



Lesson 4:

Design an Ideal Habitat—Think Like Engineers and Scientists

Grade Level: 4-6

Time: 75 Minutes

Vocabulary:

Restoration, scientist, engineer, pollution, habitat, ecosystem, food chain, shelter, resources.

Great Lakes Literacy Principles:

Principle 5

Concepts A, B, D, E, F, G, H, I

Principle 6

Concepts C, D, E

Summary:

Students learn how an engineer designs a large project like habitat restoration, working with a team of environmental professionals. Students create a mural of the ecosystem using the ecological knowledge they have accumulated throughout the educational program.

Objectives:

- Describe how an engineer designs a restoration project, including the importance of working on a team.
- Describe scientific relationships of organisms within the local ecosystem.

Materials:

See Mural Activity for additional materials. The Ecosystem Components PowerPoint and project figures and maps can be found on www.greatlakesmud.org/education.html and www.greatlakesmud.org, respectively.

Procedure:

Prior to the lesson, complete step one of the Mural Activity. Provide students a quick recap of the third lesson. Engage students in a discussion about project design concepts using the Project Design Discussion Questions and project figures and maps. Present the Ecosystem Components PowerPoint. Alternative to the discussion activity, contact Illinois-Indiana Sea Grant prior to the lesson to set up a videoconference with a project scientist. Have students complete the Ecosystem Design Components worksheet. Facilitate the Mural Activity. Administer the test on a later day.

Assessment:

Post-test and answer key are provided in Lesson Plan 1 and cover concepts learned throughout the educational program.



Project Design Discussion Questions

In order to plan effective project designs for restoration, stakeholders need to discuss important components of the design. Discuss the following questions with your students and use the answers for guidance.

What kinds of plants belong in your ecosystem design?

Think native. Talk about what kinds of plants live there now compared to what kinds of plants are supposed to live there (plants they're growing in their classroom; plants discovered for the Habitat Components PowerPoint).

What kinds of animals belong in your ecosystem design?

Again, think native. Talk about the food chain. Talk about what kinds of animals live there now compared to what kinds of animals belong there. Discuss what animals students have seen in their yards and near the river.

Why are native species having a hard time living or thriving?

This is where it is important circle back to talk about the pollution in the sediment and in the food chain (bioaccumulation and biomagnification), as well as invasive species that are taking over.

How does a team of scientists and engineers decide what plants to plant?

Explain that the plants are chosen based on what native species were documented historically as well as what resources are important for the new habitat plan. Plants must have adequate light, water, and nutrients. However, they also must provide food and shelter resources for native animals. Highlight the species the students are growing in the classroom and the role of each one.

Why are certain plants planted in certain locations?

All plants need water, sun, and nutrients – but different plants need different amounts of these resources. That's why some plants can grow underwater, slightly underwater, on the shore, and up on dry ground. They provide shelter and food for different kinds of animals. Use specific examples, such as the plants they are growing in their classroom or species from the Ecosystem Components PowerPoint.

Name _____ Date ____/____/____

Ecosystem Design

Using the information you learned from the Ecosystem Components PowerPoint, list the plants, animals, and non-living things that belong to each component of your ecosystem design. Explain the role that each plant, animal, and non-living thing plays in supporting a healthy ecosystem. (Examples are provided below.)

Component	Name	Role / Importance
On Land or in Air (Nonliving)		
On Land or in Air (Living Plants)		
On Land or in Air (Living Animals)		
In the Water (Nonliving)		
In the Water (Living Plants)		
In the Water (Living Animals)	- <i>Bluntnose Minnow</i>	- <i>Small Fish that eats plants and benthos</i>

Mural Activity

Summary:

Students draw components of an ecosystem and put them together in a mural to demonstrate scientific relationships.

Materials:

Ecosystem Components PowerPoint and Ecosystem Component Printouts (printouts are created by printing out slides from the PowerPoint, one slide per page), 4'x3' light blue butcher paper, 4'x 2' green butcher paper, 1'x1' brown butcher paper, drawing paper, pencils, markers.

Procedure:

1. Instructions for preparing the ecosystem base with butcher paper are provided in Lesson Plan 4 procedure.
2. Break students into four teams. Explain that each team will draw one of the following ecosystem components:
 - a) Above water: nonliving, living plants
 - b) Above water: living animals
 - c) In the water: nonliving, living plants
 - d) In the water: living animals.
3. Give single-sided printouts of ecosystem components to each team, along with drawing paper, pencils, and markers. Turn on an automatic ecosystem component PowerPoint slideshow in the background.
4. Walk around as students draw ecosystem components, helping them with scale and important organism characteristics. Talk to students about species diversity and distribution and encourage them to draw a species that is different from others chosen at their table. Otherwise, the mural could end up having one songbird and five birds of prey based on species popularity with the students.
5. As students finish their ecosystem component, help them paste it on the mural. Ask the students where they think their component should go on the mural based on its needs and relationships to other species within the ecosystem.

Wrap-Up:

Engage students in a discussion about the mural. Ask them about species diversity and distribution. Relate the mural back to the second lesson, and ask them if they'd be happy organisms if they lived there. This mural can be displayed at the press event, described in Lesson Plan 5.