Watersheds

MIDDLE GRADES SCIENCE NSPIRED

Science Objectives

- Students will recognize the relationship between deforestation of a watershed and its effect on the biosphere.

- Students will make observations and analyze data to determine whether a relationship between deforestation and environmental factors is inverse or positive.
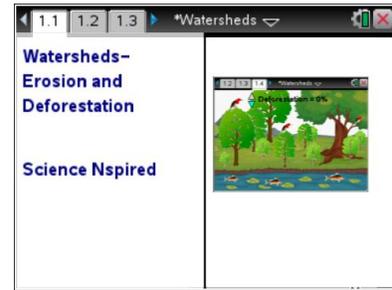
Vocabulary

- watershed
- turbidity
- erosion
- deforestation
- qualitative and quantitative data
- inverse relationship
- positive correlation

About the Lesson

- This lesson features a watershed simulation in which students can decrease the amount of ground cover and observe the effects on the turbidity of the water and populations of living things.

- As a result, students will have a better understanding of
    - Positive correlations and inverse relationships
    - The effect of stream erosion on water quality
    - The effect of deforestation on a watershed's ability to support life.

TI-Nspire™ Navigator™

- Send out the .tns file.
- Monitor student progress using Screen Shots.
- Use Live Presenter to spotlight student answers.

Activity Materials

- Compatible TI Technologies: ▦ TI-Nspire™ CX Handhelds, 📱 TI-Nspire™ Apps for iPad®, 💻 TI-Nspire™ Software

Tech Tips:

- This activity includes screen captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials

Lesson Files:
Student Activity
- Watersheds_Student.doc
- Watersheds_Student.pdf

TI-Nspire document
- Watersheds.tns

Discussion Points and Possible Answers

Have students read the background information stated on their activity sheet.

Move to page 1.2.

Have students answer question 1 on the device, their activity sheet, or both.

Q1. Predict what will happen to the turbidity of a stream as the trees and vegetation along the banks are removed.

Sample Answer: The turbidity will increase.

Move to page 1.3.

1. Have students read the description of the deforestation simulation for page 1.4.

Move to page 1.4.

2. After reading the directions for the simulation, students can close the pop-up window by selecting ☒. Students can view the directions again by selecting menu **> Watersheds > Directions**.
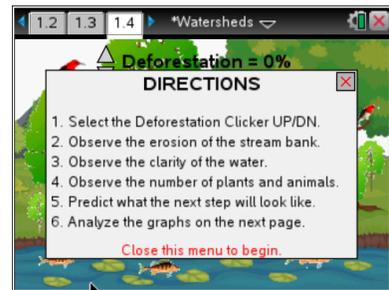
3. Students will use the Deforestation arrows to increase/decrease the amount of trees and ground cover in this watershed. Students should observe: water clarity (turbidity), number of plants and animals, and erosion of the stream bank.

> **Tech Tip:** To read the directions again, students can select 🔧 > **Watersheds > Directions**. Students may need to back-out to the main Tools Menu 🔧 to see the desired menu option.

Move to pages 1.5 – 1.6.

4. Have students use the spreadsheet of the data on page 1.5 and the graph on page 1.6 to review the quantitative data collected and answer the questions.

> **Tech Tip:** To scroll through data in the spreadsheet on screen 1.5, students can press their finger anywhere on the screen and drag it up or down.

Move to pages 1.7 – 1.9.

Have students answer questions 2-4 in the .tns file, their activity sheet, or both.

Q2. What happens to the turbidity of the stream as the percent of deforestation increases?

Answer: A. Turbidity increases.

Q3. Is there a positive correlation or an inverse relationship between deforestation and the turbidity of the water? Explain your reasoning.

Sample Answer: There is a positive correlation between deforestation and turbidity. The data forms a straight line that goes up from left to right. If the independent and dependent variable both increase at a constant rate, the relationship is positive.

Q4. Based on your qualitative observations, what was happening to the stream banks as the percent of deforestation increased?

Sample Answer: The stream banks were eroding as the percent of deforestation increased. More water could be seen and there was less green ground cover and more brown dirt.

Move to pages 1.10 – 1.12.

After analyzing the graph, have students answer questions 5 and 6 in the .tns file, their activity sheet, or both. NOTE: Question 7 is not in the .tns file.

Q5. What happens to the populations of living things in this stream's watershed as the percent of deforestation increases?

Answer: B. Population decreases.

Q6. Is there a positive correlation or an inverse relationship between deforestation and the habitat populations? Explain your reasoning.

Sample Answer: There is an inverse relationship between deforestation and the habitat populations. As deforestation increases, the habitat population decreases. On the graph, the data goes down from left to right.

Q7. Propose a hypothesis for how turbidity affects the aquatic life in a watershed.

Sample Answer: Since an increase in turbidity makes the water cloudier, the plants are not able to get the light they need for photosynthesis. When the number of plants decreases, all of the aquatic food webs are disrupted. Also, aquatic organisms rely on their gills to absorb dissolved oxygen in the water. Undissolved particles in the water can hinder the ability of gills to function properly.

TI-Nspire Navigator Opportunities

Make a student a Live Presenter to demonstrate the use of the slider. Use Navigator to capture screen shots of student progress and to retrieve the file from each student at the end of the class period. The student questions can be electronically graded and added to the student portfolio.

Wrap Up

When students are finished with the activity, retrieve the .tns file using TI-Nspire Navigator. Save grades to Portfolio. Discuss activity questions using Slide Show.

Assessment

- Formative assessment will consist of questions embedded in the .tns file. The questions will be graded when the .tns file is retrieved. The Slide Show will be utilized to give students immediate feedback on their assessment.
- Summative assessment will consist of questions/problems on the chapter test.