

Investigating the Functions of Wetlands

Grade Level: 7

Subject Area: Life Science

Virginia Standards of Learning: LS.1, LS.12

Objectives:

Students will:

- Conduct experiments in which variables are controlled
- Construct models to investigate the functions of wetlands
- Understand the functions of wetlands and apply their understanding

Summary:

Students will perform two experiments using models of wetlands to learn about the ability of wetlands to prevent erosion, control flooding, and soak up pollutants. They will apply this knowledge in an activity using metaphors to describe a wetland.

Vocabulary: wetland

Materials:

For each group/station you will need (designed for 2-5 students per group/station):

- *Student Worksheet* (included, hard and electronic copy)
- 3-4 towels for cleanup

Runoff Race

- 2 aluminum pans
- One wooden board with artificial turf on it
- One plain wooden board
- At least 2 jars of dirty water (should have chunks of dirt/sand/rocks in it). You may need more jars if groups or classes are going to be completing this activity back to back. One option is to have a bucket of dirt (potting soil works good) and some water or a sink nearby. That way, students can refill the jars of dirty water for the next group.
- Empty bucket to dump water into
- *Instructions* sign (included, hard and electronic copy)

Wetland in a Pan

- Aluminum pan
- Paint pan
- 2-4 Sponges (to fit across width of paint pan)

- Watering can
- Dirt (such as potting soil) in a Tupperware container
- Empty bucket to dump water into
- *Instructions* sign (included, hard and electronic copy)

Wetland Metaphors

- Sponge
- Pillow
- Picture of nursery
- Strainer
- Coffee filters
- Soap
- Multivitamins
- Tums
- Whisk
- Rice
- Picture of a zoo
- Picture of a hotel
- *Wetland Habitats* sign (included, hard and electronic copy)
- *Instructions* sign (included, hard and electronic copy)

Procedure:

Introduction

1. Tell students they are going to be using models and conducting experiments to investigate the functions of wetlands. Wetlands serve many functions for the environment and for humans, and the students will be learning about these.
2. Describe wetland habitats – marshes, swamps, bogs, etc. But leave discussion of the importance of wetlands for wrap-up. Students should learn about the importance with these experiments.
3. Give students brief instructions. Describe each model and the experimental design for each experiment, and give an example for *Wetland Metaphors*.
 - a. *Runoff Race* – The board with artificial turf represents a healthy wetland with lots of plants. The board with nothing on it represents an unhealthy wetland with no plants or an impervious surface such as a parking lot. The aluminum pan at the end of the boards represents the river. Water will flow from a stream (their jars of water) through the wetlands and into the river. The variable in this experiment is “plants or no plants”. All other variables should be kept constant – the boards should be held at the same angle and water should be poured down the boards at the same time and from the same height.

- b. *Wetland in a Pan* – The paint pan represents the land, the sponges represent a wetland, and the aluminum pan represents the river. Rain water will fall (from the watering can) onto the land and run off either through a wetland or not through a wetland into the river. The variable in this experiment is “wetland present or wetland absent”. All other variables should be kept the same – the same amount of water should be poured onto the land and the same amount of dirt should be sprinkled on the land.
 - c. *Wetland Metaphors* – Ask the students if they know what a metaphor is (from their English/language classes perhaps?). Describe a metaphor to them – *a comparison between two objects without using like or as*. *Example: The world is a stage*. Tell the students that they will be using the objects on the table to create metaphors for wetlands. Give them an example: *A wetland is a hotel because it is a resting place for migrating birds*. It might help to have the students think about how we use each object or what each object does for us and then try to relate that function to a wetland. (Example: We use a pillow to rest/sleep on, animals might use a wetland to rest in.)
4. Remind students of safety issues: be careful with boards - don't drop them on someone's hand - be careful of glass jars, etc. Also remind them to be as clean as possible; this activity can get messy and wet.

Activity

Runoff Race

1. One or two students will hold both boards up so that they are angled downward and the bottoms of the boards are in the aluminum pans (see figure below).



2. One or two students will pour the jars of dirty water down the two boards at the same time.
3. Students should observe what happens. How much water and dirt enters the pan at the end of each board?

4. Once students have completed the experiment, they should answer the questions on their *Student Worksheet*.

Wetland in a Pan

1. One student will hold the paint pan at an angle so that the bottom of the pan is inside the aluminum pan. The sponges should be in place across the width of the paint pan (see figure below).



2. One student will pour water from the watering can onto the paint pan. Students should observe what happens. How much water enters the aluminum pan?
3. In order to have something to compare to, students must complete the experiment without the sponges/wetland in place. Students will remove the sponges and repeat step 2.
4. Students will put the sponges back in place and sprinkle a little bit of dirt onto the paint pan.
5. Students will pour water from the watering can onto the paint pan and observe what happens to the dirt. Does it stay in place or get washed away? How much water and dirt enter the aluminum pan?
6. Students will remove the sponges and repeat steps 4-5.
7. Once students have completed this experiment they should answer all of the questions on their *Student Worksheet* – remind them to answer the final two questions that ask them to draw conclusions from both experiments.

Wetland Metaphors

1. Students will pick five (or however many you decide) objects from the table and they will decide how each object could be a metaphor for one of the functions of a wetland. Students should fill in the wetland metaphor table on their *Student Worksheet*. They should have learned about some functions of wetlands from their experiments, and they can read about some of the functions on the *Wetland Habitats* sign. But they will also have to be imaginative and creative.

Wrap Up

Have the students tell you what some of the functions of wetlands are. Ask them to describe how they came to these conclusions – what did they observe from their experiments? They should definitely have learned that wetlands filter the sediment out of the water and that they absorb water. Have the students imagine that the dirt they poured on the paint pan was pollution/chemicals/nutrients. Wetlands also filter pollutants out of the water. Discuss with students why these functions are important to animals, the environment, and us – wetlands keep our waterways clean and help with erosion, they keep nutrients and pollutants out of our water, and they absorb excess water and prevent flooding.

Have the students list some of the metaphors they came up with. You can keep a running list on the board of all of the functions of wetlands – between the experiments and the metaphor activity. Make sure you appreciate creativity, but also make sure that the students are getting the correct message. If you have time you can go over each object and how it is like a wetland.

Finish the discussion by summarizing the different functions of a wetland and pointing out to students just how important wetlands are. Also talk about where wetlands are found (in their backyards maybe), why and how they are destroyed, and why it is important to preserve wetlands.

Example Setup for Activity:

Runoff Race and Wetland in a Pan Table



Wetland Metaphors Table



Name: _____ Date: _____ Period: _____

Investigating the Functions of Wetlands

Questions from Runoff Race experiment:

1. In which wetland did the water run off into the river the fastest? (Circle one.)
Healthy wetland with lots of plants unhealthy wetland with no plants
2. Which wetland trapped more sediment (dirt)? (Circle one.)
Healthy wetland with lots of plants unhealthy wetland with no plants

Questions from Wetland in a Pan experiment:

3. Did more water enter the river when the wetland was: (Circle one.)

Present or Absent
4. What happened to the sediment on the paint pan when you poured water over it?
Did it stay in place or did it wash away?
5. Was the water cleaner when it entered the river if it flowed through the wetland first (sponges in place) or was it cleaner if it did not flow through the wetland (sponges removed)?

Conclusions:

6. From the two experiments you should have learned about two important things that wetlands do. Write down the two functions of wetlands that you observed? Think about how much water and sediment entered the rivers in each experiment.

7. If a wetland is destroyed and houses are built in its place, what might happen to the houses during a severe rainstorm? Think about what happened when water ran down the paint pan and there was not a wetland at the end.

Wetland Metaphors

Pick one object from the table. Use this object to fill out the chart below. Write down the object you choose in the “Object” column, and write down how you think this object could represent what a wetland is or does in the “Wetland Function” column. For example: If there was a picture of a hotel on the table, it could be a metaphor for the fact that wetlands provide resting places for migrating birds. “A wetland is a hotel for birds that are traveling through.” **Do this for five objects.**

Object	Wetland Function
Example: Hotel	Wetlands are resting places for migrating birds.
1.	
2.	
3.	
4.	
5.	

KEY - Investigating the Functions of Wetlands

Questions from Runoff Race experiment:

1. In which wetland did the water run off into the river the fastest? (Circle one.)

Healthy wetland with lots of plants

unhealthy wetland with no plants

2. Which wetland trapped more sediment (dirt)? (Circle one.)

Healthy wetland with lots of plants

unhealthy wetland with no plants

Questions from Wetland in a Pan experiment:

3. Did more water enter the river when the wetland was: (Circle one.)

Present

or

Absent

4. What happened to the sediment on the paint pan when you poured water over it? Did it stay in place or did it wash away? **It washed away**
5. Was the water cleaner when it entered the river if it flowed through the wetland first (sponges in place) or was it cleaner if it did not flow through the wetland (sponges removed)? **It was cleaner if it flowed through the wetland first.**

Conclusions:

6. From the two experiments you should have learned about two important things that wetlands do. Write down the two functions of wetlands that you observed? Think about how much water and sediment entered the rivers in each experiment.

Wetlands can absorb excess water and prevent flooding and they can filter sediment out of the water before it enters rivers or the Bay.

7. If a wetland is destroyed and houses are built in its place, what might happen to the houses during a severe rainstorm? Think about what happened when water ran down the paint pan and there was not a wetland at the end.

The houses might flood since there is not wetland to absorb the excess water from the rainstorm. There might also be a mudslide or the ground beneath the houses might erode away since there are no plants to stabilize the sediment around the houses.

Wetland Metaphors

Pick one object from the table. Use this object to fill out the chart below. Write down the object you choose in the “Object” column, and write down how you think this object could represent what a wetland is or does in the “Wetland Function” column. For example: If there was a picture of a hotel on the table, it could be a metaphor for the fact that wetlands provide resting places for migrating birds. “A wetland is a hotel for birds that are traveling through.” **Do this for five objects.**

Object	Wetland Function
Example: Picture of Hotel	Wetlands are resting places for migrating birds.
1.sponge	Absorbs excess water
2.pillow	Resting place for animals
3. nursery or crib	Nursery area for young animals (provides them with food and protection)
4.strainer	separates dirt, pollutants, etc. out of the water
5. coffee filter	Filter dirt, pollutants, etc. out of the water
6.soap	Cleans dirt, pollutants, chemicals, etc. out of the water
7.multivitamins	Provides nutrition to plants and animals
8.tums	Neutralizes pH, buffer for chemicals entering the water
9.whisk or electric mixer	Mixes oxygen and nutrients into the water

10.cereal/rice/picture of vegetable garden	Provides food and nutrition for plants and animals
11.picture of zoo	Habitat for animals