

Do You Know What's in Your Water?
Grade 4
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Life Science

OVERVIEW: Students will explore an aquatic ecosystem and its components. Students will conduct experiments to determine the quality of the water and the effects on the aquatic ecosystem.

MAJOR FOCUS

ACADEMIC EXPECTATIONS:

- 2.1 Students use appropriate and relevant scientific skills to solve specific problems in real-life situations.
- 2.3 Students identify and describe systems, subsystems, and components and their interactions by completing tasks and/or creating products.
- 2.5 Students understand the tendency of nature to remain constant or move toward a steady state in closed systems.
- 2.6 Students complete tasks and/or develop products which identify, describe, and direct evolutionary change which has occurred or is occurring around them.

PROGRAM OF STUDIES:

Characteristics of Organisms

Students will understand that

- organisms have basic needs and can only survive when these needs are met.
- organisms have basic structures that serve different functions. These structures are used to sort organisms into groups.

Organisms and their environments

Students will understand that

- organisms' patterns of behavior are related to the nature of organisms' environments. There are many different environments on earth that support different types of organisms.
- all animals depend on plants for food.

- organisms change the environment. These changes may be detrimental or beneficial.

Students will

- examine the role science plays in everyday life.

CORE CONTENT:

SC-E-3.1.1 Things in the environment are classified as living, nonliving, and once living. Living things differ from nonliving things.

SC-E-3.3.1 All animals depend on plants. Some animals eat plants for food.

SC-E-3.3.3 All organisms, including humans, cause change in the environment where they live. Some of these changes are detrimental to the organism or to other organisms; other changes are beneficial.

ORGANIZER:

How does water quality affect organisms within the aquatic ecosystem?

Essential Questions:

- How do the physical features of aquatic organisms help them to survive in their environment?
- How are the physical features of aquatic organisms similar or different from other animals?
- How does water pollution affect aquatic life?
- How can I help improve the environment of aquatic life?

CULMINATING ACTIVITY

Using knowledge of environmental findings that students discovered in the aquatic ecosystem, write an editorial informing the community of the quality of the water found in their area. Discuss how organisms living in this environment are affected by water quality.

This editorial should include the following information:

- oxygen levels
- pH levels
- Coliform bacteria test
- Water temperature levels
- Nitrate levels
- Types of organisms living in aquatic life

ENABLING KNOWLEDGE

- Physical features of aquatic organisms
- Survival mechanisms of aquatic organisms
- Classification techniques based on physical features and survival mechanisms
- Define water pollution
- Identify water pollutants
- Impact of water pollution on aquatic life
- Testing water quality
- Application of test results
- Identification of possible pollution sources
- Communication of results
- Possible pollution solutions
- Understanding Vocabulary

ENABLING SKILLS AND PROCESSES

- Classification skills
- Technology skills
- Cooperation skills
- Research skills
- Organization skills
- Observation skills
- Skills in using Scientific Method
- Writing skills
- Mathematical skills
- Communication skills (e.g., listening, public speaking)

INSTRUCTIONAL PLAN 1

Title: Physical features of aquatic organisms

Number of Days: 4-5

Academic Expectations: 2.3

Essential Content:

- Organisms have basic structures that serve different functions. These structures are used to sort organisms into groups.
- Organisms' pattern of behavior are related to the nature of organisms' environment. There are many different environments on earth that supports different types of organisms.

Essential question:

How do the physical features of aquatic organisms help them to survive in their environment? How are the physical features of aquatic organisms similar or different from other animals?

Enabling Knowledge:

- Physical features of aquatic organisms
- Survival mechanisms of aquatic organisms
- Classification techniques of macroinvertebrates based on physical features and survival mechanisms

Enabling Skills and Processes

- Classification skills
- Observation skills
- Technology skills
- Organizing information

Activity 1

Materials:

- Pictures of aquatic life (duck, tadpole, frog, fish, turtle, snake, dragonfly, snail)

Define the term physical features. Display various pictures of aquatic life such as mammals, reptiles, invertebrates, and amphibians. Discuss what features that students observe that might allow each to survive in the water.

- Type of feet (webbed, claws)
- Gills (fish, tadpoles)

- Fins (fish)
- Lungs (frog, turtle, snail)
- Mouth shape (fish, turtle, dragonfly)
- Wings (duck, dragonfly)
- Shell (turtle)
- Eye location (fish, turtle, dragonfly, snake, duck)

Activity 2

Materials:

- Staple remover
- Large spoon
- Tweezers
- “food”

Students will individually use tools to try to gather “food” from their environment. They will observe that some tools are better adapted than others at gathering food. This will demonstrate how individual animal adaptations help them survive in their environment.

Activity 3

Materials:

- <http://lsb.syr.edu/projects/watershed/taxkey/SampleIntro.html> Website

Look at website to practice identifying macroinvertebrates. Complete stream study of activities from the website.

Activity 4

Materials:

- water sample collected from watershed
- microscopes
- Macroinvertebrate identification poster

Bring in examples of aquatic life from watershed. Students will observe the invertebrates under microscopes noting characteristics they observe.

With identification poster, as a class classify the organisms into correct categories based on their characteristics.

Activity 5

- Venn diagrams

Complete a Venn diagram to compare/contrast characteristics of aquatic life to other life.

INSTRUCTIONAL PLAN 2

Title:

Number of days: 7-8

Academic Expectation:

- 2.1 Students use appropriate and relevant scientific skills to solve specific problems in real-life situations.
- 2.3 Students identify and describe systems and describe subsystems, and components and their interactions by completing tasks and/or creating products.
- 2.6 Students complete tasks and/or develop products which identify, describe, and direct evolutionary change which had occurred or is occurring around them.

Essential Content:

- Students will understand that organisms' patterns of behavior are related to the nature of organisms' environments. There are many different environments on earth that support different types of organisms.
- Students will understand that organisms change the environment. These changes may be detrimental or beneficial.
- Students will examine the role science plays in everyday life.
- All organisms, including humans, cause change in the environment where they live. Some of these changes are detrimental to the organism or to other organisms; other changes are beneficial.

Essential Question:

How does water pollution affect aquatic life?

Enabling Knowledge

- Define water pollution
- Identify water pollutants
- Identify the impact of water pollution on aquatic life
- Testing water quality

- Testing water quality
- Application of test results
- Identification of possible pollution sources

Enabling skills and processes

- Cooperation skills
- Observation skills
- Skills in using the scientific method
- Writing skills
- Mathematical skills
- Communication skills
- Technology skills (digital camera operation)

Activity 1

Materials:

- Pencils, pens, notebooks or clipboards
- Map of immediate area
- Chart paper and markers
- Digital camera (optional)

Define water pollution. Discuss causes of water pollution. Divide students into small groups. Distribute maps, clipboards, and pens to each team. Explain to students that they will have 40 minutes to explore part of the watershed near the school, and that their task is to observe and record the conditions they see, and note any questions they have about what they observe.

Come back together after the walk-about and have each group report the environmental conditions they saw; record their responses on chart paper. As a group, analyze what students observed, ask, "What items might point to a problem?" and "How similar/different are the items?"

Activity 2

Materials:

- Small pan of water
- Oil

Fill a small pan halfway with water, then pour a small amount of oil into the pan. Point out that oil floats on the water. Discuss what problems this oil could cause for

macroinvertebrates living in the water. Ask: How is polluted water a danger to living things?

Activity 3

Materials:

- <http://encarta.msn.com/find/concise.asp?mod=1&ti=0539D000&page=2>

Discuss different types of water pollution. See website and discuss the different types of pollution and causes of each. Reflect back to the data collected at the walk-about at the watershed. Was there evidence of water pollution? What could be some of the possible causes of pollution?