

## OVERVIEW

At the beginning of the Water Quality Unit, students are asked to observe their school grounds – mapping where water comes from, where it goes, any pollution left on the ground, and more. Based on their observations, discussions, and their review of the one-page information sheet focused on water quality, students develop ideas about what might be happening on their campus and what they want to investigate further. Student groups come up with a testable question, and set up an investigation that includes data collection and relates to water quality.



While collecting data, students continue to build content knowledge and context with more readings relating to water ecosystems, including watersheds and their living (biotic) and non-living (abiotic) components, beneficial soil and water

microorganisms, and how water flowing across their campus may contribute to whether an organism survives or not. After making observations and taking data, students present their findings and their evidence-based conclusions to the class. Students demonstrate what they have learned by creating a diagram of the living and non-living components of a water ecosystem, and how human activities affect the survival of those components. Then, students reflect on what they have learned and share their thoughts through the writing of a news article.

In the final step of the Water Quality Unit, students use their reflections to make informed choices and develop a service project to help their community. As a class, or in student groups, the Water Quality Project workbook is used to guide students through project development and follow through.

### California Grade 4 Standards

The unit lessons are designed to help students master the following standards:

#### Life Science Strand

- 3.** Living organisms depend on one another and on their environment for survival.
- a.** Students know ecosystems can be characterized by their living and nonliving components.

### Learning Objectives

Learning objectives in the context of the Environmental Principles and concepts.

#### Students will:

- Categorize the components of natural systems as living and non-living.
- Describe the living and non-living components from terrestrial, freshwater, coastal, or marine ecosystems that have similar roles.
- Recognize that the living and nonliving components of an ecosystem and the interactions among them produce the resources that are required for the survival of the living components of the ecosystem.
- Identify that the needs of humans are met by using resources (goods and ecosystem services) from natural systems.

# 4TH GRADE: LIFE SCIENCE WATER QUALITY UNIT

## California Grade 4 Standards

**b.** Students know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.

**d.** Students know that most microorganisms do not cause disease and that many are beneficial.

## Learning Objectives

- Recognize that living things meet their needs by using resources (goods and ecosystem services) from the environment around them.
- Recognize that some resources within an ecosystem are finite in supply; others are less limited.
- Explain how the health of an ecosystem affects the ability of plants and animals to survive in any particular environment.
- Provide examples of how the health of an ecosystem influences the quality, quantity, and reliability of the goods and ecosystem services it produces.
- Recognize that changes to the environment caused by humans and other animals influence the survival of some kinds of plants and animals.
- Identify that some changes to the environment caused by humans and other animals affect the cycles and processes that occur naturally in ecosystems and in turn affect the survival of some kinds of plants and animals.
- Provide examples of how human practices have altered the cycles and process that occur naturally in terrestrial, freshwater, coastal and marine ecosystems.

- Give examples of microorganisms.
- Describe the roles of microorganisms in natural systems.
- Recognize that microorganisms are involved in many natural systems processes that are used by humans and human communities and that such processes are considered “ecosystem services” (e.g., processes involving microorganisms such as fermentation, decomposition, etc.).
- Describe the role of ecosystem services involving microorganisms in human communities and societies (e.g., waste treatment).

## Investigation and Experimentation

6. Scientific progress is made by asking meaningful questions and conducting careful investigations. Students should develop their own questions and perform investigations.
- a.** Differentiate observation from inference (interpretation) and know scientists’ explanations came partly from what they observe and partly from how they interpret their observations.
  - b.** Measure and estimate the weight, length, or volume of objects.
  - c.** Formulate and justify predictions based on cause-and-effect relationships.
  - d.** Conduct multiple trials to test a prediction and draw conclusions about the relationships between predictions and results.
  - e.** Construct and interpret graphs from measurements.
  - f.** Follow a set of written instructions for scientific investigation.

## UNIT IMPLEMENTATION IDEAS

Work with another grade level (4th – 6th) or classroom to complete parts of the Unit.

- Choose specific areas of the school to conduct the Schoolyard Review. Get together and compare data and maps.
- Have students partner across grade levels to conduct the Schoolyard Review.
- Have classrooms share their observations for increased data collection and to check validity.
- Have groups partner with groups from another class to conduct their investigations, sharing the time in gathering data. Combine data for their conclusions.
- Create or share a service learning project.