Wappinger Creek Storm

Time Period: One 45 minute session
National Benchmarks: Benchmarks 5A: Diversity of Life; 5D Interdependence of Life; 5E: Flow of Matter and Energy; 9B:Symbolic Relationships; 9D:Uncertainty; 12B:Computation and Estimation; 12D:Communication Skills; 12E:Critical-Response Skills.
National Science Content Standards: *Science as Inquiry: A*; *Life Science: C*: Biological Evolution; The Interdependence of Organisms; Matter, Energy, and Organization in Living Systems; *Science and Technology: E:* Abilities of Technological Design; Understandings about Science and Technology; *Science in Personal and Social Perspectives: F:* Population Growth; Natural Resources: Environmental Quality; Natural and Human-induced Hazards; Science and Technology in Local, National, and Global Challenges
New York State Standards: 1, 2, 3, 4, 5, 6, 7

Objective: Students will know how a stream changes during and after a storm and be able to create a graph to demonstrate one of these changes.

Lesson Outline:

1. Students discuss the impacts of a flood using photos
2. Students graph the chemistry of a storm event in Wappinger Creek
3. Students think about the impacts of these changes on the local ecosystem

Materials:

Photos of flood event
Computer lab/laptop cart with Microsoft Excel
Worksheet
Projector for computer (optional)

Preparation:
Copies of the Excel tutorial would be helpful to have on hand if students get stuck.

Engage: Show students photographs of flood events (local photos are included with this lesson). Ask: what do you think happens to a stream *during* a storm event? If students have completed Lesson 1: Your Local Stream, they should have a good idea of the types of physical changes, but chemical changes are difficult to measure without constant monitoring during the event.
Explore: Students will use the data set "Storm Chemistry" and choose a variable to study. Use the worksheet to guide them through this process. All students should create a graph of rainfall and flow over time to begin with, in order to see the relationship between these two factors. Then, students can work on different variables and try to understand the changes on their own.

There is a version of the worksheet available with graphs embedded in case you don't want to use Excel and have the students graph the data.
Explain: Students may need help remembering how to use Excel. They also may be dissatisfied with data points that don't point to an obvious pattern.

This data comes from a study that was done to try to understand what happens to different variables during a storm event. Prior to this study (and many others), when calculating watershed exports, scientists were not estimating the loads in stormwater, and thus had no idea

how much nitrate or chloride 'moves out' during a big storm. Although students will not be doing these types of calculations, they should get an idea of the recovery that occurs in aquatic ecosystems, and how long it takes for this to occur. For an extension of this idea, see Lesson 4 titled "Ecosystem Disturbance" in the "What is an Ecosystem" section in Module 1.

Extend: Students share their graphs and discuss whether or not their data supports their hypothesis or not. Students can also begin to think about how exporting a large amount of nutrients in a short time period might affect the local ecosystem.

Evaluate: Students complete the worksheet based on the storm data.

Comments:

Reference: Ma, Xiaoying. 1991. Elemental Dynamics of the East Branch of Wappinger Creek during Summer Storm Events.