

Students will have individual answers to this question. Help them think through the process of taking a wide range of measurements and collapsing those measurements into just 5 categories. The detail of each separate measure is lost in this standardization process. What is gained by this process? The ability to compare and combine measurements from different types of variables is gained from this standardization process.

Findings

Look closely at figure 9 and locate the area where you live. What is the nonpoint source water pollution threat level for your area? How does the threat level compare with other areas? Based on what you have read in this article and other things you know about your area, explain why the threat level is where it is.

Students will have individual answers to this question. They should, however, be able to give a reasonable and justified explanation for why the scientists calculated the particular threat level for the area.

Observe the locations of the Eastern United States low-threat areas. Name one difference between the Florida Everglades and the other locations.

Students should notice that the Florida Everglades is much farther south than the other locations; and it has a much warmer climate.

What is similar about all these eastern low-threat areas, including the Florida Everglades? *All of these areas have lower human population density than the more populated areas across the eastern United States.*

Discussion

Federal and State lands help to protect water resources because they limit human development. Name two other natural resources that are usually protected by Federal and State lands.

Students will have individual answers to this question. Some possible answers include: animal and plant habitats, air quality, threatened and endangered species, and soil conservation. Students may be able to name others.

Think about the Clean Water Act. If population continues to rise as expected, what actions might help protect Americans from a reduction in water quality?

Students will have individual answers to this question. They should, however, realize that either modifications to the Clean Water Act or other Congressional action could be taken to reduce the amount of pollution coming from nonpoint sources. Students may also note that individuals and groups can take action to protect water resources. If students note the ability of individuals to take action, hold a class discussion about some actions they can take to protect water resources.

CARIBBEAN CRUISE

Introduction

In your own words, what is the question the scientists wanted to answer in this study?

The scientists wanted to know how the amount and type of CPOM in the watersheds changed over time.

The scientists studied two watersheds in the experimental forest. What is one reason the

scientists wanted to study two watersheds instead of only one watershed?

One reason is that the scientists wanted to be able to compare data between the two watersheds.

Methods

The scientists collected CPOM after large storms. Why do you think these collections were a good idea?

After large storms, more debris and leaf litter would likely have fallen in the watershed areas causing more of it to get caught in the traps and potentially breaking the mesh and traps. These collections were also a form of maintenance to make sure the traps kept working well.

The scientists had to test several different types of metal mesh traps to collect the CPOM until they found a design that worked. Think of a time that you have tried to make something or do something and it didn't work. What did you do? What are some characteristics that you think are important for scientists to have in order to overcome obstacles? (Hint: Take a look at some of the *Natural Inquirer* scientist cards at <http://www.naturalinquirer.org/scientists-v-92.html>. Look at the back of the cards and read about important scientist characteristics. See if you think any of those characteristics apply to this situation.)

Students will have individual answers to these questions. However, some of the characteristics that may come up are perseverance, creativity, thoughtfulness, ability to see the big picture, critical thinking, and problem solving.

Findings

CPOM export was lowest during times of drought. Think about the stream and the surrounding environment during these times.

Brainstorm some ideas as to why you think CPOM export could have been low. You may want to research one of your ideas to see what you can find out about it.

Students will have individual answers to these questions. Students should support their ideas with evidence and logic. However, some things to consider are streamflow and how drought may affect trees and plants.

December, January, and February had low CPOM export. Why do you think this low level may have occurred?

These months are low rainfall months, and although there is some litterfall it does not reach the streams to be exported.

Discussion

In your own words, what did the scientists learn from their study?

The scientists learned that CPOM export followed a seasonal pattern. This pattern loosely followed rainfall and litterfall patterns. The scientists also learned about how hurricanes and large storms influenced CPOM export. The amount of CPOM export is affected by how often the storms occur and the severity of the storm. Additionally, the age of the forest has an effect on CPOM export.

Why are natural disasters and other large weather events important to study? What information can they provide for the future management of the natural systems?

Students will have individual answers to this question. Natural disasters and large weather events, as evidenced by the results of this research, can cause major impacts to an ecosystem. Natural disasters and large weather events are common in certain parts of the world and in certain ecosystems. Studying these types of events can help us understand

how the environment reacts to the large changes. Scientists and land managers can anticipate what they need to do to protect the ecosystem in the event of a similar event.

SEDIMENT-AL JOURNEY

Introduction

Concrete is used for many building projects, including bridges, sidewalks, and buildings. Concrete is made from calcium. What part of your body contains calcium? Does this body part need to be strong? Why or why not?

Students will have individual answers to this question. They should realize that their own skeletal system contains calcium. Their bones must be strong to support their body's structure.

Based on what you have read so far, would you expect to find more calcium and lead in riparian sediment closer to or farther away from the city center? Why?

Students will have individual answers to this question. They should reason, however, that riparian sediment closer to the city center would likely have more calcium and lead than areas away from the city center. The reason is that the greater the urban development, the more buildings, sidewalks and roads are built, and therefore the greater the possibility of calcium and lead washing into waterways and deposited onto riparian areas. If students read "Thinking About the Environment," they should also remember that precipitation in urban areas drains into waterways more quickly than it does in vegetated environments, and this quick drainage carries more chemicals into soils and waterways.

Methods

Observe figure 12. Why did the scientists take samples across the entire watershed, from northwest to southeast?

Students will have individual answers to this question. They should realize, however, that the scientists were interested in differences in sediment deposits across the urban-suburban gradient. Since the Gwynn Falls watershed follows the urban-suburban gradient, it was necessary to take soil samples across the entire watershed.

Why did the scientists take every sample 10 meters from the water's edge?

Students will have individual answers to this question. They should realize, however, that by standardizing the distance from the water's edge, the scientists were removing a source of variation that could affect their results.

Findings

Scientists prefer to use measurements to describe conditions. For example, rather than describing a day as hot, a scientist would prefer to report that the temperature is 94 °F (34 °C). Based on this study's results, what measure might one day be used to describe the amount of an area's urbanization? What is one advantage of using this measure?

Students will have individual answers to this question. Based on the results of this study, the measured level of calcium found in riparian sediment samples might be used to describe the degree of urbanization of an area. If a calcium measurement could be used to describe how urbanized an area is, the description would be less biased.

The scientists found a relationship between higher levels of trace chemicals in riparian