Why is it so salty?

Time: 2 class periods
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 the application of road salt impacts water quality and be able to discover the different sources of salt as well as the amount of time that salt stays in the aquatic ecosystem.

Lesson Outline:

1. Students discuss the implications of salt as a pollutant
2. Students work as 'investigators' in groups to discover the impact of different sources of salt
3. Each group receives a data set and creates a graph of the information
4. Students discuss their findings with the whole class

Materials: Computers with Excel, worksheets

Engage: Remind students what they learned from the previous activity about organism response to salt pollution. How much salt is too much? Ask students if they think it matters whether an organism is exposed to salt for months or years. Remind students of bioaccumulation, and discuss whether salt could be another example of this. This lesson focuses on a small watershed in a relatively unpopulated section of Dutchess County. The stream is part of the Wappinger Creek watershed, which eventually empties into the Hudson River.
Explore: All students make two graphs that give them an overview of the amount of sodium and chloride in the river, as well as how much has been exported from the stream each year. A worksheet with the answers is provided at the end of this lesson plan.

Once students have made the initial graphs, they should be divided into six groups. Each group will create an additional graph that explores the amount of salt from each of six sources: road applications, parking lots, sewage, water softeners, deposition, and weathering. Students then present their results to the rest of the class, and then work to figure out which source of salt has caused the increase.
Explain: Salt has increased steadily in Wappinger Creek since 1986, with some spikes in last 5 years. The primary source is road salt, even though there has not been a significant increase in the use of road salt in the last 9 years. The steady increase is likely due to a lag effect of long-term salt use & subsurface build-up, and the amount of salt in the creek should level off (if there is no increase in road salt use).

Extend: Students could find the averages for five year periods of the amount of salt released from the stream as well as the inputs. This would show students the difference between the beginning of the record and today. Students should be able to tell that earlier in the record, salt was retained in the watershed in groundwater, and once it reached a saturation point, it began to be released.
Evaluate: Students submit their completed worksheets.

Comments: