

LESSON PLAN:

Wetlands at Work: Montezuma in a Pan

OVERVIEW:

Students will learn what wetlands are, why they are important, and how they help prevent flooding, filter pollutants, and protect wildlife. They will build a simple model to see how wetlands work.

Grade Level: 4 to 6

Note: This lesson is adaptable for younger grades as a teacher-led demonstration.

Class Periods: One 60-minute class period

OBJECTIVES:

- Students will understand what wetlands are and why they are important.
- Students will be able to explain how wetlands help prevent floods, clean water, and protect animals.
- Students will see how wetlands work by building a simple model.

MATERIALS NEEDED:

You will be breaking up your class into smaller groups of three to four students. Each group will need the following materials.

- Shallow pan (aluminum or paint roller pan)
- Modeling clay (ex. Crayola Model Magic)
- Large sponge
- Watering can or cup
- Colored drink mix (to simulate pollution)
- Paper towels

VOCABULARY:

- **Wetland:** Land that is wet most of the time; nature's sponge.
- **Runoff:** Rainwater that flows over the ground instead of soaking in.
- **Erosion:** Soil being worn away by water or wind.
- **Pollution:** Harmful objects that get into water, air, or land.
- **Watershed:** A large area of land where all the rain and snow melt flows into a single body of water, like a river, lake, or ocean.

NEW YORK STATE EDUCATION STANDARDS:

MS-LS2-5:	Evaluate competing design solutions for maintaining biodiversity and protecting ecosystem stability.
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BACKGROUND INFORMATION:

The New York State Canal System includes many types of waterbodies. Not only are there canals, but also rivers, lakes, streams, and wetlands. These waterways are critically important for people and wildlife. This lesson focuses on wetlands in general as well as the largest wetland along the canals in Central New York: the Montezuma Wetlands Complex. Montezuma is comprised of 50,000 acres of marshes, swamps, and grasslands. Portions of both the Erie Canal and the Cayuga-Seneca Canal run through this wetland system.



Teacher Procedure

► PART 1- INTRODUCTION AND MODEL BUILDING:

1. **Engage:** Ask students: “What happens to rainwater when it lands on the ground? Where does the water go?” (Possible responses: It soaks into the ground. It goes into a gutter or grate in the road. It runs downhill until it gets to a stream or river. It makes a puddle. It evaporates when the sun comes out again.”)
2. **Explain:** What is a wetland? The name says it all: **a wetland is land that is wet.** You may have heard of a marsh, swamp, or bog—these are all types of wetlands. When rain or snow falls on a wetland, the water doesn’t drain away quickly as it does on lawns or parking lots. Instead, wetlands act like sponges, soaking up water. Wetlands are important! Wetlands:
 - Help clean our water by filtering pollution and preventing it from reaching drinking water.
 - Protect us from storms and flooding.
 - Refill groundwater supplies.
 - Provide homes to a wide variety of plants and animals.
 - Offer recreational opportunities, like fishing, boating, and bird watching.
3. Use Montezuma Wetlands Complex’s Story Map to provide an overview to students.
<https://storymaps.arcgis.com/stories/a1f2bad460f04932a0c22f1edada2556>.
 - a. Key highlights:
 - i. Montezuma Wetlands Complex is 50,000 acres.
 - ii. In the 1800s, people drained much of this wetland area to make the land better for farming. They built canals like the Erie Canal and Cayuga-Seneca Canal so that they could move goods more easily.
 - iii. Today, much of the Montezuma Wetlands are preserved to protect wildlife and water quality. More than 240 species of birds can be found in the refuge, along with 43 species of mammals, 15 species of reptiles, and 16 species of amphibians.
 - b. Zoom in on the map. Identify nearby streams, rivers, and canals that flow through the wetlands. What other land features, like major roads, farms, cities and towns are nearby?
4. Break up students into small groups of 3-4 depending on class size. Have each group build a wetland model using the instructions below:
 - a. Spread the clay over half the pan to represent land. If using a paint roller pan, this should be the angled side. The other half of the pan will represent Cayuga Lake.
 - b. Use a toothpick or pencil to carve two to three lines into the clay to represent rivers and streams like the Seneca River, Erie Canal, and other waterways leading to Cayuga Lake.
 - c. Place the sponge between land and lake to represent the Montezuma Wetlands. Make sure the sponge fits securely in the pan so it stays in place for experiments.

SECTION 1: **TEACHER PROCEDURE****► PART 2- EXPERIMENTS:**

Students should take notes and make observations on the “Montezuma in a Pan – Wetlands in Action!” worksheet as they complete their experiments.

5. Experiment 1: Rain with wetland

Pour water on land. Observe: What happens when the water reaches the wetland? *water slows down, sponge absorbs it.*

6. Experiment 2: Rain without wetland

Remove sponge. Pour water. Observe: *water rushes into lake, possible flooding.*

7. Experiment 3: Rain with pollution (wetland)

Sprinkle dirt and drink mix on land. Replace the sponge. Pour water.
Observe: *wetland traps some pollution.*

8. Experiment 4: Rain with pollution (no wetland)

Remove sponge. Pour water. Observe: *pollution flows straight into the lake.*

Discussion & Wrap Up**9. Ask:**

- a. Why are wetlands important?
- b. What happens if wetlands disappear?
- c. How can we protect wetlands?

10. Provide time for students to clean up their workstations at completion of the lesson.

Extension Discussion/Activities:

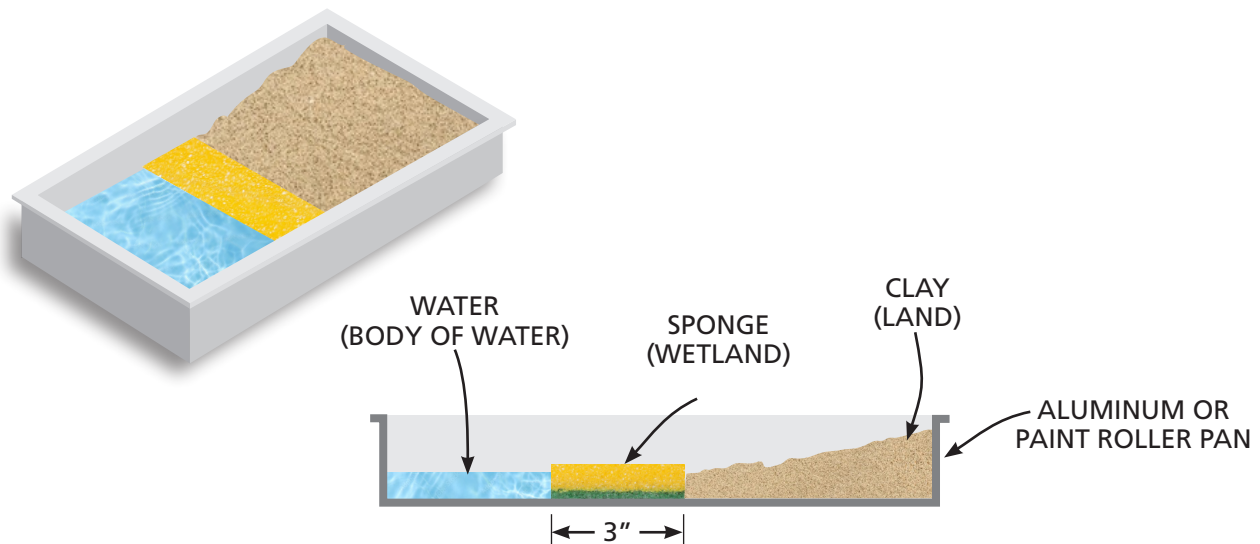
- The Erie Canalway’s waterways hold about 40% of New York State’s freshwater. This water is important for drinking water, for moving shipments by boat, and for fun activities like fishing and swimming. It is also important for farming and for keeping plants and animals healthy. What do you think would happen if there were no wetlands near the Erie Canal?
- New York is home to a variety of wetland areas. Have students research another wetland area and create a presentation about it for the class. Examples:
 - o Buckhorn Marsh, Grand Island, NY
 - o Cicero Swamp, Cicero, NY
 - o Great Baehre Swamp, Buffalo, NY
 - o Iroquois National Wildlife Refuge, Basom, NY
 - o Utica Marsh, Utica, NY

SECTION 1: TEACHER KEY

► INSTRUCTIONS:

STEP 1: Build Your Wetland Model

1. Spread clay on half the pan (land). Leave the other half empty (lake).
2. Shape the clay so it slopes toward the lake.
3. Use a toothpick or pencil to carve lines representing streams and rivers.
4. Place the sponge between land and lake (wetland buffer).



STEP 2: Test Your Model

Experiment 1: Rain with Wetland

1. Predict: What do you think will happen when you pour the water in the pan?
2. Pour water on the land.
2. What happens when the water reaches the wetland? Some of the water is slowed down by the sponge (wetland). There might be extra water that flows into the lake, but most of it should stay within the sponge.

Experiment 2: Rain without Wetland

1. Predict: What do you think will happen to the water when the sponge is removed?
2. Remove the sponge. Pour water on the land.
2. What happens? The water should flow directly into the lake faster and may even overflow.



SECTION 1: TEACHER KEY

Experiment 3: Rain with Pollution (Wetland)

1. Predict: What do you think will happen to the drink mix (pollution) and water with the sponge in place?
2. Sprinkle drink mix on land. Place the sponge back in place. Pour water on the land.
3. What happens? _____

The rain picks up and carries some sediment/pollution over the land and into the lake.

Experiment 4: Rain with Pollution (No Wetland)

1. What do you think will happen to the drink mix (pollution) and water with the sponge removed?
2. Sprinkle more drink mix on land. Remove the sponge. Pour water.
3. What happens? _____

The pollutants are all carried into the lake.

Think About It

- Why are wetlands important? _____

Wetlands are important because they act like natural sponges, soaking up rainwater, filtering pollution, preventing floods, and providing habitats for many plants and animals.

- What happens if wetlands disappear? _____

If wetlands disappear, we lose natural filters and sponges for water. This can lead to more flooding, polluted water, loss of wildlife habitat, and erosion of soil.

- How can we protect wetlands? _____

We can protect wetlands by reducing pollution, conserving natural areas, planting native vegetation, supporting restoration projects, and using land responsibly.

Attachments



NAME _____

Montezuma in a Pan—Wetlands at Work!

► WHAT HAPPENS WHEN IT RAINS?

Think about a rainstorm. What happens to the water when it hits the ground? In natural areas like the Montezuma Wetlands, the grasses, reeds, soil, and plants act like giant sponges. They soak up the water and help it slowly move into the ground. This process keeps water clean and prevents flooding.

Now, picture the same rain falling on a road or parking lot. Because these surfaces are hard and solid, the water cannot soak in. Instead, it runs across the pavement and picks up speed. As it flows, it can carry dirt, chemicals, and other pollutants into streams and rivers. Fast-moving water can also wash away soil if there are no plants to hold it in place.

► WHAT IS A WATERSHED?

A watershed is all the land that drains into a body of water. Rain that falls anywhere in a watershed eventually flows downhill into lakes, rivers, reservoirs, or even the ocean. A watershed includes everything in its area—the natural environment, cities and towns, farms, factories, and the people who live there.

The Montezuma Wetlands are part of the Oswego River/Finger Lakes watershed. This means that rain falling in the wetlands eventually flows into larger water systems, connecting the wetlands to Cayuga Lake, the Seneca River, the Erie Canal, and eventually to the Oswego River and Lake Ontario.

► HOW WATERSHEDS HAVE CHANGED?

Hundreds of years ago, thick forests covered most of the land around Cayuga Lake. Trees lined the shores of the lake and streams, protecting the soil and filtering water. Today, the area is still mostly countryside, but people have built farms, roads, and towns. These changes have affected the health of the lake and its watershed.

Much of the northern part of Cayuga Lake now includes the Montezuma Wetlands, where water flows out through the Seneca River. Conservation efforts here help protect water quality and provide habitat for wildlife.

When people build roads, clear land for farms, or make parking lots, two main problems occur:

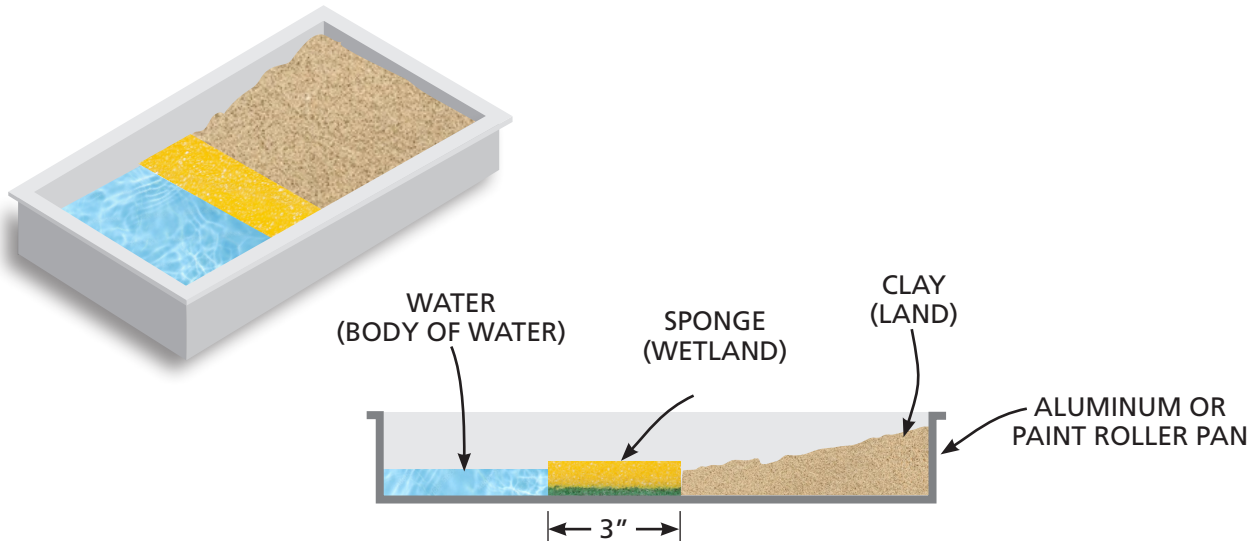
- **Runoff:** Rain cannot soak into hard surfaces like pavement. Instead, it quickly flows into drains and ditches. Heavy runoff increases erosion and can carry pollutants into waterways.
- **Loss of Plants:** Construction often means cutting down trees and removing vegetation. Plants are important because they filter water before it reaches lakes and rivers. Plant roots help hold soil in place.

NAME _____

► INSTRUCTIONS:

STEP 1: Build Your Wetland Model

1. Spread clay on half the pan (land). Leave the other half empty (lake).
2. Shape the clay so it slopes toward the lake.
3. Use a toothpick or pencil to carve lines representing streams and rivers.
4. Place the sponge between land and lake (wetland buffer).



STEP 2: Test Your Model

Experiment 1: Rain with Wetland

1. Predict: What do you think will happen when you pour the water in the pan?
2. Pour water on the land.
2. What happens when the water reaches the wetland? _____

Experiment 2: Rain without Wetland

1. Predict: What do you think will happen to the water when the sponge is removed?
2. Remove the sponge. Pour water on the land.
2. What happens? _____



NAME _____

Experiment 3: Rain with Pollution (Wetland)

1. Predict: What do you think will happen to the drink mix (pollution) and water with the sponge in place?
2. Sprinkle drink mix on land. Place the sponge back in place. Pour water on the land.
3. What happens? _____

Experiment 4: Rain with Pollution (No Wetland)

1. What do you think will happen to the drink mix (pollution) and water with the sponge removed?
2. Sprinkle more drink mix on land. Remove the sponge. Pour water.
3. What happens? _____

Think About It

- Why are wetlands important? _____

- What happens if wetlands disappear? _____

- How can we protect wetlands? _____

