Comparing Costs of Cleanup

Grade Level:
4-8

Subject Areas:
Science, Mathematics

SD Standards
Science
4.S.1.2.

Math
4.M.1.2.
4.N.3.1.

Setting:
Classroom

Skills:
Interpreting (identifying cause and effect), Critical thinking, Cooperative learning

Prior Preparation:
Have students preview a video about nonpoint source pollution and its effects on water. If possible, obtain pictures from outdoor sports, home and garden and other types of magazines that show possible causes of nonpoint source pollution. Display pictures on a tag board during pre-game discussions.

Vocabulary:
contamination, erosion, fertilizer, pollutants, storm drain, wetlands, holding pond, solid waste, sediment control fencing, watershed, thermal pollution, nonpoint source pollution

Objective: Students will calculate the value of keeping our water resources clean when they have to "pay" to clean up non-point source pollution problems in the local watershed.

Materials:
Reproduction of "Comparing Costs of Cleanup" game board
Game pieces
Coins ("pretend" money will work; however money must be the same increment amounts)
Die

Background:
Non-point source pollution problems are difficult to fix. They result when rain from lawns, city streets, parking lots, and barnyards runs off into lakes and streams. This runoff may contain oil, fertilizers, antifreeze, pesticides, bacteria, and other substances that negatively affect water quality. Another type of non-point source pollution is erosion of soil from farm lands, construction sites, and stream banks.

Fixing non-point source problems usually requires a great deal of cooperation. Communities, farmers, homeowners, forest managers, developers, and companies - all of us - must take better care of the land to help reduce non-point source pollution.

Procedure:

- Begin by asking the students what water pollution is. Help them clarify their definition.
- Ask them whose fault water pollution is. Discuss the issue of responsibility with them.
- Tell the students that protecting water quality and controlling pollution is everybody's business! The Clean Water Act gives states the authority to control pollution sources, but each of us must share in the responsibility.
- Give students the definition of non-point source pollution. Ask them to give an example of types of non-point source pollution.
- Help them identify ways they might help prevent nonpoint pollution.
- Divide class into small groups (3-5 per group). Assign a student to be "banker." The banker's responsibility is to pay and collect coins from

each player.

- Each player begins with 5 coins. The bank should contain a minimum of 50 coins.
- Players roll one die to see who goes first. Player with the highest number goes first.
- All game pieces are placed on the polluted water drop at START. Players take turns moving from one block to the next, following the arrows, to complete the game. Encourage discussion during the game on what costs are involved when hitting a "pay" (the negative number spaces) space and how this could have been prevented. Have students discuss solutions to the "pay" spaces.
- The player who reaches the clean water drop at FINISH first ends the game. All players count their coins. The player with the most coins wins.

Extensions

- Take a field trip to your local lake or river. If there is a dam there, arrange to have someone give your class a guided tour. Have the students ask pre-prepared questions about nonpoint source pollution.
- Have the students make up verses to the tune of "The More We Get Together". Suggest they use local water bodies in their lyrics.
- Divide class into small groups (3-5 students in a group). Have each group imagine they are governor of the state. Assign each group a specific type of non-point source pollution that is a major problem. Have groups brainstorm ways to solve their specific problem and present their solutions to the class.
- Design and implement a plan to monitor and improve the water quality in the watershed in which your school is located. The plan should include specific activities and a time line to insure active participation for each.

Vocabulary Glossary:

Contamination	An impurity, that causes the air, soil, or water to be harmful to human health or the environment
Erosion	soil depletion caused by running water or wind
Fertilizer	Any one of a large number of natural and synthetic materials, including manure and nitrogen, phosphorus, and potassium compound, spread or worked into the soil to increase its fertility
Holding Pond	An area where wastes are stored until it can be dispersed over land
Non-point Source Pollution	Pollution that cannot be traced to a single point, because it comes from any individual place or a widespread area (for example, urban and agricultural runoff)
Pollutants	An impurity (contaminant) that causes an undesirable change in the physical, chemical, or biological characteristics of the air, water or land that may be harmful to or affect the health, survival or activities of humans or other living organisms
Sediment Control Fencing	Fence line placed at a development site used to control sediment runoff
Solid Waste	All wastes that include garbage, rubbish, ashes, industrial wastes, swill, demolition and construction wastes , and household discards such as appliances and furniture
Storm Drain	The entrance to an underground pipe system the controls flooding from rainfall
Thermal Pollution	A form of pollution that makes water too warm to support cold water species or plants and animals due to removal of trees and shrubs along shorelines and in streams
Watershed	Land area from which water drains to a particular water body