



Exercise 1: Comparing Ecosystems

Panel 1: Predicted Differences Between Locations

Note to instructors: Students will select two differing locations to observe and count plants and animals. Predictions will differ based on locations, but students should have sound reasoning behind predictions. For example, a student should predict that a wetland site would have water dependent plants and animals compared to an exposed hillside location, or that forested locations would result in plants consisting of tall trees and ground plants adapted to low light along with squirrels and birds of the canopy; compared to a meadow that would be occupied by grasses, flowers, butterflies, and ground dwelling animals.

Panel 2: Area 1 Location and Description

Students' responses will vary based on the study area selected but should contain the name, county, and state of the location along with a brief description, such as natural meadow or dense forest.

Photo 1: Study Area 1 Entire Site

Note to instructors: The response should consist of a photograph of the study location described in Panel 2.

Photo 2: Quadrat 1

Note to instructors: Student responses should include a photo of their 1.0 m² quadrat from study area 1 showing the plant species it contains.

Table 1: Characteristics of Study Areas

Parameter	Study Area 1	Study Area 2
Date and Time	Study answers will vary.	Study answers will vary.
Temperature (°C)	Study answers will vary.	Study answers will vary.
Number of Trees within 20 m	Study answers will vary.	Study answers will vary.
Number of Bushy and Shrub-Like Plants within 20 m	Study answers will vary.	Study answers will vary.
Percent Sun Exposure	Study answers will vary.	Study answers will vary.

Parameter	Study Area 1	Study Area 2
Soil pH	Study answers will vary.	Study answers will vary.

Data Table 2: Animals and Plants Observed

Students should report the living organisms (plants and animals) observed at this study area. The approximate number of individuals should be recorded when possible. Students should record observations for a total of 20 minutes. Student answers will vary based on the sampling site. Example provided below.

Study Area 1 Organism (Name/Type)	# of Individuals Counted	Study Area 2 Organism (Name/Type)	# of Individuals Counted
Ex. Squirrel	3	Ex. Dandelions	75

Panel 3: Area 2 Location and Description

Students' responses will vary based on the study area selected but should contain the name, county, and state of the location along with a brief description, such as natural meadow or dense forest.

Photo 3: Study Area 1 Entire Site

Note to instructors: The response should consist of a photograph of the study location described in Panel 3.

Photo 4: Quadrat 2

Note to instructors: Student responses should include a photo of their 1.0 m² quadrat from study area 2 showing the plant species it contains.

Question 1

Would you consider the two environments you investigated to be different ecosystems? Explain your answer by referencing the definition of an ecosystem and your results in Data Tables 1 and 2.

Students were required to identify two distinctly different environments and use as study areas, so they should conclude that the areas were different ecosystems as evidenced by the different

physical characteristics recorded in Data Table 1 and different arrays of species recorded in Data Table 3. Students should also provide a definition for ecosystem: a defined area including the interactions between all biotic and abiotic components.

Question 2

Which abiotic factors differed between study areas? Reference your data and photos in your answer.

Students' answers will vary based on study areas but should only include abiotic factors such as temperature, soil pH, sun exposure, topography, and weather differences. Students should support their answers by referencing the data tables and photo panels.

Question 3

Which biome was represented in your study areas? Reference the location of your areas recorded in Panels 2 and 3 and the interactive biome map from the Exploration section in your answer.

Student answers will vary based on the locations recorded in Panels 2 and 3 but should match the biomes illustrated on the interactive map presented at the beginning of the Exploration section of this lesson.

Question 4

Describe the habitat and niche for one organism from each study area. Include the definitions of habitat and niche in your answer.

Student answers will vary based on the two organisms selected but should match the study areas and organisms recorded in the data tables. Students should describe the habitat by the resources present in the study area that each organism requires. Students should describe the niches of each organism by including all the interactions the organism has with the biotic and abiotic components of its habitat.

Question 5

Was your prediction recorded in Panel 1 supported by your observations recorded in the data tables? Why might there have been more or fewer differences between study areas than predicted?

Student answers will vary but should match the predictions from Panel 1 and data from Data Tables 1 and 2. Students may conclude that there were fewer differences between the study areas because they occurred within the same biome. Conversely, students who did not predict the magnitude of differences between study areas may conclude that organisms have specific habitat requirements and occupy unique niches that are not easily replicated at other locations.

Extension Question

Anthropogenic biomes and ecosystems result from human settlements, agriculture, and animal husbandry practices. One example is cropland ecosystems consisting of hundreds of acres of a single plant species. Apply your knowledge of natural biomes and ecosystem sampling to predict how habitat diversity and biotic interactions in a cropland ecosystem would compare to a natural ecosystem in a nearby area.

The cropland ecosystem should have lower habitat diversity than a natural ecosystem since all the plants are the same species. This would result in the same food and shelter resources being available to all organisms in the ecosystem. Because the resources are identical within the ecosystem, the numbers of biotic interactions in the area would also be reduced. The entire system would become a uniform habitat compared to natural ecosystems that consist of many habitats and biotic interactions between species.