

# Water We Doing to Our Environment



# National Mississippi River Museum and Aquarium Conservation Education Curriculum

**Target Grades:** 4-12

**Key Words:** watershed, best management practices, point and non-point source pollution

**Subject Areas:** water quality, pollution, watersheds

**Duration:** 45 minutes

Time can be extended by request

**Title:** ***Water We Doing to Our Environment***

Program presented on site at Museum.

**Summary:**

Do you really know how your actions affect the overall health of the Mississippi River? How does what you put in your sink, on your lawn, or on your street affect the nearby creeks, watershed and river? We will use an ***Enviroscape*** model and various materials to investigate point source and non-point source pollution. We will also figure out how you can reduce the erosion and pollution that enters into the Mississippi River.

**Objectives:**

To visually learn about watersheds, water pollution, cause of impaired water areas, to graphically see how rainwater carries soil and chemical pollutants through various drainage systems of a model watershed to a body of water, such as a pond, lake, or the Mississippi River.

Students will be able to:

1. define a watershed
2. define point source and non-point source pollution
3. describe ways in which to protect the watershed from getting polluted
4. describe ways to slow soil erosion and protect exposed soil

**Group Size:** 10 - 20

**Background for Educators:**

Everyone lives in a house with a roof. This roof represents a small watershed with its sloping shingles, rain gutters, downspouts, and where the water travels after it leaves the roof. Many students live in a city, the country, or on a farm and are part of a much larger watershed. Discuss the various “watershed addresses” where the students live and where their school is located. (Example: Someone living in Monticello, Iowa could trace water from their roof to their yard, to the city street, to a storm sewer or drainage ditch, to the Maquoketa River, to the Mississippi River, to the Gulf of Mexico and into the Atlantic Ocean.)

- Source pollution is pollution coming from a traceable source (you can point directly to the spot the pollution is coming from) such as a factory, building, spill site, or dumping of toxic chemicals, petroleum products, animal manure, etc.
- Non-Source pollution is pollution coming from large areas or areas that cannot be easily traced (you know the pollution is coming from say a farm field but you cannot pin point the exact spot in the field from which it is coming) such as pollution in the ground water that we drink from wells, lake or river water flowing from many sources, or farm field drainage ditches or tiles.
- Best Management Practices (BMP's) – using the land wisely and following the best practices on the land to prevent soil erosion, chemical pollution, manure and nutrient overload, and groundwater contamination.

**Materials Needed:**

*Enviroscape* model provided by the National Mississippi River Museum & Aquarium

**Procedure:**

The museum educator will set up the *Enviroscape* Model with all of the houses, factory, farm equipment, etc.

All of the areas of the *Enviroscape* will be pointed out to the students including the residential area, construction site, sewage treatment plant, golf course, deforested hillside, factory, farm, pasture, waterways, highway system, and lake. The educator will also point out details at each one of the sites, such as the rain water storm drain in the city street and the outlet pipe from the factory.

The educator will talk about what the causes of pollution are such as soil, herbicide runoff, pesticide runoff, petroleum products, manure and untreated sewage. Green Kool-Aid will be sprinkled onto the areas where herbicide/fertilizer would be used on this model and in some areas even over-applied such as the golf course or one of the residential yards.

Next the red Kool-Aid will be applied to areas where pesticides might be used. Bare soil at the construction sight, farm field, erosion in ditches, disturbed hillside, or overgrazed pasture is represented by powdered cocoa. Liquid cocoa represents cattle manure, sewage, oil spills (or dumps down the storm sewer), factory sludge, and other dumped pollutants.

A spray bottle is used to produce a mist on the entire *Enviroscape* representing a rain shower. The spray bottle can be passed from student to student to allow them to have a chance to make it rain on the model. Soon it will become evident what the rain does to all of the applied chemicals, loose soil, and other added pollutants. The once clear water lake looks very polluted. Have the students watch closely how the pollutants get into the lake. Explain to them this information will be necessary in the next step of the program.

A short discussion can be given on what just happened and then four or five teams can be formed from the student group. Each team is assigned to manage a certain area of the *Enviroscape* and they must come up with ways to eliminate the source and non source pollution.

Teams may include: **1.** city managers (residential area and construction site), **2.** public works department (highways, lake, sewage), **3.** farm managers (farmstead, fields, pasture with cattle), **4.** factory managers **5.** park department (golf course and wooded hillside). The last group can be added to one or more of the other four if only four groups are divided.

While the students are in groups discussing their action plans, the museum educator will be cleaning the *Enviroscape* model with water and drying with towels. The model will then be set up as when the students arrived. The students will be given materials to make conservation “Best Management Practices” on the land. Items may include strips of felt for grassy waterways, marshes, filter strips, or prairie. Other items might be Q-tips used to represent tree roots. Clay can be used to build terraces, stands for additional trees, and dikes. Oatmeal can be used for mulch in the woodland or for no till farming on the field. A fence can be used to control cattle grazing away from the stream edge or for rotational grazing. A manure pit can be used to collect manure for later field application instead of letting it run off to the nearest stream.

If time allows the students or museum educator can apply some of the representative Kool-Aid and cocoa. Reduced chemical use such as pesticides and herbicides can be applied. Reduced open soil will mean less cocoa is applied, etc.

Discussion as to better sewage treatment, no dumping labeling of city storm drains, ethics of residential, farm, and factory owners can be discussed. The model is then misted (rained on) again and the students can visually see what their conservation efforts have done.

**Evaluation:**

By participation and discussion generated by the students. Pre or post tests could be given the students.

**Additional resources:**

Natural Resources Conservation Service (NRC) office

**Extensions:**

A program or demonstration of how water creates stream channels at the museum & Aquarium erosion table. Perhaps take an outdoor field trip or the eco boat cruise from the museum & aquarium along a stream valley to study stream formation, landforms, erosion, and pollution sources or potentials.

Related programs available at the National Mississippi River Museum & Aquarium:

***Wet and Wild Along the Mississippi River***

***Water We Doing to Our Environment***

**Credits:**

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*Enviroscape* model and accompanying information

Iowa DNR information

