Biome and Arthropod Species
Ecoplexity Data Explorations
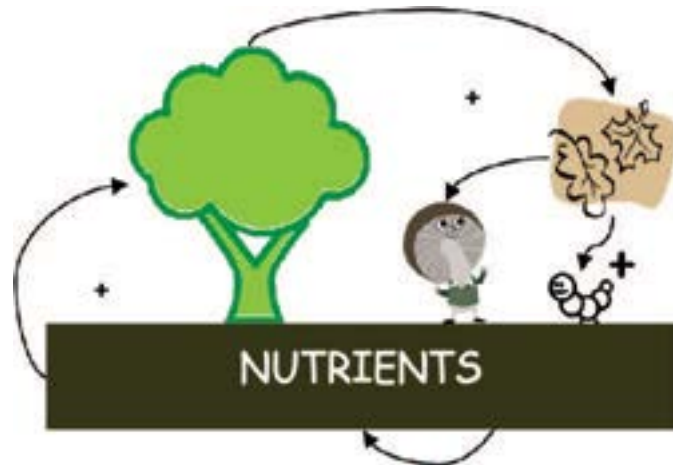
Objective(s):

- Students will analyze patterns in arthropod distribution for each biome.

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Time: 30-45 minutes

Grade Level: 9-12

Background:

Biomes are comprised of ecosystems with particular biotic and abiotic components and their own unique ecological interactions. In comparing two distinct biomes, such as a desert and a temperate forest, we might predict to find different numbers and types of organisms. For example, a greater organic layer in the soil could lead to increased complexity of the detritivore community feeding on the organic matter. In turn, this could lead to increased nutrient availability to both plant and soil community members leading to increased plant productivity and resources to herbivores and omnivores.

Functional groups are ubiquitous components of all habitat types, at all scales and useful categorical tools. They are often employed to help develop hypotheses about complex ecological phenomena such as nutrient/mineral movement between the abiotic and biotic community. This lesson uses arthropod functional groups to explore and brainstorm potential causes leading to different functional group bundances (numbers) in different biomes.

Advanced Preparation:

Students should have been introduced to basic information about population and community ecology.

Materials:

Student Worksheets

Pictures of urban desert and temperate forests would help students unfamiliar with these biomes.

Graph 1. Arthropod

Evaluation:

1. Observation during the activity and participation in discussion.

2. Student responses to reflection questions.

Extensions:

Have students view models of ecosystems and design experiments based on protocols at http://ecoplexity.org/home

Abundance
Total number of arthropods caught in pitfall traps in an Urban Desert and a Temperate Forest.

total arthropods/day/trap

Urban Desert (PHX)

Temperate Forest (Oregon)
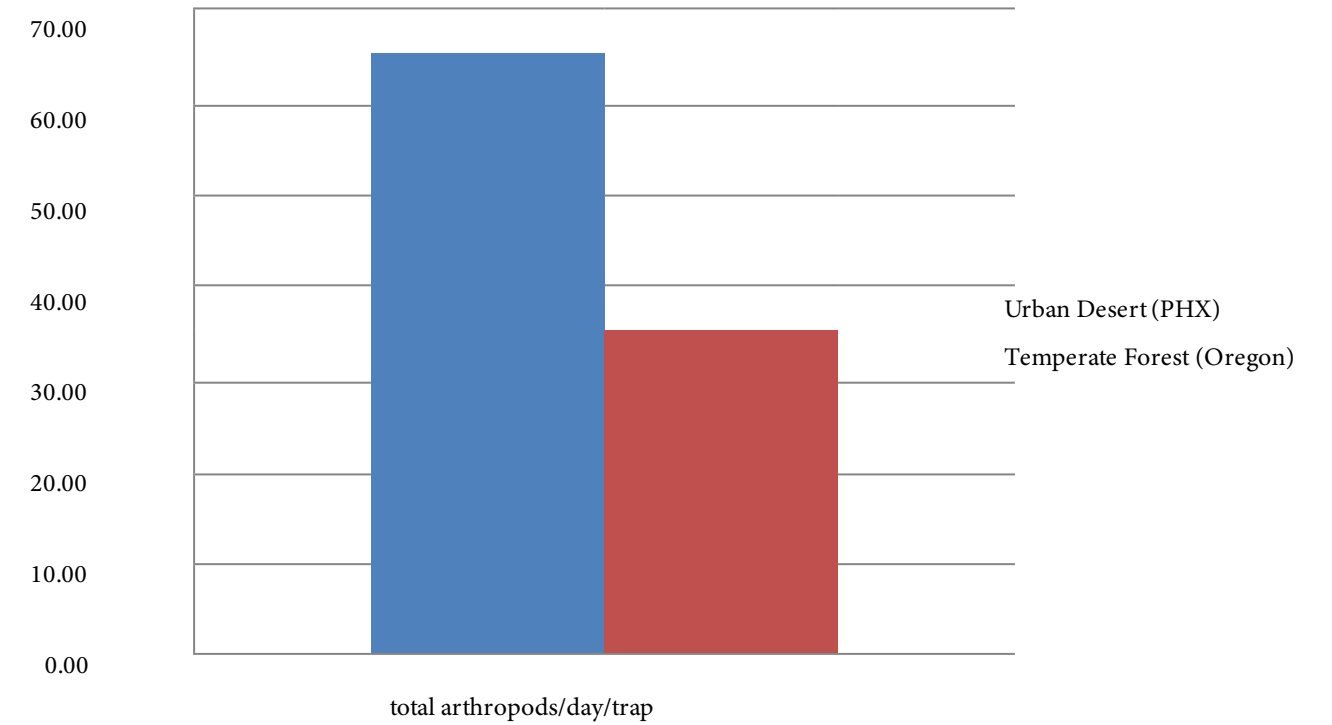
Functional groups:
Arthropod functional groups are based primarily on feeding habits. The groups used here are:

1. Carnivore: feed on other arthropods or animals

2. Detritivores: feed on detritus or decaying/dead matter such as dead leaves and insects

3. Herbivores: feed on plants (herbs)

4. Omnivores: feed on both plant and animals

5. Parasites: feed on a host species

6. Fungivores: feed on fungus

Make some predictions:

1. Which functional group do you think is most abundant in an Urban Desert? Why?

2. Which functional group do you think is most abundant in Temperate Forest? Why?

Analyze data:
Use the data table below to make a bar graph comparing the relative abundance of each arthro- pod functional group for both biomes.

Func- tional Group	Mean Number/Trap	
	Urban Desert (PHX)	Temperate Forest (Oregon)
Carnivore	2.13	2.67
Detritivore	5.17	7.54
Herbivore	3.20	0.41
Omnivores	16.86	4.23
Parasite	3.00	0.27
Fungivore		0.61

1. First, look at Graph 1: which biome has the greatest number of arthropods?_____
_____
_____
_____
_____
_____
_____
_____
_____

2. Then look at the graph you made: which biome has more functional groups? _____
_____
_____
_____
_____
_____
_____
_____
_____
_____

3. How does the number of functional groups (in your graph) compare with the number of arthropods (Graph 1) in each of the two biomes?_____
_____
_____
_____
_____
_____
_____
_____
_____

4. List three characteristics of a Desert compared to a Temperate Forest that might explain the pattern you found in question 3._____
_____
_____
_____
_____
_____
_____
_____
_____

Example graph for functional group data:

Mean number of arthropods/trap for each biome