

Freshwater *Natural Inquirer* • Reflection Section Answer Guide

GREEN MEANS CLEAN

Introduction

Do you know where your drinking water comes from? If so, what is the source? If you are not sure of the source of your drinking water, do some research to identify the source. Your source might be a stream, river, lake, or reservoir. You may also have a spring, an individual water well at your home, or a community well.

Students will have individual answers to these questions. The goal of these questions is to get students to think about where their drinking water comes from long before it reaches the tap.

Look at figure 7a. Why do you think **wastewater** treatment plants are identified as a risk to safe drinking water?

Students will have individual answers to this question. Students should be made aware that treated wastewater is clean, but not clean enough to drink. Treated wastewater is released from wastewater treatment plants into rivers. Students should also consider that wastewater, prior to treatment, is contaminated water and may cause a hazard to drinking water supplies.

Explain in your own words why the scientists wanted to conduct a national assessment of drinking water watersheds.

Students will have individual answers to this question. They should, however, realize that the status of the Nation's drinking water watersheds, and therefore the status of the Nation's water quality, cannot be determined by looking at smaller watersheds. The only way to understand the national picture is to standardize assessment methods across all of the Nation's watersheds.

Methods

Explain what kind of information the scientists compared for each of the drinking water watersheds.

Students will have individual answers to this question. They should, however, realize that for each drinking water watershed, the scientists compared land cover change between 1992 and 2001 while considering what percentage of the watershed was protected from further urban development.

What is the relationship between land cover change and drinking water quality?

Students should realize that the more a watershed is developed into urban or agricultural land cover from natural land cover, the less protected is the drinking water quality.

Findings

What national trends in land cover change were discovered for the drinking water watersheds?

Students should see that although the numbers were not large, the trend was for a loss of natural land and an increase in urban land in U.S. drinking water watersheds.

Based on what you learned in this article, would you say that future threats to drinking water quality are equal across the United States? Why or why not? Provide reasons for your answer.

Students will have individual answers to this question. However, they may conclude that water quality threats will rise across the United States due to continued development and growth. The west may be less susceptible to issues due to the large amounts of public land that can protect the water resources.

Discussion

The scientists discovered that 8 percent of the Nation’s drinking water watersheds contain at least 20 percent urban land. Do you think these more urbanized watersheds are mostly found in the Eastern United States or the Western United States? Why?

Students can use evidence from the article for their answers. Information from the article shows that the Western United States has more conserved public land, which is evidence that there is less urban land. The “Findings” section also notes that loss of natural vegetation is common in the Ohio and Southeast hydrologic regions which are both in the Eastern United State region.

Based on this article, do you think that drinking water sources will face more challenges from pollution in the future? Why?

Students will have individual answers to this question. Based on this research, however, students should reasonably conclude that unless more land is put into protective status or less urbanization occurs, drinking water watersheds will face more challenges from urbanization, including pollution. The trends uncovered in this research would lead one to conclude that challenges will increase if present trends continue.

WHAT’S THE NONPOINT?

Introduction

Why might understanding the nonpoint source water pollution threat by U.S. watershed region be helpful to those trying to better understand water pollution?

Students will have individual answers to this question. Students should reason that if pollution threat is greater in the east, for example, that something about larger population density might be contributing to

water pollution. Likewise, if pollution threat is greater in agricultural areas, students might reason that something related to agricultural production might be contributing to water pollution.

In the years since passage of the Clean Water Act of 1972, one type of threat to water quality has not been adequately addressed. Explain in your own words why it is difficult to identify and address nonpoint source pollution.

Students will have individual answers to this question. They should be able to explain that nonpoint sources are generalized and widespread, and therefore more difficult to address through legislation or direct action. Nonpoint sources of pollution also take a longer time to address. For example, cars are polluting less today than in 1972, but it has taken decades for this improvement in pollution control to happen.

Methods

What are the basic sources of the three water quality problems? (Hint: Look at the contributing factors in figure 8.)

Students will have individual answers to this question. They should, however, use figure 8 to look for clues. In general, the sources of the water-quality problems identified by the scientists are human development and activity, including housing, roads, mining, and livestock production.

Observe the different units of measurement used for the different contributing factors in figure 8. As you can see, these different units of measurement could not be added together. Think about converting each of these measures to 1 of 5 percentiles. What is lost when this kind of standardization process is used? (Hint: Review figure 1 in “Thinking About Science” on page 27.)