Seeing Watersheds Storm Water Extension

Purpose: To provide Storm water applications for the Project WET "Seeing Watersheds" activity

Submitted by: Project WET Products and Publications Team, 2014

Background:

Wherever cities were built, there was once a natural watershed. Perhaps a river with tributaries flowed through the landscape now changed, redirected and concreted. As it flows through the city after a storm, water in narrowed, non-absorbent channels increases in speed leading to flooding and erosion. Heat and pollutants picked up as the water flows over roofs and roads, are carried with runoff into the river and can adversely affect fish, wildlife, plants, and even our drinking water supply.

Storm water starts out as rain or snow that encounters the city environment. In the Urban Watershed precipitation that does not soak into the ground becomes surface runoff when it flows across streets and rooftops. The runoff either flows directly into rivers or streams or is channeled into storm sewers, which eventually discharge to surface waters.

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Storm water is of concern for two main reasons: one is the increased volume of runoff water which may lead to stream bank erosion and flooding and the other is the potential contaminants that the water carries across the city and into the rivers and streams.

Urban threats to water quality and habitat:

Point and Nonpoint Source Pollution

As the water flows through the urban environment some of the pollutants it gathers can be identified and the source found, such as a direct pipe into a stream. This is known as **Point Source Pollution**.

The majority of pollutants that enter our waters, however, come from unidentified sources. They could be something like fertilizers, detergents, construction run off, sediment, oil, grease, pet waste or pesticides but it is very difficult to tell exactly where they originate. This is called **Nonpoint Source Pollution**.

Building on the land

The soil does a remarkable job of filtering out contaminants. But once buildings and pavement are introduced, less water is able to penetrate the soil. When vegetation is cleared for construction, it decreases a watershed's capacity to capture moisture, increasing the amount that runs off. The loss of vegetation also destabilizes stream banks and reduces the shade produced by the canopy. Increased

solar pollution raises stream water temperatures during the summer months, affecting habitat for wildlife and disrupting the ecosystem.

Impervious Surfaces

As a watershed area becomes more populated, natural surfaces that absorb water and recharge ground water supplies, are covered with hard, impervious surfaces (streets, sidewalks, rooftops, driveways, and parking lots). This reduces the amount of infiltration (soaking into the ground) and increases the amount of runoff.

Objectives: *In addition to those in the original activity*

Students will:

- Describe how precipitation in an urban environment leads to runoff and how that runoff impacts the stream
- Demonstrate the effects of storm water on pollution using a 3-D model
- Identify ways to reduce and/or prevent urban storm water pollution
- Define nonpoint source pollution and recognize common activities leading to it

Specific Topic Framework:

1. Natural Watersheds (use activity as written)

In which learners understand how watersheds function, why watersheds matter to people.

Seeing Watersheds
Rainy Day Hike
Blue River
Thunderstorm
Humpty Dumpty

2. Urbanized Watersheds and Water Quality Impacts (use this extension in the Warm Up)

People use and alter watersheds. Learners explore how storm water is produced, how its handled (or not) by infrastructure, and what the impacts of storm water are on water quality of receiving bodies.

A-maze-ing Water
Ask the Bugs
Macro Mayhem
Blue River
Color Me a Watershed
Common Water
Nature Rules
Watershed Mural
Storm Water
Reaching Your Limits
Sum of the Parts
Super Sleuths

Materials: *In addition to those in the original Warm Up part of the activity*

- plastic tray, one per group of students
- powdered paint and sand mixture (sediment)
- chocolate jimmies (pet waste)
- red Kool-Aid (pesticides)

- cooking oil (oil and gasoline from cars)
- food grade glitter (trash)
- spray bottle, water with a drop of liquid soap to break adhesion and cohesion

Extension procedure:

Participants will learn 1) how water from precipitation becomes runoff and flows down watersheds through storm drains in cities and neighborhoods, 2) how this storm water runoff causes erosion and picks up pollution, and 3) how to reduce or prevent urban storm water runoff.

Activity:

1. Use a tray to hold the wax paper to catch the additional water runoff created in this extension
2. After completing the original **Warm Up** section of the activity and identifying various watersheds found on wax paper land surface, have students sprinkle a new crumpled wax paper model with sand mixture and spray with water. Note what happens.
3. Students will then add the other materials one at a time, spraying and noting what happens after each is added.
4. Let students share what happened to the materials added to the wax paper watershed.
5. Lead a discussion on the impact to the environment:
   - How are these materials like pollutants?
   - How did the pollutants get into the watershed in the first place?
   - Can you always tell exactly where the pollutants entering the stream came from? (nonpoint source pollution)
   - In the city what happens when it rains? Where does the water go from the street storm drains?
   - How does an urban environment lead to runoff when it rains and how might that runoff impact the streams and rivers?
   - Are there ways to prevent these materials from entering the waterways?