

Program

Six

Natural Systems: Water Treatment Teacher's Guide



Water quality is one of the clearest indicators of human impact on the environment. The condition of our water has a profound effect on our health, as well as the health of every living organism in our ecosystem.

As a consequence of either poor or misinformed decisions, we are now limited to the number of fish we can safely eat and places that we can swim. The long term effects of pollutants, such as lead and

mercury, last for many years.

We tend to associate much of the knowledge gained from our environmental investigations with bad news. However, it is important to note that this knowledge also provides us with the science needed to restore our environment back to a healthy state.

In many cases, facilities such as the Bowling Green water treatment plant are now returning water back to the environment in a cleaner state than when it was removed.

Program Objectives

Students will learn that:

- Science and scientists are at work in northwest Ohio solving the problems posed by human activities.
- Human activities can have both a positive and a negative effect on natural systems.
- Once scientific evidence is determined, we need to apply technical solutions.

Ohio Science Standards

Life Sciences

Benchmark G

Describe how human activities can impact the status of natural systems.

Indicator 18, Grade 10

Describe the ways human activities can deliberately or inadvertently alter the equilibrium in ecosystems. Explain how changes in technology/biotechnology can cause significant changes, either positive or negative, in environmental quality and carrying capacity.

Science and Technology

Benchmark B

Explain that science and technology are interdependent: each drives the other.

Indicator 1, Grade 10

Cite examples of ways that scientific inquiry is driven by the desire to understand the natural world and how technology is driven by the need to meet human needs and solve human problems.

Materials

- Computer with access to the Internet
- Paper and pen
- Handouts

Pre-Viewing Activity – Prepare to Learn

The use of filtered water from the tap and bottled water has increased dramatically over the past decade. For some, the consumption of bottled water may be a status symbol, but for others it reflects a concern that our water may not be safe to drink.

Water, like food, is something that we consume on a daily basis. We use water to bathe, wash our clothes, flush our toilets, cook our food and quench our thirst. All in all, we have a unique relationship with water.

Given the close nature of our relationship with water, are our concerns justified? What is being done to address those concerns?

Based on evidence, industry is considered to be the chief source of pollution in our waters. The result of this knowledge and concern was much needed government regulation. However, as our knowledge and awareness of the environment increased, it became apparent that industry was not the only culprit. Run off from farms, roads and homes are also major sources of pollution.

The next time you pour something down the drain, think about where it is going, and then think about where your water comes from.

Vocabulary

- pH
- Carbonated
- Turbidity
- Dissolved solids
- Activated carbon
- Effluent
- Affluent

Related Discussion Items

- How important is abundant water to your family's well being?
- How important is reliable water to your family's well being?
- How important is clean water to your family's well being?
- The cost of water, does it effect jobs?
- Are there advantages to living near to an abundant water source, such as Lake Erie?
- What effect on water quality might some of the following places have?
 - ✚ Industry
 - ✚ Home use
 - ✚ Farms
 - ✚ Runoff from streets and parking lots

Activity

Create a cognitive map as a follow-up to the discussion. Some possible items might be the health benefits of clean abundant water sources. This discussion might evolve around long term health effects of lead or mercury in the water supply.

Quiz

1. The withdrawal of water from a river for use in manufacturing, drinking or agriculture is a human activity that can have an impact on the status of down river communities.

True or False

2. Water coming from a resource such as the Maumee River is referred to as "raw water." Consumers may safely use this water without alteration.

True or False

3. We need to be careful how we treat water, not only to avoid damaging natural systems such as wetlands, but human systems such as waterlines as well.

True or False

4. While pesticides, fertilizers and herbicides help us produce better crops, they can also have a negative impact on the quality of our drinking water. This is especially true following a heavy rain.

True or False

5. Pollutants found in tap water, such as the heavy metal lead, often originate from the solder used to connect copper pipes found in the home rather than from farm or industrial runoff.

True or False

Related Lesson Plans

[Environmental Monitoring Adventure](#)

(ORC# 831)

Environmental problems are of particular interest and concern to many students and teachers. In this activity, students research a local water pollution issue firsthand. While in the field, they experience the problem directly, and use the scientific method to better understand the impact of pollutants on the local flora and fauna. After identifying the problem, students brainstorm possible solutions.

[Living Watershed](#)

(ORC# 519)

This resource provides a unit outline which uses the local watershed as a classroom. Through this unit students have the opportunity to explore basic ecological concepts, conduct scientific inquiries, understand the interdependence between science, technology, and mathematics in an urban community, develop competency in the use of technology equipment, and develop co-operative working relations. The unit uses local resources, speakers, print and video materials, as well as standard text materials to study the ecosystem of the local watershed. Labs, field work, research, classroom discussions and the preparation of written documents and oral presentations provide a variety of activities thereby meeting the needs of a diverse population of students. Students acquire lab skills and research abilities, practice with written or oral presentation of materials, team work skills, exposure to career possibilities, and the ability to plan specific actions to solve a problem. The unit provides a unifying theme, establishes a positive relationship with the community, and promotes stewardship for our earth.

[Hydrology Investigation](#)

(ORC# 1033)

"Hydrology Investigation" is a complete unit designed to develop students' understanding of the importance, unique properties and content of water. Through applications of water analyses, students come to understand water chemistry and how it is important in understanding the health of aquatic environments. Students measure the following key indicators of water quality: transparency, temperature, dissolved oxygen, pH (pen or meter), conductivity or salinity, alkalinity, and nitrate. Students develop numerous scientific skills ranging from observation and data collection to model building and data analysis.

Educational Resources

Additional Resources Using: D3A2

Search String = ground water
sewage disposal
water pollution



The **D3A2** helps educators analyze data, and then points them to resources such as lesson plans, assessments and activities designed specifically to address the academic need identified by the data. In addition to linking content to data analysis, educators will have general search capabilities to locate education content resources aligned to the Ohio's Academic Content Standards. Examples of the state resources queried are:

INFOhio

<http://www.infohio.org/>

Ohio Resource Center

<http://ohiorc.org/>

Other Resources

Environment Canada

http://www.ec.gc.ca/water/en/manage/poll/e_poll.htm

INFOhio (AccessScience)

Keyword search: [water pollution](#)

Ohio EPA

<http://www.epa.state.oh.us/water.html>

U.S. Environmental Protection Agency

<http://www.epa.gov/highschool/>

Mercury in the environment

<http://www.epa.gov/mercury/science.htm>

<http://www.usgs.gov/themes/factsheet/146-00/>

Lead in the environment

<http://www.ext.vt.edu/pubs/housing/356-483/356-483.html>