TEACHER NOTES: Island Biogeography Quick Demo Setup (for teachers)

Four pieces of poster board—two full sized and two half sized. (Buy three total) I suppose you could decorate them like islands, but mine are just poster board with “Island” written on it.

Tape a shore onto the floor. I did this in the hallway and used blue painter’s tape. The kids can’t cross the line when they are dispersing their “species”. I put the “near islands” about two feet from the shore. The “far islands” were two or three feet from those.

Bag of the following for each kid: 5 cotton balls, 5 dried beans, 5 large safety pins, 5 medium-ish screws.

Have the kids stand on the shore and throw their “species onto the island (do one island at a time—ie. Everyone aims at the large island close to shore). I have about 20 kids so I did it in two shifts

After everyone has thrown, have one kid assigned to each “species” count how many landed on the island. Have everyone record the data. Have everyone clean up.

Repeat the same process with the other three islands.

Complete the worksheet. – Calculate diversity on each island. Simpson’s or S-W?

Day before homework: read about Island Biodiversity in book, read this article below and answer some questions. Also make them interpret the data.

http://news.sciencemag.org/environment/2013/09/biodiversity-forest-fragments-proves-precarious

Name

**Exploring Island Biogeography and Biodiversity**

Intro & Questions adapted from Carolina Exploring Biodiversity Lab; Idea borrowed from ?; compiled by Amy Slack

Island biogeography is the study of community diversity on islands. One of the variables studied is the rate of colonization by additional species – called recruitment. The farther an island is from the mainland (or the source of colonists), the less frequently new colonists will arrive and become established. Also, the larger an island, the more likely it is more colonists to “find” that space and establish themselves on the island.

Another variable is the carrying capacity of the island. Small islands contain fewer resources and support populations of fewer individuals. Small populations are more susceptible to local extinction; so small islands have fewer species than equivalent large islands. Small islands also have a higher ratio of perimeter to area than larger islands. This is important because at the borders of habitats, the physical conditions are often a combination of the conditions of either habitat. An example on oceanic islands is the perimeter of the forest, which will be buffeted by salt spray, while the forest’s center will not be. This creates an “edge effect.”

The principles from island biogeography can easily be applied to terrestrial situations. For example, alpine habitats are usually separated by lowland habitats, and lake habitats are separated by terrestrial and stream habitats. Fragmented habitats, such as rainforest parcels separated by farmlands, can be considered “islands.” Many wildlife managers have taken the effects of “island” size into account and have begun to link smaller fragments of habitat together using small corridors to effectively increase the island size. (Costa Rica is an example.) There has also been increasing concern that if a catastrophe damages a nature preserve that is essentially an island, the preserve may not recover quickly unless there is a source of colonists (equivalent to the mainland) fairly close by.

**Part I: Procedure**

Materials per student: 3 clothes pins, 3 screws, 3 plastic beads, 3 cotton balls, 3 paper clips

1. You are standing on the mainland and located around you are four islands. There are two large islands and two small islands located at varying distances from the mainland. You cannot leave the mainland for this activity.
2. Each of your species is going to be “migrating” to a new island. One island at a time, throw some of your species onto the target island. Remember, organisms will be aiming for land – they don’t want to end up in the ocean.
3. 4 students will go to each island and count the species that have managed to colonize the island.
4. The remaining students will go rescue the species that are drowning in the ocean (that means clean-up everything that missed an island).

**Part II: Class Data**

Once everyone has counted the number of species on each island, we will share with the class.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Island Size | Location from mainland | # of plastic beads | # of screws | # of paper clips | # of clothes pins | # of cotton balls |
| Island 1 |  |  |  |  |  |  |  |
| Island 2 |  |  |  |  |  |  |  |
| Island 3 |  |  |  |  |  |  |  |
| Island 4 |  |  |  |  |  |  |  |

**Part III: Data Analysis**

Calculate the relative biodiversity on each island using the Shannon-Weiner index. Note, I didn’t give you the set-up so refer to your library lab for a reminder of how to calculate this using a table.

H = - Pi(lnPi)

where Pi is the proportion of each species in the sample.

Island 1: H =

Show your calculations here:

Island 2: H =

Show your calculations here:

Island 3: H =

Show your calculations here:

Island 4: H =

Show your calculations here:

**Conclusion Questions**

1. Which island had the highest diversity according to your calculations? Explain why this might be.
2. Would fragmentation of the mainland habitat affect the diversity of the species found on the islands? Explain.
3. If you were designing a biological reserve on the basis of your data, what size island would be ideal? Why? What would be your goal?
4. The biodiversity of each island tends to be dictated by the rates of immigration and extinction. Species can be saved from extinction by a phenomenon called the “rescue effect.” Which islands do you think would be most influenced by “rescue effects” and why?