

THE BIODIVERSITY BOX: INQUIRY SCIENCE AT THE ELEMENTARY LEVEL

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This article describes how to engage students in inquiry-based learning of several ecological topics related to conservation (species diversity, habitat loss, and invasive species), through a fun and active lesson. The Biodiversity Box, developed as an assignment in a science course for preservice teachers at Grand Valley State University, helps students (grades 3-5) learn science content by making predictions and reaching conclusions based on evidence. Let's begin by reviewing the relevant concepts.

Biodiversity describes the great variety of life on this planet, including plants, animals, fungi, and various microscopic organisms. As one measure of biodiversity, *Species Diversity* estimates the number of different species in a particular environment.

Biogeography explores the geographic distribution of organisms around the world, including historical explanations for these patterns, basically asking why different species are found where they are.

Island Biogeography explains how island size affects species diversity. Large islands, because of more abundant resources and diverse habitats, support more species than small islands. Large islands are also easier targets for species to reach from other islands or the mainland, the sources of colonization. Island biogeography is relevant to current conservation efforts, as natural habitats are lost and fragmented, leaving only "islands" for species to inhabit.

Make a Biodiversity Box

To create a Biodiversity Box you need a few basic materials: a shoe box, glue stick, blue and green construction paper, scissors, markers, and five cut-outs of different birds. Begin by cutting a piece of blue construction paper that fits snugly in the bottom of the box. Next, cut out six oddly shaped pieces of green paper to represent islands. These should all be different sizes and should be labeled "A" through "E," from smallest to largest. Glue or tape these islands to your blue sheet of paper and attach the whole map to the bottom of the box.

Now print out or draw six small pictures of birds, no bigger than the size of a quarter. Cut out the birds on various colored pieces of construction paper (representing different species). Write, "Hey Mr. Hurricane in the sea, when will your winds stop pushing me? Just let me land on an island please, and I'll increase its biodiversity!" on another piece of construction paper. Attach this to the lid of your box. Enhance the appearance of your box by covering it with wrapping paper and adding colorful stickers or pictures.

Engage Your Students

Present the Biodiversity Box to your students, showing them the islands inside the box, as well as the birds. Explain that the different species of birds have become lost at sea and hope to make it to an island so they can survive. Place the birds inside, close the lid, and chant the poem that is written on top. While doing so, shake the box vigorously to simulate a hurricane carrying birds out to sea. Without letting your students see inside the box, peek under the lid and act surprised. Ask students what they think happened. After several answers, tell students they will have to make their own box to find out.

Explore Through Inquiry

After students have constructed their own Biodiversity Box, have them write a paragraph predicting what they think will happen and why. Have them test their predictions by simulating their own hurricane. Instruct them to record how many birds land on each island, individually or as a class on the board (Figure 1). Have them conduct several trials and average the results; or simply sum the total number of colonizations for each island, depending on grade level. What your class should find is that the birds will tend to land most often on the larger islands, and least often on the smallest ones.



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Figure 1. Record how many birds land on small and large islands (A-E).

	A	B	C	D	E
1			Island		
2					
3					
4					
5					
6					
7					
8					
9					
10					
Average					

No inquiry is complete, however, until students explain their conclusions based on the evidence. Have students compose a short essay, adding to their paragraph above, describing how they tested their predictions and what they found. Ask them what their results mean for conserving biodiversity. Explain to them that natural habitats become more and more like isolated “islands” as land development continues. Your students should be able to predict that larger nature reserves will have more biodiversity than smaller ones.

What’s Next?

To extend the lesson, explain to your class that there are a number of threats to biodiversity besides loss of habitat, such as over-hunting, pollution, or global climate change. A threat of particular importance is unwanted species from other parts of the world that arrive on boats or airplanes and displace native species. These invasive species, like the zebra mussel or brown tree snake, act as unusually strong competitors or predators and can dramatically decrease the biodiversity of an area.

Integrate an investigation of invasive species into your lesson by having students research and report on the arrival and impact of a biological invader in Michigan. Suggest that students create a poem of their own to illustrate their knowledge of this intruder. They might even be able to develop a game to simulate the impact of invasive species on biodiversity!

A detailed lesson plan for the Biodiversity Box is available on the GVSU Integrated Science Program website (www.gvsu.edu/isci), through the “5E Lesson Plans” menu option.