Activity 1: Manipulate the Watershed Model

Overview

Students will perform various experiments with the second watershed model constructed in Chapter I to illustrate how human activities can impact wetlands.

Materials

- Constructed watershed model from Chapter I, Activity 1B
- Food dye or colored drink mix
- Clay or plasticene
- Sand and potting soil
- Watering can or plant mister

Procedure

1. Take out the watershed model (Chapter 1, Activity 1B) and review wetland functions (e.g., erosion and flood control) with your students. Have students perform the following experiments with the model to observe how wetlands and other water bodies are impacted by human activities.
2. *Water Quality Protection* — Discuss with students the water quality protection that wetlands provide (Refer also to discussion questions from the Chapter III activities *Treatment Plants* & *Run Off Race*).
   - Why is clean water important to our everyday lives? (We drink it; use it for recreation – boating, swimming, fishing; it provides a home for many plants, fish, and animals.)
   - What kinds of pollutants contaminate water? (heavy metals, pesticides, bacteria, viruses, fertilizers)
   - What are some of the causes of this pollution? (car emissions, industrial factories, septic tanks, runoff from agricultural fields, etc.)
3. Use food coloring to demonstrate how pollutants on land end up in wetlands and in other waterbodies. Have students remove the wetland from the tank and place a few drops of food dye just below the rock cliffs. Now have them spray the rocks gently with water and watch the color disappear from the surface and end up in the stream. Replace the wetland and repeat this procedure. The dye should appear in the wetland (sponge or towel) instead of the stream.
   - How do wetlands help maintain water quality? (Wetland plants absorb and process nutrients – nitrogen and phosphorus – and store other pollutants in their tissues.)

4. *Reducing Erosion & Sedimentation* — Have students change the types of land cover in the watershed model and see what happens. *Pave* the watershed by placing clay or plasticene over a large portion of it. Sprinkle sand and/or potting soil on top of this surface. Remove the wetland adjacent to the stream. Pour *rain* from the watering can and observe how *quickly* the water runs off the impervious surfaces and what *amount* enters the stream.

- Did the rapid volume increase of the stream affect the houses along the banks?
- Did any of the sediment get washed into the stream?
- Brainstorm a list of effects of turbidity on fish, animals, and plants. (smothers bottom-dwelling aquatic life, inhibits sunlight for plant growth, fills harbor channels, affects drinking water quality)
- What do you think might happen if the wetland weren't removed from alongside the stream?

5. Talk about places in town that are entirely paved, like a shopping mall parking lot.

- Where does the water go that falls on these areas? (storm drains)
- What pollutants might water pick up along the way? (dripping oil, gasoline spills, antifreeze, salt, and sand)
- Consider what impact these pollutants have on a nearby stream or wetland in light of the previous water quality experiment.

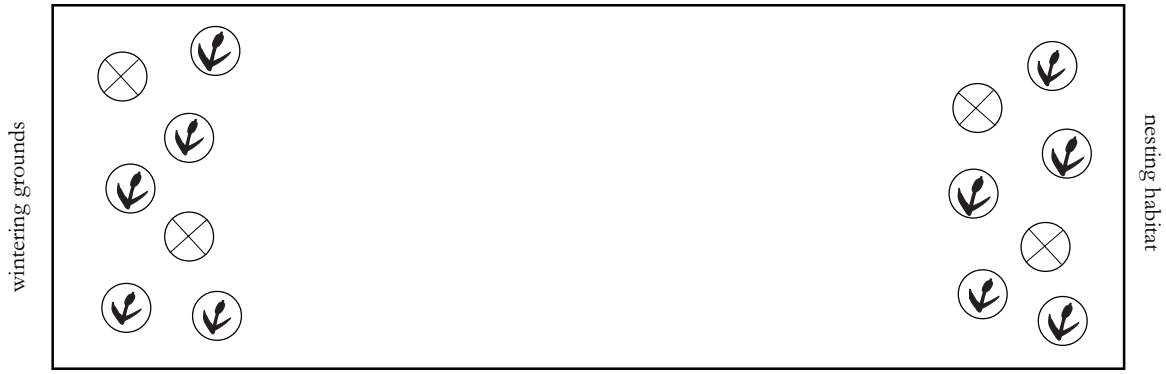
Activity 2: Migration & Habitat Loss

Overview Students role play migrating water birds traveling between nesting habitats and wintering grounds. They are subject to hazards at either end of the migration path and along the way. In the process, they will experience the environmental and human factors that contribute to habitat loss and degradation.

Background There are many types of migrating birds – ducks, geese, swans, cranes, herons, egrets, gulls, terns, and shorebirds – that require the presence of wetlands in their breeding and wintering grounds. Since these two regions are often thousands of miles apart, they also need to utilize wetlands along their migration route (also called a *flyway*) to provide them with the food and rest necessary to complete their journey.

The primary threat to the survival of migratory water birds is the disappearance and degradation of wetlands. Before regulations, hunters in the 19th century decimated flocks of migrating birds, and wetland habitats were converted to farmland and settlements. Today, agriculture and development continue to reduce the wetlands available as habitat for these migrating birds.

Materials One plate for each student. The plates should be clearly marked to differentiate top (wetland drawing) from bottom (an 'x').



Procedure

1. Select a large space where students have enough room to run, approximately 50 feet in length. Place the paper plates in two patches on either end of the room or playing field. One of the patches will represent the "wintering grounds," and the other the "nesting habitat." Remember to include enough plates at *each* end of the playing field to accommodate all players.
2. Now tell the students that wetland habitats used by migratory birds are being destroyed for a variety of reasons. Lead a brief discussion in which students are asked to generate ideas

about the probable reasons for 1) habitat loss 2) habitat degradation and 3) wetland conservation.

Some factors to consider:

Factors ***Limiting*** Survival of Migrating Birds:	Factors ***Favoring*** Survival of Migrating Birds:
• wetland drainage	• preservation of wetlands
• drought	• high rainfall
• pollution and contamination of water	• restoration of habitat
• urban expansion	• regulation of hunting
• conversion of wetlands to farm land	• wetlands purchased as conservation land
• illegal hunting	
• lead shot in food supply	
• disease	

3. Explain to students that they will each represent thousands of water birds migrating back and forth at your signal across the playing field. Tell them that the paper plates represent their wetland habitats, and that each plate can accommodate only two people or *birds* at a time. If they cannot find a plate to "land on", then they have to die because there is not enough suitable habitat available for them to use. These students must move off to the sidelines and watch.
4. Have all the students line up at one end of the playing field, two students for every wetland plate. Tell them that they will be flying to their wintering grounds, and at your signal have them start out at half-speed. Practice this a few times until the students get used to it.
5. Get two or three of the students to role play hunters who will tag only one bird each per migration. Occasionally have the hunters sit out on the sidelines to allow those birds that have "died" to enter back into the game.
6. With each migration cycle, begin to remove and occasionally replace wetlands at each end of the playing field, giving one of the above-listed reasons as you do so. For example, you can explain that an enormous oil spill has resulted in a catastrophic loss of four regional wetlands and remove four of the plates at one end of the field.
7. When students have no plates to land on, they must go to the sidelines; they have died from loss of suitable habitat. Explain to these students that they will have a chance to get back in the game when favorable conditions restore more wetland habitat.
8. By the end of the game, there should be fewer wetland plates at each end of the playing field than you started with. Gather the students into a group and discuss the process they just went through. Ask the following:
   - What did they learn about migration?
   - Name some of the factors that benefitted the birds.
   - Name the direct and indirect factors that resulted in habitat loss or degradation.
   - Can they think of any wetlands in their community that might be affected by the above factors?

Other Activities:

The Migratory Bird Handbook: *Activites & Lessons*, Jamie K. Doyle, Bird Conservation Specialist, Smithsonian Migratory Bird Center, National Zoological Park, Washington, DC 10009. (202) 673-4908.

Flyways of North American Ducks in the United States