

Name: _____ Date: _____ Period: _____

Name of Partner: _____

Ecology Project – Earth’s Biomes

Biomes

1. Savanna
2. Temperate Grasslands
3. Desert
4. Tropical Rain Forest
5. Taiga /Boreal Forest
6. Tundra
7. Temperate Forest
8. Temperate
Shrubland/Scrublands
9. Northwestern
Coniferous Forest

Background: A *biome* is defined as a group of ecosystems that share similar climates and ecosystems. They are described in terms of abiotic factors like climate and soil type, and biotic factors like plant and animal types. It is the fifth level of ecological organization, comprised of species, populations, communities, and ecosystems. Earth is made up of many types of biomes, of which descriptions can be found on pages 112-115 in the textbook, as well as in the supplemental packets provided in class, and from your computer research.

Purpose: In this project you will be working with a partner over the course of several days to research and understand one of Earth’s major biomes. Each group will be assigned a different biome to research and will be responsible for teaching the rest of the class about their biome. The purpose of this project is to explore and understand interactions among organisms and their environment with focus on how nutrients and energy are cycled.

Type of Biome: _____

A – Biotic and Abiotic Factors

Part I: With your partner brainstorm the different types of organisms that live in your biome. These are your *biotic factors*. Don’t forget to think about plants, insects, fungi, and bacteria as well. List **at least** ten different organisms.

Part II: What types of *abiotic factors* are in your environment? Think about light availability, weather, climate, rocks, water, and soil types.

When you have finished your brainstorms check in with the teacher. If these are determined to be sufficient, you will be allowed to go onto the Internet to complete research about your biome.

Teacher Initials



Part III: With your partner research your biome and answer the questions below. As you complete your research, continue to add to your list of biotic and abiotic factors on the previous page. For this part, one person will be the **Researcher** and will be in charge of Internet searches. The other partner will be the **Recorder** and will take notes and add to the lists. Remember, *this is a partner task*, no one person should be doing all the work by themselves and all questions should be discussed prior to writing down an answer.

1. What are the main forms of vegetation in this biome? Why might this be?
2. What is the soil composition in this biome? What types of vegetation can this support?
3. How would you characterize the climate of this biome? Describe the weather during each season.
4. How much rainfall does your biome receive annually? Write your answer in centimeters.
5. Where is the majority of water stored in this biome? Is it in lakes, rivers, plants, ice, et cetera?
6. Where in the world does this biome exist? Define in terms of latitude, countries or regions.
7. Draw a climatograph for your biome.
8. What kinds of adaptations do the plants and animals in this biome exhibit?
9. Are there any human or climate threats to this biome? What might be the impact of these threats be?

Teacher Initials

Part IV: Draw your biome in color on a piece of poster board (provided), include as many biotic and abiotic factors as you can reasonably fit into your drawing. This is essentially a landscape drawing of your biome. You will have opportunities to add to your poster as we work on new material. (See examples provided)



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B – Energy Flow

Background: Energy moves through ecosystems from primary producers to consumers. These are linked through feeding relationships, depending on who eats whom. All biotic factors can be thought of food. Although there are many types of feeding relationships, energy always moves in one direction, from producers to consumers.

Purpose: For this section you will be organizing the biotic factors in your biome into trophic levels. Once all factors have been organized you will begin to create food chains and a food web to represent feeding relationship and show how energy moves from organism to organism within this biome.

Part I: Define the terms and answer the following questions. Information for this section can be found in your notes and in Chapter 3 in the textbook.

Define the following terms:

- Trophic Level: _____
- Primary Producer: _____
- Consumer: _____
- Carnivore: _____
- Omnivore: _____
- Herbivore: _____
- Scavenger: _____
- Decomposer: _____
- Detritivore: _____
- Autotroph: _____
- Heterotroph: _____

1. Contrast the way that autotrophs and heterotrophs obtain energy.

2. How much energy is available to third level consumers from secondary consumers?

3. Explain the 10% rule in your own words.

4. What happens to the energy that is not passed between trophic levels? Where does it go?

5. What is the role of decomposers and detritivores in the energy cycle? Where in the cycle are they located?



Part II: Using your brainstorm from yesterday, classify each of the biotic factors in this biome as either autotrophs or heterotrophs. Then organize the organisms into their trophic level. If at any point you think of more organisms that live in this biome be sure to include them.

Autotroph:

Heterotroph:

Trophic Level	
<u>Primary Producer</u>	<u>First-Level Consumer</u>
<u>Second-Level Consumer</u>	<u>Third-Level Consumer</u>

Teacher Initials

Part III: When you have finished categorizing all organisms check with the teacher. If it is both complete and correct you will get your biome poster and add these new factors to your poster.

CLEAR OVERLAY – Get a sheet of clear acetate paper. Lay the paper over your biome drawing. On the paper start to sketch the food web for this biome, making sure that each organism is placed within its correct level with all energy connections labeled. Use Figure 3-9 as an example.



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C – Cycles of Matter

Background: There are four major cycles of matter – water, carbon, nitrogen, and phosphorous. Each of these cycles is important to move and recycle matter through the biosphere, sustaining all life on Earth. Unlike energy flow, which moves in only one direction, matter is cycled and recycled within and between ecosystems. Remember – matter is never created or destroyed; it is only changed.

Purpose: For this section you will be investigating how water, carbon, nitrogen, and phosphorous cycle through your biome. You will be adding these cycles onto the food webs you made during the previous class. If you do not have enough room on the web, you can diagram the cycles on the other side.

Part I:

Define the following terms:

- Biogeochemical Cycles: _____
- Biological Processes: _____
- Geological Processes: _____
- Chemical & Physical Processes: _____
- Human Activity: _____

For each of the cycles below, describe the process of the cycle, the sources of the water/nutrients, and the significance of this cycle to preserving life on Earth.

Cycle	Process	Sources	Significance
Water			
Carbon			
Nitrogen			
Phosphorous			



Part II: Using the material from the lecture and section 3.4 in the text, respond to the following prompts.

1. Describe each of the four processes involved in biogeochemical cycling. Provide examples for your biome that represent each process.
2. What would happen if matter could not be recycled into a system, instead moving in only one direction?
3. Describe nutrient limitation. What effect can this have on the plants and animals in your biome?
4. How is oxygen cycled through the biosphere? What compounds contain oxygen?
5. What environmental impacts are there to your biome? Describe how each of these impacts one or more of the cycles of matter.

Part III: Brainstorm the sources of water and each of the nutrients within your biome. Think of how each are cycled and what organisms (if any) play a role in this.

Water:

Nitrogen:

Carbon:

Phosphorous:

When your brainstorm is complete, add the cycles to your food web. You may have to draw a more detailed picture to be able to do this.

Teacher Initials

CLEAR OVERLAY – Get a new sheet of clear acetate paper. Lay the paper over your biome drawing. On the paper start to sketch the cycles for this biome, making sure that each cycle is represented across your biome.. Use Figure 3-17, 18, and 19 as examples.



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D – Presentation Preparation

Purpose: For this section you will be finishing your biome posters and preparing for your presentation next week. All diagrams need to be detailed and contain energy flow and the four cycles. Each partner will need to feel confident sharing material and interpreting their diagram for other groups and the class as a whole. Each presentation will need to cover a specific set of material, outlined below. Additionally, the rubric that will be used to assess your project is also included.

Presentation Topics:

1. Describe your biome. Where in the world is this biome found?

2. What type of vegetation is the primary producer in your biome?

3. Using your food web, explain **one** food chain that includes a primary producer, first-level consumer, second-level consumer, third-level consumer, and a decomposer.

4. Explain the major source(s) of water in your biome. Be sure to indicate where it is stored and how it cycles through your biome.

5. Explain how carbon, nitrogen, and phosphorous are cycled through your biome.

6. Pick one human or natural threat to your biome. Explain the threat and detail how it has an effect on the organisms, energy flow, water cycle, and nutrient cycles within your biome.

Rubric:

	Does Not Meet	Meets	Exceeds
Diagram	Diagram is missing major elements. Does not include all five cycles or cycles are incomplete. Points _____	Diagram includes all major elements. All cycles are included. Not all connections are clear to the reader. Points _____	Diagram includes all major elements. All cycles are included and detailed. Connections are clear to the reader. Points _____
Content	Missing content. Not all questions are answered. Points _____	All questions are answered. Basic information with limited detail is provided for each topic. Points _____	All questions are answered. Detailed information is provided for each topic. Points _____
Presentation	Not knowledgeable of material. Is unable to answer questions or interpret diagram. Points _____	Knowledgeable of all material. Is able to answer questions in limited detail and can verbally interpret some of the diagram. Points _____	Very knowledgeable of material. Is able to provide detailed answers, verbally interpret diagram, and answer follow up questions. Points _____
			Total Points:

