

A LIVING WATER ECOSYSTEM

PART 4 – 45 minutes

OVERVIEW

After teams have collected data at least twice, students read a one-page information sheet about the living and non-living components of a watershed and water ecosystem, and the factors that affect the survival of those components. Students take what they learn and relate it to the data they are collecting. Students continue to observe and record data.

Standards: 5c, 5e, 7b

Materials

- Information Sheet B – A Living Water Ecosystem – 1 per group

Vocabulary Words

- Abiotic factor
- Biotic factor
- Contamination
- Decomposition
- Dissolved Oxygen
- Invertebrate
- Microorganism
- Photosynthesis
- Runoff
- Sediment
- Watershed

Other Resources

See Teacher Resources, page 116 for additional activities that relate to watersheds.

Helpful Hints

- Provide additional information about the local watershed.
- Watersheds can be as small as a leaking sprinkler head to as large as an entire city basin. Show students the smaller watersheds that can be found around the schoolyard.
- Help students investigate where water goes after it leaves their campus.
- Provide students with information about a local body of water. To locate your closest body of water, consult a local map. Go to www.epa.gov/surf to find the name of your watershed.
- If possible, take a field trip to the local waterway to observe how humans may be impacting it.

PROCEDURE

1. Have each student read Information Sheet B – A Living Water Ecosystem.
2. Have student groups discuss what they read and the ways in which it relates to their investigations. Each group can report their main points to the class as part of a group discussion.
3. Looking at the illustration on Information Sheet B, have students figure out how water moves in their watershed community. Have them investigate further to confirm their ideas.
4. Have students investigate the pathway water takes from their campus to the nearest body of water.



GUIDED QUESTIONS



- How do biotic factors differ from abiotic factors?
- What are the biotic and abiotic factors of your watershed?
- Where are there watersheds within our schoolyard?
- When abiotic factors are impacted in a water ecosystem, how does this affect the biotic factors?
- What water services or goods do you depend on?
- What is the closest body of water to our school?
- Where, if at all, does that body of water flow to?
- What impact is what you are observing having on your local water system? How do you know?

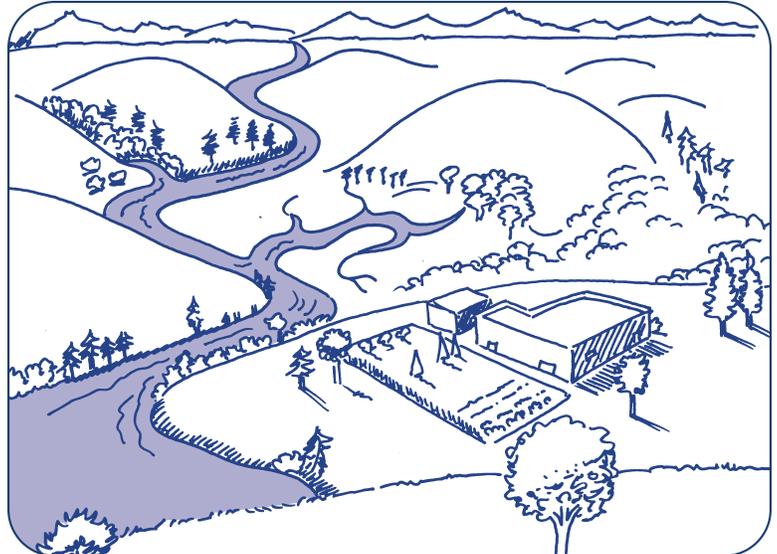
A LIVING WATER ECOSYSTEM

Your community, whether it is in a city or rural town, is part of a watershed. A watershed is the land area that directs water to a drainage system or river. It helps supply water to our community by allowing it to seep into the ground or channel it into streams, rivers, and other bodies of water. Gravity moves water through the watershed from higher to lower areas.

A watershed includes living components or biotic factors such as people, wildlife, plants, and insects; as well as non-living components or abiotic factors, including sunlight, oxygen, temperature, and soil. Both components belong to the environment of a watershed community.

Look around. What are the biotic and abiotic parts of your watershed?

Your watershed directs water into another system of living and non-living components – a water ecosystem. It is the abiotic factors that make up the environment for the living organisms – water, sunlight, rocks, soil, and air – and allow them to thrive. Without these, living organisms would not survive.



Humans depend on the products of a water ecosystem. Water ecosystems provide us with goods and services, including drinking water, recreation, and food. In fact, about 9,000 different species of fish are harvested for food from our water systems. Humans are responsible for protecting these ecosystems. However, pollution can harm these ecosystems and damage their ability not only to provide us with goods, but also maintain the balance of a functioning ecosystem. For example, large rivers in California such as the Sacramento, American, Feather, and lower San Joaquin, provide major fish spawning habitats for salmon, steelhead trout, and striped bass. Young fish depend on small invertebrates – mostly insects and tiny shrimp – for food. When land pollution, field pesticides, and erosion from construction sites run off through a watershed and enter streams and rivers, they kill or seriously harm these food sources and the young fish. This is just one way the condition of the ecosystem is harmed.

Let's take a closer look at how abiotic factors are affected.

Water: All living things need water to carry out their life processes. Contaminated water from land pollution not only affects the water habitat for fish and other animals but also plants and algae.

These organisms use water along with sunlight and carbon dioxide to make food as part of photosynthesis. Other living things eat the plants and algae to obtain energy.

Sunlight: Because sunlight is necessary for photosynthesis, it is an important factor for plants, algae, and other living things. If plants or algae do not receive sunlight, they cannot grow. When dirt, sand, and oil that build up on city streets get washed into streams, it decreases the amount of light able to penetrate the water, reducing the amount of light for plants and algae to grow.

Oxygen: Fish, plants, and other water organisms need oxygen to survive. They obtain dissolved oxygen from the water around them. Dissolved oxygen refers to the oxygen stored between water molecules in a river or lake. The amount of oxygen in water is critical to the health of any river system. Runoff of oxygen-demanding organic matter such as sewage, lawn clippings, and leaves can cause excessive decomposition by microorganisms, using up too much oxygen in the process, and decreasing the amount of dissolved oxygen available for other living organisms.

Temperature: Temperature of the water can also affect oxygen levels. Cold water can hold more dissolved oxygen than warm water. Water temperature can rise when runoff that flows over hot asphalt and concrete pavement drains into the water system. This not only lowers the amount of oxygen available for living organisms, but causes serious problems for organisms adapted to certain water temperatures and already stressed by other contaminants in urban runoff.

Rock and gravel: Rock and gravel provide necessary habitats for living organisms. Fish and amphibians also use them as a spawning ground for laying and hatching their eggs. Runoff of “land pollution” and sediments can cover the available rocks and gravel needed for the fish to lay and cover their eggs.

When affected by “land pollution” and other runoff, all these abiotic factors decrease the availability of resources available to the living organisms within a water ecosystem. Every non-living component is impacted and therefore impacting the living components.

What is happening in your community? Where is the water from your schoolyard going? To a nearby river, stream, lake, or ocean?

The watershed of most cities and school grounds contain up to 90 percent hard surfaces such as rooftops, concrete playgrounds, streets, and parking lots where water collects quickly and runs off into the street. This not only prevents water from seeping into the ground to replenish underground supplies of fresh water, but sends “land pollution” directly into our rivers and the ocean.

Think about the following questions:

- What are you observing during your data collection? Do hard surfaces have an impact?
- What about the “land pollution?” What impact on your local water ecosystem do you think it may have?

