Nashua River Watershed Investigations for Grades K-8

Lesson # 3-1

Title: 3-1 How Can I Create a Barrier to Prevent Flooding?
Grade Level & Standard: Grade 3
3-ESS3-1 Evaluate the merit of a design solution that reduces the damage caused by weather.

Objective: Students will build a landscape with houses and structures and then introduce flooding with water. Students will observe flooding with and without barriers of different types. They will measure effects of these barriers (wetlands, logs, berm, greenways).

Background: Periods of high rainfall, storms, hurricanes and the new issues of rising ocean levels can cause flooding in communities. Environmental engineers are designing and testing various structures to prevent towns and cities from flooding. Solid wall structures have been used in the past but now eco-engineers are finding that natural structures such as grass, shrubs, and trees work better. Soil berms and coastal jetties also can reduce flooding.

Vocabulary:

- **Wetland -** area where standing water covers the soil or an area where the ground is very wet. Wetlands include swamps, bogs, and marshes.
- **Berm** - a narrow edge of land (usually unpaved) along the side of a road; a narrow ledge or shelf typically at the top or bottom of a slope.
- **Greenway** - a strip of undeveloped land along a river, stream, pond or lake set aside for environmental protection. Greenways provide a buffer zone, filter out pollutants, and protect water quality and wildlife habitat.

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Materials: 6 basins or aluminum trays, 10 cups of sand, artificial or real plants or tree stems, large container of water, small measuring cups, small plastic houses or lego pieces, sticks, stones.

Procedure:

1. Watch **www.pbs.org**/wgbh/nova/tech/nat-**flood**-protection.html and http://www.pbs.org/wgbh/nova/tech/judo-nature.html: two short videos about flood protection engineering such as building a living wall of mussels and using trees in front of dikes to reduce wave erosion.
2. Students are given a measured amount of sand in a tray.
3. Students build a "hill" 15 cm long and put buildings on the hill. Have students measure the amount of land from the edge of the tray.
4. Next each group receives ½ cup of water to put in the tray.
5. Then a student lifts one end of the tray gently to demonstrate flooding. Lifting 10 times to cause erosion.
6. Measure how much land remains (measure from edge of tray again).
7. Have students now rebuild and measure the land and replace the houses.
8. Build a flood barrier that can prevent flooding using sticks, real twigs, artificial trees, and stones.
9. Create 10 waves again.
10. Measure the change in land movement and compare to without a barrier.

Tray with sand hill

1 cm 15 cm

Sand fills 15 centimeters in tray	Build barrier here	Pour ½ cup of water here

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How Can I Create a Barrier to Prevent Flooding? **NRWI Lesson 3-1**

Name_____

1.With your team, discuss and draw a plan below to prevent flooding in your tray. Label the parts of your solution.

2. Record your data below.

	Centimeters of land before flooding	Centimeters of land after flooding	Number of houses flooded
Hill without a barrier			
Hill with a barrier			

3. Describe what happened with your barrier. Did it really work? Why or why not?

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