

***CREATE YOUR OWN  
MINI WATERSHED***



**Michigan Water**  
Stewardship Program

**Materials for each mini-watershed, often created by small groups:**

- Aluminum roasting pan, “disposable”, as for a turkey
- Newspaper
- Aluminum foil
- Permanent markers to write on aluminum foil
- Toothpicks
- Spray bottle with water
- See other props listed toward end under Land Uses and Pollutants

**Lesson Description:**

**MINI Watersheds**

We all play a role in protecting our watershed. In this hands-on activity, students will design mini watersheds. The resulting pollution generated from the different uses of land and water will allow students to see the impacts on groundwater and surface water in their watershed and they will also learn about the role they play in preserving water quality.

**Groundwater and surface water are shared resources used by many in a variety of ways, and the effects on its quality and quantity.**

**KEY CONCEPTS:**

- Watershed
- Groundwater and Surface water- connected
- Water Cycle- water always moving
- Effects of weather patterns have on watershed: Stormwater run-off.
- Point and Non-point pollution
- Water-finite resource, constantly recycling it
- Invasive species
- Water conservation
- Consumptive use- Water quantity
- Water quality
- Land use: Different uses have varying effects on water! Lots of parking lots and paved surfaces affect groundwater discharge.

## INTRODUCTION:

- Questions to ask students:
- **Where are you from? What City?**

**What do all living things have in common?** All use/require WATER!

**Is water a finite resource?** YES! And it is a reusable resource that can be used over and over, so it is important to keep it clean, and to conserve it as well.

**Is water renewable?** Yes! Biological and physical processes in healthy ecosystems replenish water quality and quantity. Waste water treatment facilities facilitate these processes as well.

(Biological processes- filtering through soil and vegetation

Physical processes- rain, settling out of sediments)

**What are some of the different users of water?**

- Agricultural use- Grow crops that we eat. Water animals.
- Homeowner use- Water lawn. Drink it. Soccer fields.
- Business and Industry use. Factories manufacture things we use.

**What is the water cycle?**

**What is a watershed?**

The area of land that drains to a common body of water, whether a stream, river, or lake, is called a **watershed** or **drainage basin**. Small streams, surrounded by small watersheds, flow into larger rivers with larger watersheds. The small stream's watershed is part of the larger river's watershed and is called a **sub-watershed**. The boundaries of a watershed are the higher elevation ridges and hills around a stream, river, or lake that separate it from the adjoining watershed. This is called the **drainage divide**. From a drainage divide, water runs down gradient to a particular stream, river, or lake.

One way to understand watersheds it to go outside when it is raining and watch the flow of water on the parking lot, hillsides, and ditches. Recall that water falling to the ground as rain or snow can **evaporate**, **sublimate** (go from solid to water vapor), **transpire** through plants, **infiltrate** through the soil to the groundwater, or simply **run off**. If the ground is not frozen or saturated from previous rainstorms or snowmelt, much of the rain that falls on lawns, parks, farm fields, and forests will infiltrate, or seep, into the ground. Once the ground becomes saturated or frozen, most or all of the rain will runoff. Runoff moves from higher to lower elevations, traveling over a variety of surfaces or land cover types until it reaches a body of surfaces or land cover types until it reaches a body of surface water, such as a stream, river, or lake. In Michigan, most of the surface water eventually runs into one of the Great Lakes.

**Why are Watersheds Important?**

In order to effectively manage the land and protect water quality, we need to determine the boundaries of a particular watershed and define the land uses and

land cover types in the watershed. The size of the watershed, the land cover types (grass, forest, pavement, etc.) and the land uses (farming, logging, residential, urban, etc.) affect the quantity and quality of water in the river, stream, lake, or groundwater. Because a single stream or river can flow through several towns, it is important to have all these entities working together to protect water quality through a process called watershed planning.

### **Where does our drinking water come from?**

- Groundwater or Surface water.
- **What is groundwater?**
- Half of the residents in MI depend on groundwater for their surface water.
- GW: water that fills spaces between rocks and soil particles.
- SW and GW are connected, so in case you think you don't have to care about gw, think again! Contaminating one contaminates the other!

### **What is surface water?**

- Water that comes from Great Lakes, lakes, streams, rivers, creeks, etc.

**What happens when a lot of different people use water for a lot of different reasons?** Water is hard to conserve and hard to prevent from being contaminated.

### **What is point and non-point pollution?**

Point: Ex. A pollutant dumped directly into a body of water.

Non-Point: Ex. Difficult to trace, may be caused by run-off from a farm, subdivision, or other broad sources that cannot be pinpointed.

### **Who owns water?**

### **Who controls how much each user can use and which users have access to water?**

### **Who do you think uses the most water?**

### **Who do you think uses the least water?**

### **Explanation of Activity:**

In this activity, we are going to learn what a watershed is, and then take a look at what is going on across the watershed, and we'll simulate changes in a watershed to see how potential sources of pollution and the different ways in which the land is being used affect the water in the watershed. In other words, we'll look at the effect of multiple users of the land and water and the effects of weather on water quality and quantity in the watershed.

#### 1. Rules:

Individuals should take turns in their group during each step of the exercise.

#### 2. At the end of the activity, please help clean up and return things to the way they were at the start of the activity.

## Activity demonstrates:

- Effect of multiple users of water and that how we use and manage land, coupled with natural weather processes, can have huge impacts on the quality and quantity of water in the watershed.
  - What we do in our watershed doesn't stay in our watershed. It just becomes a part of another larger watershed and because we keep reusing water, it is in our best interests to conserve it, preserve it for the future.
  - It is not easy to provide water for all water users, to conserve it, and preserve its quality for future use. How we as a group or as individuals use the land and water impacts the entire watershed. Important to consider each other's water needs and to share and protect the quality of this finite resource. This requires careful planning for and managing these needs to ensure water for all users.
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## Steps of the Lesson:

### 1 Introduction

### 2 Set up model

### 3 Design watershed

### 4 Introduce contamination sources and dangers that result from water and land use

#### 1 Introduction.

- What can you tell me about the water cycle?  
**Precipitation, Recharge, Evaporation, Transpiration, Photosynthesis.**
- What is a watershed?
  - An area of land that drains into a body of water.
  - Ex. Each of the Great Lakes has its own watershed.
  - Ex. Clinton River has its own watershed. Begins at headwaters in Brandon, Springfield, and Independence townships to mouth in Harrison Township where it enters Lake St. Clair.

#### 2 Set up Model.

**Crumple up newspaper.**

**Place Aluminum foil over the newspaper. Notice there are some high points and some low points.**

- Poke a few holes (of all sizes) in the tin foil. This simulates where rainfall is absorbed back into the ground. **GW RECHARGE.**
- Spray blue-colored water on their watershed model to understand what a watershed is, and how all the water in a certain area drains to a common point.

### **3 Design Watershed.**

- **Decide where water is: creeks, streams, lakes, rivers.**
- **Each model has to have a source of drinking water— can choose to see where water collects after a rain event—surface water which could represent a municipal or city source of water, or can place sponge anywhere to represent a groundwater source of drinking water aka a water well.**
- **Decide possible land uses: Recreation, parks, home, factory, mines, farms, landfills, etc.**
- **Plan other aspects of your watershed. Trees, plants, fields, parking lots and roads, bridges, etc.**
- **Go through a number of different scenarios:**
- **Decide which of the potential contaminants are threatening your watershed.**

#### **Props for MINI Watershed Model:**

	<i><b>Prop</b></i>	<i><b>Represented by</b></i>
<b>1</b>	<b>People</b>	<b>Plastic people</b>
<b>3</b>	<b>Cars/Trucks</b>	<b>Toy vehicles</b>
<b>4</b>	<b>Boats</b>	<b>Plastic boats</b>
<b>5</b>	<b>Houses/Factories</b>	<b>Monopoly houses or buildings</b>
<b>7</b>	<b>Aquatic species</b>	<b>Fun Foam fish or Plastic tiers</b>
<b>8</b>	<b>Sponge</b>	<b>Represents drinking water source or well</b>
<b>9</b>	<b>Paper/plastic</b>	<b>Trash</b>
<b>10</b>	<b>Toothpicks, Craft sticks</b>	<b>Roads, bridges, other construction materials</b>
<b>11</b>	<b>Mustard/cumin seeds</b>	<b>Crops/Garden plants</b>
<b>12</b>	<b>Green felt strips</b>	<b>Vegetation</b>
<b>13</b>	<b>Toothpicks</b>	<b>Used to poke holes in tin foil, representing recharge areas</b>
<b>14</b>	<b>Clay</b>	<b>Use to plug up recharge areas to simulate stormwater runoff, impervious surface, or clay layer</b>

**List of Contaminants:**

Rain water will be represented by water colored by blue food coloring in spray bottles.

	<b><i>Contaminant</i></b>	<b><i>Represented by</i></b>
<b>1 New home? Construction?</b>	<b>Eroded sediment</b>	<b>Real soil/ sand/rocks or Cocoa powder</b>
<b>2 Got bugs or diseases? Gardens? Farms?</b>	<b>Pesticide</b>	<b>Red powered drink mix</b>
<b>3 Lawns, Gardens, Crops, Recreational fields?</b>	<b>Fertilizer</b>	<b>Green food coloring</b>
<b>4 Have a lawn? Mow your grass?</b>	<b>Grass clippings, leaves</b>	<b>Real grass, leaves</b>
<b>5 Use roads to travel?</b>	<b>Road salt</b>	<b>Real Salt</b>
<b>6 Septic system in your backyard? Live near a farm?</b>	<b>Human sewage or animal waste or make something up</b>	<b>Chocolate syrup</b>
<b>7 Everyone generates trash</b>	<b>Trash</b>	<b>Wadded up paper and pieces of plastic</b>
<b>8 Travel in a motorized vehicle?</b>	<b>Motor Oil</b>	<b>Vegetable oil</b>
<b>9 Spill gas while filling up the mower.</b>	<b>Gasoline</b>	<b>Yellow food coloring</b>
<b>10</b>	<b>Trees</b>	<b>Twigs, toothpicks</b>

**Special cases:**

- **What other contaminants can you think of?  
Add a MYSTERY contaminant (s) that has the potential of causing damage to the watershed.**
- **Weather events and its affect on water in the watershed.**
  - **HEAVY RAINSTORM.**
  - **8 FEET OF SNOW FALL IN ONE DAY, AND IT ALL MELTS THE NEXT DAY! GROUND IS ALREADY FROZEN!**
  - **NO Rain.**

**AFTER** each additional item has been introduced or a new event has occurred:

- Discuss quality and quantity of water for each item added.  
What type and how many waste materials were generated?  
Where is the pollution going?
- After each activity, how did water move?
- What could you have done differently to prevent the spread of contamination?
- Take a look at what has drained into the bottom of your model, through the aluminum foil (representing what is returning to the groundwater)?

**Wrap-Up/Action/Assessment:**

- Discuss ways to protect our watersheds.
- What are some ways YOU can conserve water?
- How can we be smart about how we manage and use our land and water resources?

**CLEAN-UP:**

**Before you leave, PICK OUT ALL OF THE REUSABLE CONTAMINANTS OR PROPS OUT OF THE WATERSHED MODEL, PLACE THEM IN THE EMPTY WHITE BUCKET AT YOUR TABLE, AND RINSE!  
THANK YOU!**

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