

NSTA Connection

Full Lesson Plan

Marsh Madness

Sample SSI Lesson: Marsh Madness!

Lesson Summary: During this lesson, students investigate the ecological relationships between living and non-living components of a wetland and collaboratively determine the type, extent of, and consequences of nearby development.

Grade Levels: 3-5

Time Required: Four 40-minute class periods

Day 1 – **Engage** with *About Habitats: Wetlands* and **Explore** with Wetland Simulation

Day 2 – **Explore** with iBiomes:Wetlands *or* Wetland Food Web Activity

Day 3 – **Explain** with *Here is the Wetland* and **Elaborate** with Dragonfly Pond

Day 4 – **Elaborate** with Dragonfly Pond and **Evaluate** with Town Hall Meeting

NGSS: 3-LS4-4 Biological Evolution: Unity and Diversity - Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change (see Standards Box).

Driving Questions:

Day 1 – What are wetlands and what important functions do they serve?

Day 2 – What organisms live in a wetland and how do changes in the environment affect those organisms?

Days 3 and 4 – How does development impact wetlands and what steps can mitigate or lessen those impacts?

Materials: (per class) *About Habitats: Wetlands* and *Here is the Wetland*, one large copy of Dragonfly Pond; (per team) paint pan, large sponge, clay, soil, water, measuring cup, (optional stickers, florist moss, toothpicks to create wetland), scissors, tape; (per pair or per person) iPad, iBiomes: Wetland

Engage (Day 1):

Read the book, *About Habitats: Wetlands* by Cathryn Sill, as a whole class read-aloud, to begin a study of the wetland environment. This book describes various types of wetlands (e.g., bogs, marshes, swamps, etc...) and their importance to their plant and animal inhabitants as well as to people. Informally assess students by asking: 1) What is a wetland? (places that are covered by shallow water). 2) What are some of the different types of wetlands? (bog, marsh, prairie pothole, swamp, vernal pool, riparian wetland). 3) What are some of the living and non-living parts of the wetland environment? (sun, water, plants, fish, invertebrates, etc...) and 4) What are some of the important functions of a wetland? (provides food, shelter, and protection for animals and their young, food for people, prevents flooding and erosion, and acts as a filter for water).

Explore (Day 1):

To enhance students' understanding of the role of the wetland in preventing flooding and erosion, as well as its ability to filter pollutants out of water, we had student teams of four conduct wetland simulation activities by creating and testing wetland models using plastic paint trays, sponges, clay, and water using a "Wetland in a Pan" lesson plan found at :

<http://www.miseagrant.umich.edu/lessons/lessons/by-broad-concept/earth->

[science/wetlands/activity-wetland-in-a-pan/](http://www.miseagrant.umich.edu/lessons/lessons/by-broad-concept/earth-science/wetlands/activity-wetland-in-a-pan/) In this activity, students "rain" water over land near wetlands to test the effects of the wetland (sponge) on absorbing and filtering runoff (water and

soil). Students also remove the “wetland” to see how its absence impacts erosion. Provide students with additional items including toothpicks, sticks, and florists’ moss to enhance their models. Some of discussion questions included in the lesson plan are: 1) How might muddy water affect fish, plants, and other animals? (reduce light and oxygen, make it harder for fish and other animals to breath) 2) How might the loss of wetlands affect you? (more floods, erosion, less food and wildlife).

Explore (Day 2):

Using iPads, have students (individuals or pairs) investigate and manipulate wetland habitats using the interactive app “iBiome-Wetlands.” On this app, students build wetland environments by reading about various organisms, adding living and non-living elements to their experimental dome, and testing the impact of introduced species on the wetland food web.

(Source: iBiome-Wetland: School Edition By Springbay Studio Ltd.

<https://itunes.apple.com/ca/app/ibiome-wetland-school-edition/id1069411327?mt=8>). For those using PC’s, there is a free but limited (freshwater marsh only) demo version of this app at:

<https://www.brainpop.com/games/ibiomewetlandschooledition/>.

To assess this activity and help students to organize their conceptual thinking, we asked the following questions: 1) If a wetland became polluted, how would it affect the living things? (water would not be healthy for plants or animals, oxygen could be reduced, light could be reduced and impact plants animals); 2) If a wetland were drained for buildings, how would it affect the living things? (animals and plants would lose their homes, flooding would increase from lack of absorption from wetland, more erosion if plant roots aren’t there to keep soil in place); 3) If people build dams that prevent water from entering a wetland, how would it affect

the living things? (without water, plants and animals would die).

Explain (Day 3):

Begin with a whole-class read-aloud of, *Here is the Wetland*, by Madeleine Dunphy, which uses cumulative, lyrical prose to illustrate the wetland food ecosystem. Using Think-Pair-Share, discuss and describe the following: 1) What is a wetland? 2) Why are wetlands important? 3) What is an example of a wetland food chain? 4) What are some of the threats to wetlands? We found that students had forgotten some of the threats to wetlands.

Elaborate (Day 3 and 4):

To answer that question, we used the “Dragonfly Pond” activity by Ducks Unlimited available at: http://msue.anr.msu.edu/uploads/236/66856/DragonflyPond_-_updated_11-05.pdf. In this SSI land use activity, teams of students represent various constituencies in a town such as homeowners, business owners, and farmers, and are charged with developing an area near a wetland. Show students maps of Dragonfly Pond and explain that the surrounding area, a freshwater marsh, was being considered for development of a town. Pose the question, “How should we develop Dragonfly Town?” Divide students into teams of four or five, and had one student from each team pick a slip of paper with a constituency on it randomly. Options on the slips of paper are: 1) Homeowners; 2) Farmers; 3) Business Owners. (Note: Depending on the number of students, you can include other constituencies such as “Environmentalists,” “Local Tourism Company,” etc...). Explain to the students that during the next class, they would be participating in a Town Hall Meeting to decide which development plan should be followed. Have teams discuss advantages and disadvantages of wetland development *to their constituency group* and then sharing out with the class. Provide groups with a map of a fictional “Dragonfly Pond” and cutout pieces to represent aspects of the proposed built environment such as houses,

farms, stores, etc... Have students discuss and debate the advantages and disadvantages of various plans, with particular focus on the impact of the plans on wetland species. Then have students use tape rings to place their pieces on the maps.

Questions for consideration”

- 1) What is most important to you?
- 2) What are the trade-offs of getting what you want? Are there disadvantages?
- 3) Do you think you share any of the same interests as other groups?

Evaluate (Day 4):

Each team presents a 3-minute opening statement while showing and describing their plans. Write the criteria for the opening statement (which parallels the assessment) on the board.

The opening statements must include:

- 1) Why did you decide on that layout?
- 2) What good and bad effects might your plan have on the environment?
- 3) What did you do to protect the wetland? After a team presented, town members were allowed to ask questions.

After all teams have presented, allow time for students to ask each other questions. Then, place a larger-scale map of Dragonfly Pond on the board (or project it) and ask each team to place their most important elements on the new class wetland area. After all teams have gone, try to come to consensus on a plan. See scoring rubric below.

Rubric for Town Hall Meeting

Task: Each team will make a 3-minute clear, organized, and evidence-based opening statement that describes: 1) The rationale for their map layout; 2) The impacts of their plan on the environment; and 3) the way(s) they have attempted to mitigate negative impacts on the wetland environment. They will then respond to questions from town members. 15 pts.

| | Early 1 pt | Emerging 2 pts | Sophisticated 3 pts | Points and Comments |
|--|---|--|---|------------------------|
| Use of Evidence | Students use opinion without evidence to back their claims | Students use tenuous or incomplete evidence to back claims | Students demonstrate complete and accurate use of evidence to back claims | |
| Source and Quality of Evidence | Students are unable to identify sources of evidence | Students demonstrate some effort in identifying and evaluating the the sources of evidence | Students thoughtfully identify and evaluate the sources of evidence | |
| Science Content Understanding | Students demonstrate minimal understanding of science content | Students demonstrate a moderate degree of understanding of science content. | Students demonstrate strong understanding of science content and consistently apply it to their arguments | |
| Clarity and Organization of Presentation | Presentation is unclear and disorganized | Presentation is somewhat clear and organized | Presentation is clear, organized, and compelling. | |
| Response to Questions | Students are unable to respond to questions | Students respond in inappropriate manner or with inaccurate information. | Students respond appropriately, thoughtfully, and accurately. | |

Total _____/15

Extend – Advocacy Letter (Optional Homework or In-Class Writing Assignment)

Students write a letter to the town council or the town newspaper explaining their position on the wetland development plans. Students must present evidence from their class readings and investigations.

Extend – Interviews (Optional Research Source)

Students interview their families, local land developers, business owners, farmers, environmentalists, and/or government representatives to investigate their perspectives on environmental impacts of land development. Findings are incorporated into town council presentations.