

Phenomenal Image: Beavers as Ecosystem Engineers

The photos on the right are taken from a research article titled “Using ecosystem engineers as tools in habitat restoration and rewilding: beaver and wetlands” in the journal *Science of the Total Environment*. The photos show the same landscape 1 year (top) and 12 years (bottom) after beavers were re-introduced into the environment.

What do you notice? What do you wonder?

Show the images to students without providing them with any context.

Ask students to:

1. Jot down what you see in these two photos, at least 3 things for each photos.
2. Think about what you’ve observed and write some questions that could help explain what you’ve observed. Questions can focus on why, how, or what-if?

Compare and Contrast

3. Focus on comparing and contrasting what you see in the two photos. List and explain at least 2 similarities and 2 differences between the two landscapes?

Hypothesizing about Biodiversity

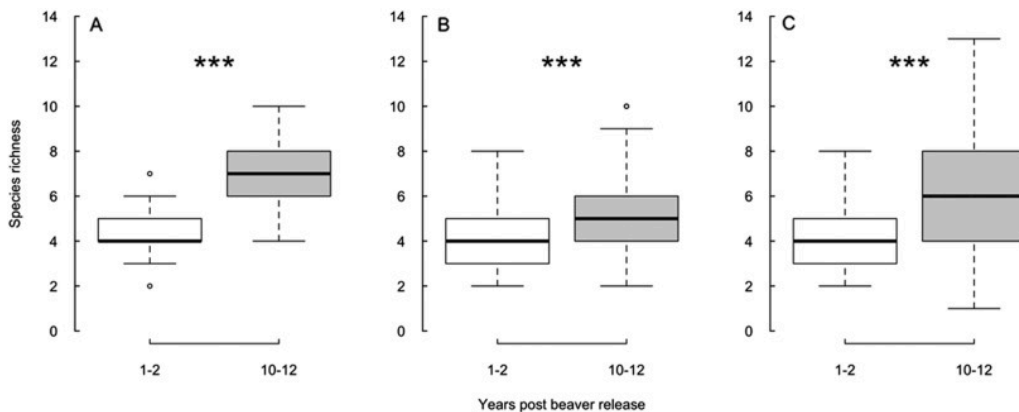
Now provide students with additional information and focus questions for thought and discussion:

1. Would you say that these photos look like two different habitats? Which do you think contains more living things? Why? (abundance)
2. Which habitat do you think supports more different kinds of species? Why? (species richness)
3. The two photos are of the same place but taken 11 years apart. The top photo was taken just 1 year after beavers were released into the area. The bottom photo was taken 12 years after the presence of beavers. What do you think accounts for the differences between the two images over time? Try to explain your reasoning in terms of proximal and ultimate causes.
4. What additional information do you want to better understand the changes that have occurred in this place over time?



Data Play: What Impact do Beavers Have on Biodiversity?

The box-and-whisker plots below are from the article “Using ecosystem engineers as tools in habitat restoration and rewilding: beaver and wetlands” in the journal *Science of the Total Environment*. For each of the three plots, the white boxes represent species richness (total number of species) for the places 1-2 years after the beavers were released and the gray boxes represent species richness for the same places 10-12 years after beaver release. Plots A, B, and C represent different initial conditions: A) permanently ungrazed by beavers by means of enclosure; B) initially ungrazed and then beaver grazing allowed; and C) grazed by beavers for the duration of the experiment.



Initial Data Analysis:

Have students employ the [I2 strategy](#) for analyzing data from BSCS to both figures.

- **Identify:** What do you see? Note what you see in the figure. Mark and describe at least three observations.
- **Interpret:** What might the data mean? Note any trends you see in the data, identify and explain similarities and differences.
- **Caption:** Using your observations and comparisons, write your own caption for the figure.

Biodiversity Analysis

Now consider the following questions for discussion or to answer on your own.

1. Compare the species richness over the 12 years of experimentation. What trends do you notice?
2. Do beavers have a positive or negative effect on species richness? How do you know? How does this data relate to your observation and predictions of the phenomenal images?
3. What is a possible explanation for the similarities among figure A and C even though the places in figure A were blocked off to beavers?
4. Why do you think beavers have the effect that they do on biodiversity (species richness)?