



Wetland in a Pan

Activity: Students review a selection of career profiles and play a lively classroom game to find out more about marine and aquatic science professionals.

Grade Level: 4-8

Subjects: Science, social studies

Setting: Classroom and/or outside

Duration: 1.5 hours

Key terms: Nursery, Wetland

OBJECTIVES

After participating in this activity, students will be able to:

- Observe building a model wetland.
- Understand that wetlands are defined by plants, soil and water
- Identify some wetland types and their locations
- Relate importance of wetland function to people's needs and daily lives

SUMMARY

Wetlands provide some of the most important ecological functions of any habitat type. They provide nursery areas for fish, support an abundance of wildlife, help control flooding, filter nutrients and sediments and even some harmful pollutants. In the process, wetlands improve water quality and enhance our natural environment. By creating a wetland model, students observe these concepts in action and watch what can happen when a wetland disappears.

BACKGROUND

Wetlands are an important feature of the Great Lakes region. Marshes, a type of wetland, are found along the Great Lakes, but in some areas they've decreased by 90 percent. It is estimated that Michigan once had over 11 million acres of wetlands. Today, a little over 5.6 million acres remain.

A wetland is an area that periodically has waterlogged soils or is covered by shallow surface

water. This surface water supports plants and animals that are adapted to living in a watery environment. Some major functions of a wetland are:

- Reduce flooding (flood buffering)
- Filter pollution
- Prevent soil erosion
- Provide habitat for aquatic and terrestrial animals and plants
- Serve as breeding, feeding, and nesting grounds

Wetlands are classified as marshes, bogs, swamps, vernal ponds, and wet meadows. These are the types found in Michigan. Some non-Michigan wetlands are salt marshes, mangrove swamps, and prairie potholes.



ADAPTED FROM FISHERIES LEARNING ON THE WEB
HTTP://WWW.MISEAGRANT.UMICH.EDU/FLOW
DEVELOPED BY MICHIGAN SEA GRANT COLLEGE PROGRAM

See: Great Lakes Coastal Wetlands (<http://www.miseagrant.umich.edu/wetlands/index.html>)

MATERIALS & PREPARATION

- Modeling clay
- Rolling paint pan (or small aluminum pan)
- Sponges
- Carpet or florist oasis foam
- Watering can or similar device
- Cup of soil
- Jar of muddy water

PROCEDURE

Build a Model Wetland

The first part of the procedure demonstrates how wetlands prevent flooding and soil erosion.

- 1) Explain that wetlands, like all habitats, are very complicated natural systems. They perform some very important functions such as filtering pollutants, reducing flood damage, and preventing soil erosion. Some wetlands, at times, recharge groundwater supplies
- 2) Explain that you will make a wetland model to demonstrate some of these functions in a very simplified way.
- 3) Put the clay along one side of the pan. Fit the piece of carpeting or sponge into the wetland area along the edge of the clay. Slowly sprinkle some rain on land (the clay) and let the students observe and describe what is happening. Ask: If I make it rain on the model, what do you think will happen to the rainwater? (Rain will flow downhill). The wetland (carpeting) will slow the rate of flow, and the excess rain will slowly enter the body of water. Point out that the wetland absorbed some of the water—pick up the wetland and squeeze some water out to prove it.
- 4) Ask: What do you think will happen if a wetland is removed? (The water will not be absorbed; it will flow more quickly into the body of water). Remove the carpeting and water. Pour the same amount of water on the model at the same spot and rate as before. Have the students note any differences. The water

should fill the body of water much more quickly and may eventually overflow and flood the land. That's because it's no longer retained by the wetland.

Discuss the results

- Explain that most wetlands are shallow basins that collect water and slow its rate of flow and also retain water for a time. This slowing process helps reduce flooding and also helps prevent soil erosion. Ask: If a wetland is destroyed, and houses are built in its place, what might happen to the houses during a severe rainstorm? Why? (They might be flooded because the wetland will not be there to absorb and slow the rush of water from higher ground).
- In many areas, wetlands are drained and filled, and houses and marinas are built right along the water. Without a wetland buffer, these developed areas, particularly along the coast, are often subjected to severe flooding and erosion, especially during violent storms.

Modify the Wetland Model

The second part of the procedure demonstrates how wetlands improve water quality by filtering sediments and pollutants.

- 1) Pour the water from the last demonstration out of the model, squeeze out the “wetland” and replace the piece of carpeting. Spread a layer of soil over the clay. Explain that this demonstration will be just like the first, except that topsoil will cover the clay. Ask: What do you think will happen to the bare soil when it rains? (The rain should pick up and carry some sediment over the land and into the body of water. Explain that this water represents polluted runoff such as silt from farmland and construction sites or salt from snow-covered streets).
- 2) Ask the students to compare the water that ends up in the body of water with the muddy water in the jar. Explain that the carpeting trapped the soil particles, making the water in the body of water much clearer. The uphill

side of the wetland should be coated with trapped sediment.

- 3) Remove the carpeting, pour out the water, and try the experiment again. What happens without the wetland in place? Ask the students why all the soil particles end up in the body of water this time. (The thick mat of plant roots in a wetland helps trap silt and some types of pollutants, much as the carpet or foam did in the model. Without a wetland, excessive amounts of silt and pollutants can end up in lakes, rivers, and other bodies of water).

Discuss the Results

- How might muddy water affect fish? (Makes it harder for them to see and breathe with clogged gills, and could lead to their death). How might the muddy water affect other animals and plants? (Settling sediment smothers clams, plants do not get sunlight needed for growth, birds and other animals that eat fish or plants have less to eat if food sources die or cannot be seen in muddy water, etc.)
- How might the muddy water affect boats and ships? (The mud settles out and eventually fills channels important for navigation). How might all of this affect you? (Decrease in natural resources and food sources; decline in quality of drinking water; impacts on recreation such as swimming and fishing; change in aesthetics; change in community economy, such as shipping problems that affect jobs and industry, etc.) How can we prevent these undesirable effects? (By protecting wetlands and helping to make their benefits known!)
- Have students describe how wetlands function to reduce flooding and retain sediments.
- Have students analyze what would happen to water, sediments, homes and wildlife if wetlands were destroyed.

ADAPTATIONS

Students, individually or as small groups, can make their own detailed wetland models using small aluminum foil pans, clay, and florist's foam, carpet, or sponges. Provide reference books with pictures of different types of wetlands. Students can use an assortment of collected material to decorate their models. Have students present their models by explaining their particular characteristics. Some ideas:

1. Use long pine needles for reeds and toothpicks to attach plants.
2. Shape wetland creatures from clay, or glue paper cutouts to toothpicks.
3. Dried flower heads make nice trees, and small pine cones painted green form evergreens.
4. For cattails, use cotton swabs. Paint sticks green and cotton parts brown, or paint toothpicks green, and attach bits of brown clay to the tops.

ASSESSMENT/EVALUATION

An assessment chart is included in the following pages to allow teachers to create their own assessment.

SOURCE

Adapted from an activity by Anna Switzer and Joyce Daniels for Fisheries Learning on the Web, <http://www.miseagrant.umich.edu/flow>, Michigan Sea Grant

GLOSSARY

Nursery: Breeding or nesting grounds for plants or animals.

Wetland: An area, such as a bog, swamp, or marsh that has seasonally wet soils and a distinct plant community. Wetlands provide valuable nursery areas and habitat for many plants and animals.

Wetland in a Pan Assessment

This assessment chart was designed for teachers to create their own assessment. The recommended points show the relative difficulty of student performance. In creating assessments, the total point value will depend on the number and type of perform-

Learning Objective	Student Performance	Recommended # Points
Build a model wetland	Identify: The parts of the model that correspond to parts of a wetland (e.g. carpet = wetland, etc.)	1 each
	Describe: What happens to the 'rainwater' in the model with and without the 'wetland' in place.	2 each
Understand that wetlands are defined by plants, soil, and water	Name: The three important aspects of a wetland.	1 each
Identify some wetland types and their locations	Describe: Different types of wetlands and where they are generally found	1 or 2 each (depends on how much this material is stressed in the lesson)
Relate importance of wetland function to people's needs and daily lives	Explain: The various benefits or functions of a wetland for the whole ecosystem (including humans)	2 each
	Predict: What might happen if a lot of the wetlands disappear (e.g. by being developed, or via	3 each (look for discussion of immediate effects, long term effects, effects directly on humans, and effects mediated by other factors like fish or plants)

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Standards and Benchmarks

For PDF summaries of the Elementary and Middle school standards listed here, see:

Elementary: www.miseagrant.umich.edu/flow/pdf/FLOW_Elementary_Standards.pdf

Middle: www.miseagrant.umich.edu/flow/pdf/FLOW_Middle_Standards.pdf

State of Michigan

Science	
Elementary	Middle
II.1.2 II.1.4 III.5.5 V.1.1 V.2.2	II.1.3 II.5.4 III.5.6 V.1.1 V.1.5 V.2.2

Social Studies	
Elementary	Middle
II.2.1 II.2.2 II.2.4 II.4.5	11.2.2 II.2.3 II.2.4 II.5.1

National

NSES	
Elementary	Middle
C1-1 C3-4 F4-2	D1-6 F2-2 F3-2

AAAS	
Elementary	Middle
4C-1 11B-1 11B-2	4B-7 4B-11 11A-2

NAAEE	
Elementary	Middle
1-F 2.1-A 2.3-C 2.3-D 2.4-A 2.4-E 3-B	1-F 2.3-C 2.3-D 2.4-A 2.4-B 2.4-D 3-B

NCSS	
Elementary	Middle
III.b III.e III.h III.i III.j VIII.b VIII.e IX.d IX.e	III.b III.e III.h III.j IX.d

Notes:

NSES = National Science Education Standards

AAAS = American Association for the Advancement of Science (Benchmarks)

NAAEE = North American Association of Environmental Education (Guidelines for Excellence)

NCSS = National Council for the Social Studies (Standards)