Middle School Green Career Awareness Modules

Clean Water

Segment	The Nature of Water
Lesson # and Title	Lesson Three Wetland in a Pan
Duration	45 minutes

Lesson Overview

Wetlands are important to coastal communities. During this lesson, students learn about the role wetlands play in flood and coastal erosion protection. Students will demonstrate (using models) how wetlands can slow erosion, as well as how wetlands can absorb water and slowly release it to avoid flooding. This lesson will both introduce students to those concepts and prepare them to compare areas with and without wetlands.

Learning Objectives

By the end of this lesson, students will be able to:

1. Describe a wetland's role in flood protection for cities and local coastal communities.
2. Describe a wetland's role in erosion protection for coastal communities.

Content Standard(s)

NGSS MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

CCSS ELA SL6-8. 2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

Equipment, Instructional Resources, and Materials

1. Wetland model (1 for each small group about 4 students)
2. Soil enough to fill a small dixie cup for each group
3. 1 dixie cup (or small cup) per group
4. Spray bottle of water (1 per small group)
5. Somewhere to dump water (a sink, extra bucket, plants, or outside)

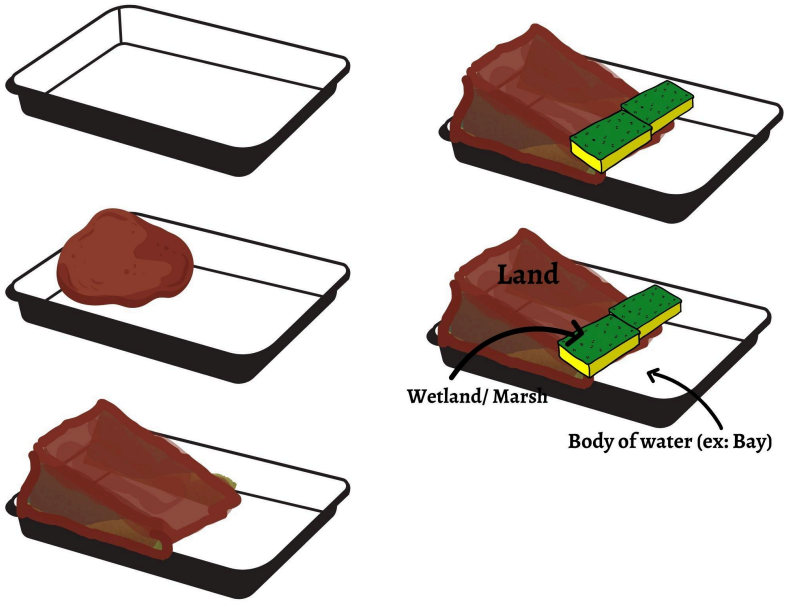
Key Vocabulary and Terms

Vocabulary:

1. Wetland- “Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. Water saturation (hydrology) largely determines how the soil develops and the types of plant and animal communities living in and on the soil. Wetlands may support both aquatic and terrestrial species. The prolonged presence of water creates conditions that favor the growth of specially adapted plants (hydrophytes) and promote the development of characteristic wetland (hydric) soils.” - EPA
2. Salt Marsh -”Salt marshes are coastal wetlands that are flooded and drained by salt water brought in by the tides. They are marshy because the soil may be composed of deep mud and peat. Peat is made of decomposing plant matter that is often several feet thick. Peat is waterlogged, root-filled, and very spongy. Because salt marshes are frequently submerged by the tides and contain a lot of decomposing plant material, oxygen levels in the peat can be extremely low—a condition called hypoxia. Hypoxia is caused by the growth of bacteria which produce the sulfurous rotten-egg smell that is often associated with marshes and mud flats.” - NOAA
3. Flooding- “the covering or submerging of normally dry land with a large amount of water.” - oxford languages
4. Erosion - “Erosion is the geological process in which earthen materials are worn away and transported by natural forces such as wind or water.” - National Geographic
5. Runoff - “Runoff is nothing more than water "running off" the land surface. Just as the water you wash your car with runs off down the driveway as you work, the rain that Mother Nature covers the landscape with runs off downhill, too (due to gravity). Runoff is an important component of the natural water cycle.” - USGS

Teacher Preparation

1. Familiarize yourself with slide deck
2. Familiarize yourself with vocabulary terms
3. Build wetland models
    a. Using long shallow pans (ex: aluminum trays(11x9in), metal or glass pans, rolling paint pans)
        i. Add clay to half the tray creating a gentle slope down towards the middle of the pan (make sure to get it all the way to the edge of the pan to create a seal)



        ii. Add sponges on the bottom portion of the slope

4. Gather materials

Lesson Procedure

Slide Deck: Clean Water: Lesson 3: Wetland in a pan

Segment Title	Activity/Task, Student Grouping, Special Accommodation, Related Career(s), and Assessment	Time (min)

Introduction	Activity/Task: 1. Ask students what they think a wetland is 2. Introduce or review what a wetland is 3. Introduce the part of the model they will be using for the demonstrations. Student Grouping: Whole Group	10
Wetlands hold water demo/ prevent flooding **with** marsh	Activity/Task: 1. Give each group a wetland model, and a spray bottle 2. Check that the sponges (wetlands) have been put in place 3. Have the groups guess what will happen if it rains on the land 4. Have students spray water on the land to represent rain 5. Ask students to observe what is happening (some of the water should be slowed or absorbed by the “marsh”, some may run straight out to body of water, if students don’t think the marsh has collected any water you can have them pick it up and squeeze it) 6. Share what they observed Student Grouping: Small Group (~ 4 students) Related College Major and Career(s): Watershed science, wetland scientist	5-7 min
Wetlands hold water demo/ prevent flooding **without** marsh	Activity/Task: 1. Give each group a wetland model, and a spray bottle 2. Remove the sponges (wetlands have been removed) 3. Have the groups guess what will happen if it rains on the land 4. Have students spray water on the land to represent rain (same way as the last time) 5. Ask students to observe what is happening (all of the rain should be washing into the body of water and may even start to show flooding on the land) 6. Share what they observed Student Grouping: Small Group (~ 4 students) Related College Major and Career(s): Wetland restoration, city planning, environmental planner, water resource planner	5-7
Clean up/ reset	Pour the old water from the model out and reset the models	2-3
Wetlands provide filtration and prevent erosion of coastlines **with** marsh	Activity/Task: 1. Give each group a wetland model, and a spray bottle 2. Place the the sponges across the bottom of the land (wetlands have been put in place)	5-7

	3. Sprinkle half dixie cup of soil (this represents runoff and other pollution) across land a. Optional extension: You can also use different colors of sugar free kool aid powder to show different types of pollution like fertilizer, pesticides, oil 4. Have the groups guess what will happen if it rains on the land 5. Have students spray water on the land to represent rain (same way as the last time) 6. Ask students to observe what is happening (the sponges should trap some of the soil on the top side of the sponge) 7. Share what they observed Student Grouping: Small Group about 4 students Related College Major and Career(s): Wetland restoration, city planning	
Wetlands provide filtration and prevent erosion of coastlines **without** marsh	Activity/Task: 1. Give each group a wetland model, and a spray bottle 2. Remove the sponges (wetlands have been removed) 3. Sprinkle half dixie cup of soil across land a. Optional extension: You can also use different colors of sugar free kool aid powder to show different types of pollution like fertilizer, pesticides, oil 4. Have the groups guess what will happen if it rains on the land 5. Have students spray water on the land to represent rain (same way as the last time) 6. Ask students to observe what is happening (the rain should wash the soil out as well as pull the soil off the edge of the land (this is representative of coastal erosion)) 7. Share what they observed Student Grouping: Small Group about 4 students Related College Major and Career(s): Wetland restoration, city planning	5-7
Review/ Conclusion	How do wetlands help humans with flooding, pollution, and erosion? Student Grouping: Whole Group	5

Adapted from “WOW” the wonders of wetlands “wetland in a pan”