W 929

ISLAND BIOGEOGRAPHY

The Distribution of Animals and Plants on Habitat "Islands"

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Skill Level
Intermediate

Learner Outcomes
The learner will be able to:
- Explain what the discipline of biogeography studies
- Collect and analyze species count data
- Identify types of habitat islands

Educational Standard(s) Supported
MS-LS2-2, L.S2.C

Success Indicator
Learners will be successful if they:
Explain that the number of species we expect to find on islands are a function of both island size and distance from shore

Time Needed
30 minutes

Materials List
Sidewalk chalk or masking tape
Approximately 6 each of 6 different types of small items (i.e. 36 objects total) that can be thrown a few feet. For example: cotton balls, dried beans, seeds, popcorn (popped or unpopped), pinecones, safety pins, binder clips, beads, washers, acorns, small plastic toys, etc.

Introduction to Content

In this lesson, students will be introduced to biogeography and what defines an island. They will think about how island size and distance from mainland might influence how animals and plants arrive on islands.

Introduction to Methodology

After making a prediction about how size and distance affects the number of species that might end up on an island, students will mimic species dispersal by throwing "species" (a variety of small objects) at four "islands" drawn on the ground.

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Adapted from:
"Island Biogeography" CPALMS Resource ID#30368
https://www.cpalms.org/Public/PreviewResourceLesson/Preview/30368

Terms and Concepts Introduction

Island: An area that is isolated or detached from surrounding areas in some way.
Biogeography: The geographical distribution of species and ecosystems.

Setting the Stage and Opening Questions

Do you see the same types of plants and animals living everywhere you go? For example, do you see the same animals and plants in Florida that we have here in Tennessee?
Biogeography is a field of biology that studies the patterns of where species live. These distributions can be over space or time, but this activity will just focus on space. The biogeography, or distribution, of animals and plants is often controlled by temperature, rainfall, food sources, and other factors.

What is an island?
Most students will identify an island in the physical geography sense, that is, a small land area surrounded by water. But in biogeography and ecology, our definition is broader: an island is any area that is isolated from surrounding areas by some barrier. Barriers can be natural, like land, water, or mountain ranges, or introduced by human development, like highways, buildings or parking lots. The tops of mountains can be thought of as islands, because the plants and animals that are at the top will have to scale down and back up large distances to go to a new mountain top habitat. A park in the middle of a city is an island if it is isolated from other habitats by concrete and buildings. A pond can be an island if it does not have any streams flowing in or out of it. A patch of trees in your backyard can be an island if animals or plants living in it would have to trek long distances to another patch of trees. A dung pile is an island for a dung beetle.

What determines the types of species living on an island?
In order for a species to live on an island they must overcome large physical barriers that can prevent many other animals and plants from living there. The farther away an island is from the mainland, the harder it can be for species to make the journey. Additionally, a big island can be much easier to get to than a small island, because it is easier to see and has more space to land. With islands like Hawaii, animals and plants must get across the ocean somehow, but not all animals that live on islands can swim–and no plants can swim!

What are some ways that plants and animals arrive at islands?
Animals and plants can travel to islands in a variety of ways. They can swim, fly, ride on floating debris, stick to the shoes of travelers, attach to boats and planes and be blown in the wind.

Tips for Engagement

This activity can be done in a classroom or outdoors.

The objects used as "species" can be just about anything that can be tossed a few feet. If outdoors, consider using natural or biodegradable items (acorns, seeds, pinecones, popcorn etc.)

The "islands" can be drawn with chalk or tape, or make cut outs of poster board or fabric.

For an added art project, have students decorate their islands or draw an island habitat, thinking about elements of the habitat (e.g. food, water, shelter) that would encourage a diversity of species.

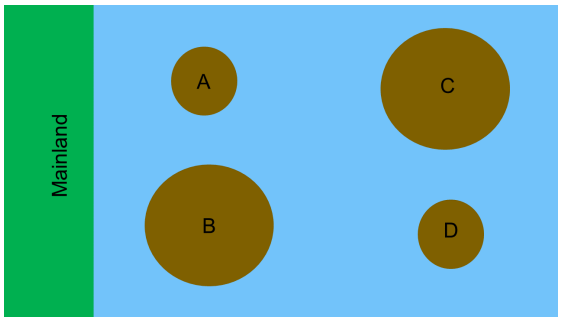
Life Skill(s)

Head, Thinking:
Learn to form ideas, make decisions, and think critically.

Hands, Working:
Use skill, effort, or ability to accomplish a goal.

Experience

1. **Set up in advance:** Using sidewalk chalk or masking tape, draw a line for the mainland, and four islands similar to the pictures below. Two of the islands should be large (approximately 20-24" diameter), the other two small (10-12" diameter). The two near islands should be about 3-4 feet away from the mainland, the two far about 5-6 feet away. Put all the "species" objects into a bag.



2. Make a prediction: How does size and distance influence the number of species living on an island? Which islands do you expect to have the most individuals and most species types? [Optional: Give each student the "Island Biogeography" worksheet to record predictions and data.]
    a. We would expect bigger islands to have more species because there is more room for them to live, more resources, a larger area to land on, it's easier to see, etc.
    b. We would expect closer islands to have more species because they are easier to get to (less of a barrier to dispersal).
3. Test your prediction: Island biogeography activity.
    a. Start with one island and have students take turns selecting a species out of the bag and throwing at the island. Continue until all individuals have been thrown at one island.
    b. Record the number of species and the number of individuals that land on each island. (One person may record this for the class, or have students use the optional worksheet.)
    c. Pick up the "species" and repeat the activity for each of the remaining 3 islands, throwing all items at one island and recording the number of each species and number of individuals.

Share

Did the species numbers for each island match your predictions?
Have students think about why this may or may not be the case. If their data fits their predictions, it confirms that both distance and island size determine how many species can get there, and that explains why we see the most numbers of species on the larger, closer islands. (This happens in real life!) If their data doesn't follow the model, discuss possible reasons why not. (This could be random chance or throwing the species could be impacted by a particularly windy day.)

Process

What types of boundaries do animals and plants overcome to live in different types of islands? Think not just about islands in the ocean, but also the other types of islands: ponds, mountain tops or fragmented habitats.

What traits in animals and plants might make it easier or harder for them to get to islands? Think about how plants and animals move themselves or their offspring around. Some have active locomotion, while others rely on passive transport and catch a ride via wind, water or even other species!

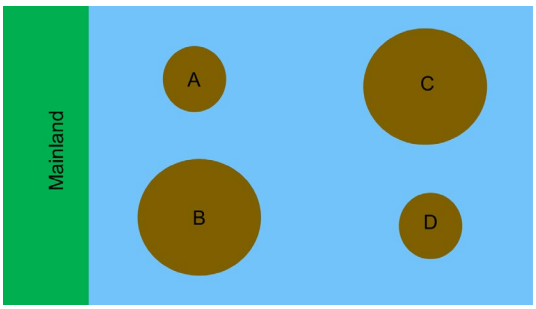
Generalize

There are islands all around us. What kinds of islands do you see on a daily basis? At home, school, camp? What types of plants and animals would you expect in these islands?

Apply

How does human activity create "islands?" Discuss ways we change the landscape that can result in habitat fragmentation, and how this can make it harder for animals to find and move between habitats.

Island Biogeography – Student Worksheet

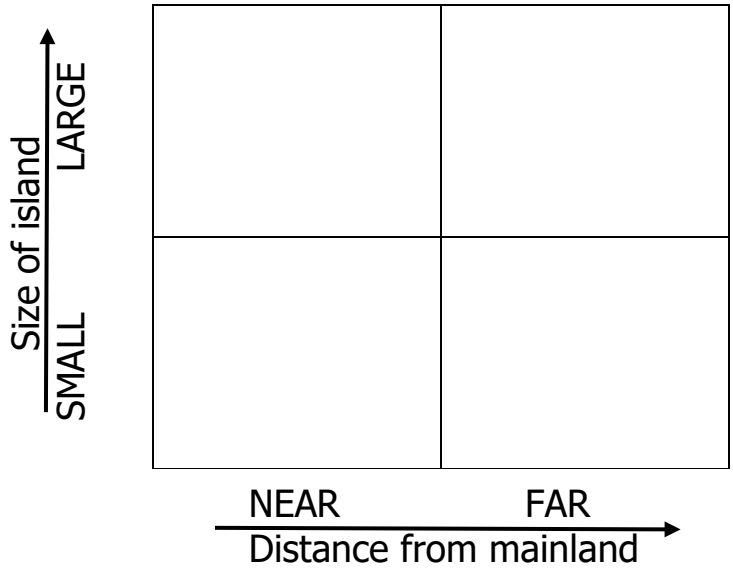


1. Look at the image of four islands. Would you expect bigger (B, C) or smaller (A, D) islands to have more species? _____

2. Would you expect closer (A, B) or farther (C, D) islands to have more species? _____

3. Based on your answers to question 1 and 2, which of the four islands (A, B, C, or D) would you expect to have the most number of species; i.e. be the most biodiverse? _____

Island Biogeography Game Observations



In the above chart, each square represents one island. Fill in each square with the number of individuals and total number of different species that land on each island during the game.

Did the species numbers for each island match your predictions? _____

Supplemental Information
Educational Standards Met

MS-LS2-2.

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

LS2.C: Ecosystem Dynamics, Functioning, and Resilience.

Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5)