Reading the River, Summer 2002

Understanding Personal Contribution to Pollution

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Grade Level: 8th Grade
Time Period: 90 minutes

Objectives

In this lesson, students will:

1. Summarize how a freshwater ecosystem can be affected by humans.
2. Summarize why and how ecosystems are altered and why they are difficult to restore, focusing on freshwater ecosystems.
3. Research and create a letter to an official concerning one of three possible scenarios.

Program of Studies

Scientific Inquiry

- identify and refine questions that can be answered through scientific investigations combined with scientific information.

- communicate (e.g., write, graph) designs, procedures, and results of scientific investigations.

Conceptual Understandings

- investigate and analyze populations and ecosystems.

Applications and Connections

- recognize how science is used to understand changes in populations, issues related to resources, and changes in environments.

- recognize that science is a process that generates conceptual understandings and solves problems.

- design and conduct different kinds of scientific investigations to answer different kinds of questions.

Core Content

SC-M-3.5.1 A population consists of all individuals of a species that occur together at a given place and time. All populations living

together and the physical factors with which they interact compose an ecosystem.

SC-H-3.5.3 Organisms both cooperate and compete in ecosystems. Often changes in one component of an ecosystem will have effects on the entire system that are difficult to predict. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.

SC-H-3.5.5 Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected.

Materials

Enviroscope Group (1)
Enviroscope and accompanying material

Sum of All Parts Group (2)
1-meter square pieces of white paper
Coloring Materials
Assorted items (pencils, paper clips, paper balls to serve as garbage)

Humpty Dumpty Group (3)
Magazine page or other nature pictures
scissors
Glue
Poster

Activity Procedure

Prior to Class:

1.) Cut sheets of paper into 1-meter square pieces.
2.) On one short side of the paper, draw a blue line to show water.
3.) In a corner, write numbers on half of the sheets, and letters on the

other half.

4. Set up Enviroscope with animals, buildings, trees, etc. and gather all appropriate materials for use, including spray bottle of water, and several items to serve as pollutants.

During Class:

1.) Break Students into three groups
2.) One group of students will work with the Enviroscope Model, another will complete the "Humpty Dumpty" activity, and the other group will begin on the Sum of All Parts project.

Sum of All Parts:

1. Give each student a 1-meter square of paper and coloring materials.
2. Instruct the students that they have been given a piece of stream front property and one million dollars to use to develop the land.
3. Give students 45 minutes to develop their piece of land in whatever way they want to.

Enviroscope Group

1. Teacher will serve as the facilitator for the group.
2. Go through the process of "polluting" the water of the Enviroscope community, using each child as a helper in the pollution.
3. Activity should last roughly 45 minutes.
4. When finished with demonstration, each student should write a summary of what they saw, and then write their opinion or reaction to what they saw happen to the fresh water of the community. Students should be guided to react to how the water started clean and the dirt was contributed by various human related factors.

Humpty Dumpty Group

1. Students will each be given a nature scene from a picture or magazine.
2. Student should cut of their scenery into many pieces, though they should be instructed not to cut them too small.
3. Once pieces are cut, students are to mix them up, and try to put them back together.
4. Pieces should be glued back together in the appropriate order on the poster board.

After 45 minutes:

1. Bring class back together as a group.
2. Those students that completed the Sum of All parts activity will now align sheets of paper on the floor placing numbers in ascending order and letters in ascending order across from the numbered sheets for class to view. Have each student bring a small "piece of trash".
3. Allow each student to explain how they developed the land and why.
4. Once all have finished, place the piece of trash near the water of each property.
6. Have students push their trash downstream, and discuss the fact that events upstream affect how downstream waters are affected.
7. Have students how participated in the Humpty Dumpty activity show their progress in putting back together their natural habitat.
8. Discuss the difficulty experienced by the students, and parallel this difficulty with how difficult it is to put back in place a natural habitat once it has been destroyed.
9. Allow time for those who participated in the Enviroscope activity to explain the process that they went through and to share some of their reactions and thoughts regarding pollution of freshwater systems.
10. Entire class should take the last 5 minutes of class to write a passage in their journal/learning logs regarding the lesson.

Definition/Explanation of Concept

These activities will be a culminating activity for a unit of study on freshwater ecosystems. Students have some understanding of how vital water is to us as humans, but sometime lack the knowledge of how life for all organisms is impacted by human interaction with the world. Once they have been taught the basics of ecosystems, we can take them one step further into analyzing their day to day actions to determine the impact that it has on the water in our community.

In a unit of study regarding ecosystems and pollution of them, students often have strong feelings connected with these issues. When students realize what their personal impact is, no matter how small, they often want to know what they can do. Writing a letter to an official (and mailing them) gives students the knowledge that they play a vital role in prevention of pollution.

Assessment

1. Participation in the activities demonstrated by presenting to the rest of the class, a reflection on activity (Enviroscope), Poster with pieces put back together (Humpty Dumpty), and a piece of "property" (Sum of All Parts).
2. Journal entry.
3. Letter to the a local official regarding what has been learned about freshwater ecosystems and the concern about human impact on them.

Lesson Context

Lessons prior to this class period would have included the parts of a freshwater ecosystem, including living organisms, explanation of the water cycle, importance of water to biological function, and explanation of what it means for water to be unclean. Students will have learned several methods for determining stream health.

References

Kentucky Department of Education
http://www.kde.state.ky.us/oapd/curric/corecontent/science_cc_30.asp

http://www.kde.state.ky.us/oapd/curric/Publications/ProgramofStudies/Science/midsci.html

Project WET: Curriculum and Activity Guide
Both "Humpty Dumpty" and "Sum of all Parts" were modified from: The Waterhouse and Council for Environmental Education (CEE), 1999