human patterns of life. This is because the changes we make are often very major and quick.

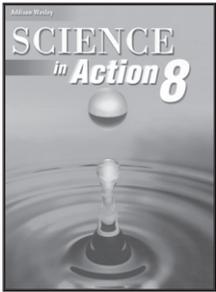
We harm aquatic ecosystems in many ways. Loss of habitat is a very large concern. Wetlands are drained to plant crops. Shorelines are altered to become attractive beaches.

Shrimp and fish farms fill areas where once a diverse group of organisms lived. We pollute bodies of water with our sewage and when we drill for oil and gas. Pesticides and other chemicals run into waterways. Humans have also introduced new plant and animal species to foreign areas. They interact with, and sometimes seriously harm, native species. All of this has a great effect on the diversity in all types of aquatic ecosystems.

Human interaction does not allow for many generations of organisms to deal with the changes; rather, we demand immediate change. This has caused extinction and near-extinction of many species.



Fortunately government agencies in many parts of the world are starting to recognize the impact that humans have on aquatic species and are conducting research to reduce the impact of some of these activities. They are also providing guidance in how activities affecting water and the organisms that rely on it should be performed.



Activity 3

Read and understand the previous paragraphs and pages 383 to 384 in *Science in Action 8*. Then, answer the following questions.

1. In your own words, describe two human-caused problems aquatic species encounter. What effects do these problems have on aquatic species?

Answers may vary, students will possibly refer to

pollution, loss of habitat, and suggest animals' health

and ability to reproduce may be harmed. They might even

die as a result of the problem.

2. Use the Internet or other sources of information. In a few sentences, describe a problem caused by man that is affecting an aquatic species.

Answers may vary. Seismic operations are causing

dolphins and whales to become deaf. Seismic

operations "blast sound" into the ocean floor to make

maps of suspected oil deposits. Whaling, pollution, and

damage to aquatic habitat are decreasing the numbers

and health of aquatic mammals.

