

SI Environmental Science - Full Discipline Demo

Biomes, Ecosystems, and Habitats

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Environmental Science - Full Discipline Demo
Course	SI Environmental Science - Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

Match each term with the best description.

Terms to match:

- Biome
- Abiotic component
- Biotic component
- Habitat
- Niche

Descriptions to match:

- Description of an organism's ecological role within an ecosystem
- Non-living physical element of the environment
- Living organism within an ecosystem
- Physical area where an individual organism or group of similar organisms resides
- A geographic region defined by climate

Numbered boxes for answers:

-
-
-
-
-

Correct answers:

- 1 Niche 2 Abiotic component 3 Biotic component 4 Habitat
- 5 Biome

Identify a defining characteristic of each biome.

⚡ Includes tropical savannahs and chaparral

⚡ Covers over 30 percent of Earth's surface with trees as the dominant vegetation

⚡ Coldest biome with permanently frozen soil

⚡ Receives less than 50 cm rainfall per year

⚡ Biome containing the greatest diversity of life on Earth

Aquatic	Desert	Forest	Grassland	Tundra
1	2	3	4	5

Correct answers:

- 1 Biome containing the greatest diversity of life on Earth

- 2 Receives less than 50 cm rainfall per year

- 3 Covers over 30 percent of Earth's surface with trees as the dominant vegetation

- 4 Includes tropical savannahs and chaparral

- 5 Coldest biome with permanently frozen soil

Exploration

The ____ biome includes rivers, estuaries, and coral reefs.

☐ aquatic
☐ desert
☐ tundra
☐ forest

✓

Biotic components of an ecosystem include ____.

- ☐ temperature
- ☒ plants
- ☐ soil chemistry
- ☐ sunlight

✓

Two species may share the same niche within an ecosystem.

- ☐ True
- ☒ False

✓

Exercise 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.

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.

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.

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.

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.

Panel 1: Predicted Differences Between Locations
(SAMPLE ANSWER BELOW)

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

(SAMPLE ANSWER BELOW)

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

(SAMPLE ANSWER BELOW)

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

Photo 2: Quadrat 1
(SAMPLE ANSWER BELOW)

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.

Data Table 1: Characteristics of Study Areas
(SAMPLE ANSWER BELOW)

Parameter	Study Area 1	Study Area 2
Date and Time	Student answers will vary based on site selection	
Temperature (°C)		
Number of Trees within 20 m		
Number of Bush and Shrub-like Plants within 20 m		
Percent Sun Exposure		
Soil pH		

Data Table 2: Animals and Plants Observed
(SAMPLE ANSWER BELOW)

Study Area 1 Organism Name/Type	Number of Individuals Counted	Study Area 2 Organism Name/Type	Number of Individuals Counted
Ex: Squirrel	3	Ex: Dandelions	75
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.	No sample answer	No sample answer	No sample answer
No sample answer	No sample answer	No sample answer	No sample answer
No sample answer	No sample answer	No sample answer	No sample answer
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No sample answer	No sample answer	No sample answer	No sample answer
No sample answer	No sample answer	No sample answer	No sample answer

Panel 3: Area 2 Location and Description
(SAMPLE ANSWER BELOW)

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 2 Entire Site
(SAMPLE ANSWER BELOW)

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

Photo 4: Quadrat 2
(SAMPLE ANSWER BELOW)

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.

Competency Review

_____ are geographic regions defined by climate.

- ☒ Biomes
- ☐ Ecosystems
- ☐ Habitats
- ☐ Niches



The eastern third of the United States is composed of the ____ biome.

- ☐ chaparral
- ☐ temperate grassland
- ☒ temperate broadleaf forest
- ☐ northern coniferous forest

A(n) ____ includes all the biotic and abiotic components of a defined area and their interactions.

- ☐ biome
- ☒ ecosystem
- ☐ habitat
- ☐ niche

A habitat includes all required resources for an organism.

- ☒ True
- ☐ False

Abiotic components determine which organisms live in an ecosystem.

- ☒ True
- ☐ False

____ should be recorded for a 1 m² quadrat when comparing ecosystems.

- ☐ Plant numbers
- ☐ Soil pH
- ☐ Sun exposure
- ☒ All of the above

Two observation areas with differing abiotic components provide similar habitats for organisms.

☐ True

☒ False



A field study site with acidic soil, cool summer temperatures, and a predominance of needle-leafed trees would be representative of the ____ biome.

☐ tropical forest

☐ desert

☐ tundra

☒ northern coniferous forest



Extension Questions

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. (SAMPLE ANSWER BELOW)

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 resource 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.