



Conserving Water In the Desert

Lesson 4: Importance of Wetlands

Enduring Understanding

Wetland plants not only provide habitat to many organisms, but the plants growing there are vital in the water cycle process. They prevent erosion, filter out pollutants in the water that is seeping into the ground, and through the process of photosynthesis, cycle water back into the atmosphere by transpiration.

Essential Question

Why are plants in wetland ecosystems important in the water cycle?

Background Information

Even though Utah is comprised mostly of a cold desert and is the second driest State in the nation, it has a variety of wetland ecosystems in various parts of the state.

The importance of wetlands in the water cycle cannot be overlooked. Wetland plants serve a vital role in the water cycle process as collection and filtration.

To see how citizens can have an impact on decisions about wetlands, visit this site to find out about the Legacy Highway in northern Utah:

Citizens and Environmental Groups fought legal battles to stop the original proposed Legacy Highway which would have stretched from Logan, Utah to Nephi, Utah (approximately 120 miles) through the Great Salt Lake Ecosystem. The affects on the wildlife and the wetlands filtering capabilities would be devastating. By working together, citizens have made a difference, even reclaiming some of the wetlands and protecting it for the future. See the results of the compromise:

<http://www.environment.fhwa.dot.gov/ecosystems/eei/uto6.asp>

See Lesson #5 for additional information on the impacts of development on plants and wildlife.

Lesson Plan

Warm-up

Materials

- BB Biome Cards (Appendix)
- BB *America's Wetlands* book

Use the biome cards to demonstrate some of the elements of each biome: desert, forest and wetland, and the plants and animals found in each, with special focus on the wetlands.

Ask students to describe the different characteristics they notice in the plants and animals in each of the three different biomes, and reasons for the differences they notice.

Then, read *America's Wetlands* (Western section) included in the Bin. Discuss what students notice about plants in the wetland environment:

Are plants a significant part of the wetlands?
What part do you think they play in the water cycle in the wetlands?
What would happen to the water in the wetlands if there were no plants?
What would happen to the wildlife if there were no plants?



Activity #1: Water Filtration by Plants

Materials

- 6 four-inch potted plants with drainage holes
- 6 clear containers at least 5"x5" wide and 2" deep or deeper for drip trays to hold pot and drained water
- "Pollutants"
 - 3 T. soil
 - Approximately 2 T. unsweetened grape or cherry drink mix
 - 2 T. vegetable oil
 - 2 T. Comet or Ajax powdered household cleaner
 - 2 T. liquid laundry detergent
- 11 clear 10-oz. plastic cups (2 per team, 1 for clear water)

Instructions: Tell the students they will be testing the ability of plants to filter out different substances from water, similar to the way plants would do in a wetland. Each group will be pouring a solution of water mixed with a different substance to resemble a pollutant into a potted plant and through its root system. Tell them about the different substances they will be pouring into the plants.

Divide the students into five groups. Have each team make predictions on the Student Worksheet Water Filtration by Plants about what will happen to the substance once it is poured through the roots of the plants.

Use one of the plants and demonstrate to the students what happens when you pour clean water through the plant. Use this drained water for comparison to the "polluted" water that is drained out of their plants.

Have each team mix their "pollutant" with a cup of water and stir thoroughly. They will save some of the mixture to compare with the mixture after it has been poured through the plant. Then have them pour the mixture into the plants, through the plant's roots. Then have them compare their polluted water with the clean water. When they have poured additional water through the plants, have them do another comparison with the clean water and the first polluted water that was drained. Have them fill out their Gathering Data, Reasoning and Communication sections of the Student Worksheet. Lead a whole group discussion about the role of plants in filtering pollutants from the ground water.



Name: _____ Date: _____

Student STEM Practices Worksheet

Lesson 4: Water Filtration by Plants, 3rd-6th Grade

Objectives

You will test the ability of plants to filter simulated “pollutants”.

Each group will have a different “pollutant” to test. Make a prediction about what you think will happen with your pollutant after it is poured through the plant’s root system. You will compare plants at the end of the testing.

Place your plant into a clear, slightly larger drip tray that will collect the water mixture draining from the bottom of the plant. Water your plant so that the soil is saturated, but is not still draining.

- Mix about 2-4 tablespoons of your pollutant with 6-8 ounces of water in a container and mix thoroughly. Save about 2 ounces of the mixture into 1 10 oz. clear plastic cup to use for comparing with the mixture you will be filtering through the plant. Record the color and texture of the mixture in the box below and fill out the Prediction about what the mixture will look like after it is poured and drained through the plant’s roots.
- Pour the “pollutant” into the plant’s soil very slowly and carefully. Compare the original mixture and the mixture that was poured through the plant. Record your data. Save the drained water in a separate 10 oz. clear plastic cup.
- Now, pour 6-8 ounces of clear water through the plant. Compare the original mixture, the first mixture that was poured through the plant, and the clear water that was poured through the plant. Record your data.

1. Gathering Data:

Questions I have: _____

My Prediction: _____

Pollutant Data

1. Describe how the “pollutant” appears before being filtered.	2. Describe how the “pollutant” appears after it has been poured through the plant.	3. Describe how the clear water appears after it has been poured through the plant.

2. Reasoning:

Analyze your data and explain what happened. You may draw a picture.

Explain what happened in the first filtration of the polluted water. What role do you think the plant played in this? What happened in the second test when you poured clear water through the plant? What do you think happened?



RED BUTTE GARDEN BOTANY BINS



3. Communicating Your Findings:

Compare your waters with those of the other teams. What can you say about this? You may draw a picture.



Activity #2: Water Filtration

Materials

- BB *America's Wetlands* book
- BB *Near One Cattail* book
- BB Biome Cards (Appendices)
- One of the following for each pair of students:
 - Container with holes in the bottom (empty pop bottles with holes punched in bottom)
 - Coffee filter or paper towel
 - 1 c. larger rocks
 - 1 c. gravel or small pebbles
 - 1 c. sand
 - 1 c. dirt
 - water in 2 quart jar container
 - 2 plastic trays 2" deep or deeper

Tell students they will be making a water filtration system in a small container to see what happens to water when it percolates through the ground. Have them fill out the Prediction section on the Student Worksheet Water Filtration.

Put materials listed above on a table where students can choose what they will use for their filtration system. Have each pair of students plan their filtration system. Allow them about 15 minutes to assemble their system. Have them put the container inside the plastic drain tray.

Mix some dirt with the water in the 2-quart jar and shake it around. Pour a little of this mixture into one of the trays to compare with the water that will be filtered.

Pour the remainder of this mixture through the filtration system and see what happens to the water as it seeps through the filtration system.

Have students complete the remainder of the Student Worksheet, and then compare differences with other students. This demonstration is similar to what happens to our water as it percolates underground through different sized rock layers and sand layers.



Name: _____ Date: _____

Student STEM Practices Worksheet

Lesson 4: Water Filtration, 3rd-6th Grade

Objectives

You will be working with a partner to engineer a filtering system for water using the materials typically found on the ground and underground where water collects.

Using what you know about the geology of underground layers of soil, rock and sand, layer your materials in a way you think will filter water most efficiently. Write a prediction about why your filtering system will be most efficient.

1. Gathering Data:

Questions I have: _____

My Prediction: _____

Describe or draw a model of your filtration system:

- After you have built your filtration system, mix some soil with water in a 2-quart jar and shake it around.
- Pour some of it into a 10 oz. clear plastic cup to use as comparison with the water you will filter through your system.
- Next, pour the remainder of the soiled water through your filtration system.



2. Reasoning:

Analyze your data and explain what happened. Why did you layer the materials the way you did? Was your filtering system effective? You may draw a picture.

3. Communicating Your Findings:

Compare your filtration system and the water that filtered through with other groups. Explain any different outcomes and why they occurred. You may draw a picture:

Activity #3: Plant Cell Structure

Materials

- BB Slides from drought resistant, moderate water needs, and plants with high water needs
- Microscopes

Students will compare the cell structure of slides of xerophyte (drought tolerant), mesophyte (moderate water need), and hydrophyte (high water need) plants. Have them fill out the Student Worksheet Plant Cell Structure and discuss the differences they noticed and explanations they have for the differences based on the information learned from the biome cards and the wetlands book.



Name: _____ Date: _____

Student STEM Practices Worksheet

Lesson 4: Plant Cell Structure, 3rd – 8th Grade

Objectives

You will compare the plant cell structure of plants with different water needs.

1. Gathering Data:

Questions I have: _____

My Prediction: _____

Draw/describe the xerophyte (low water) monocot cell (yucca).	Draw/describe the hydrophyte (high water) monocot cell (elodea).	Draw/describe the mesophyte (moderate water) monocot cell (zea).

2. Reasoning:

Analyze your data and explain your observations. You may draw pictures.

3. Communicating Your Findings:

Discuss your findings with a partner. Explain your conclusions here. You may draw pictures.

Extensions

Project Wet Curriculum and Activity Guide:

First/Second Grade: The Life Box, page 69

Groundwater: Springing Into Action, page 203

Wetland Soils In Living Color, page 217

Water Inspirations, page 535

