

ASSIGNMENT DISCOVERY ONLINE CURRICULUM

Lesson title:

Unique Plants of the Biomes

Grade level:

6-8

Subject area:

Life Science

Duration:

One to two class periods depending on the amount of time you want to devote to research. Ideally, during one class period you would discuss the project and obtain general information on the biome. In the next class you would concentrate on researching a particular plant.

Objectives:

Students will—

1. Understand that Earth's surface is divided into a number of biomes characterized by unique plants and animals and a distinctive climate.
2. Identify adaptations of plants in specific biomes.
3. Explain how certain adaptations help plants survive in the specific biomes.

Materials:

For the class:

- Computers with Internet access (optional but very helpful)
- Reference materials: books, encyclopedias, and periodicals

For each student:

- Pens and paper
- One copy of Classroom Activity Sheet: Plant Data
- One copy of Take-Home Activity Sheet: Plant Profile

This lesson plan can be enhanced by purchasing a copy of the documentary *It's a Jungle Out There* from our School Store. This documentary airs on the Discovery Channel February 23, March 30, May 4, and June 8.

Procedures:

1. Explain to the class that a biome is a large region with distinctive vegetation and climate—such as a desert. Ask students to brainstorm other biomes of the world. Other examples include tropical rain forests, tundra, temperate forests, even the ocean. Each biome is influenced by abiotic factors—or the nonliving parts of an

ecosystem, such as rainfall and temperature. Biotic factors refer to the living parts of an ecosystem, such as the unique species that live there. Ask students to think about how the abiotic factors of a biome influence its biotic factors. Encourage them to give specific examples.

2. Decide how many biomes you would like the class to study, and divide the class into that many groups. Explain that each group will research one biome. (You may want to assign different biomes to make sure no two groups research the same one.) Possible biomes include a desert, a tundra, a coniferous forest, a deciduous forest, a tropical rain forest, a temperate rain forest, an estuary, a marsh, a swamp, a pond, a lake, an ocean, or a grassland.
3. Have each group research its biome. Make sure students include information about abiotic factors—annual rainfall, length of the growing season, average daily or monthly temperature, temperature extremes, and seasonal changes—as well as information about biotic factors—key organisms of the biome. Suggest that students use reference books from the library or the following Web sites:

What's It Like Where You Live?: Biomes of the World

<http://mbgnet.mobot.org/sets/index.htm>

All about Nature: Biomes/Habitats

<http://www.AllAboutNature.com/biomes/>

Tour of Biomes

<http://www.cotf.edu/ete/modules/mse/earthsysflr/biomes.html>

CyberZoo's Key to the Biomes

<http://lsb.syr.edu/projects/cyberzoo/biome.html>

Biology4Kids: Ecology

<http://www.kapili.com/biology4kids/eco/index.html>

Biomes of the World

<http://www.snowcrest.net/geography/slides/biomes/index.html>

4. After learning basic facts about their biome, each group should pick a unique or characteristic plant that grows there. Have the groups research the plant in depth and record their findings on the Classroom Activity Sheet: Plant Data. They will be researching the following questions:
 - Describe the abiotic factors of the biome.
 - Describe a unique characteristic of many of the plants living in the biome.

- Describe the structure of your plant's roots, stems, or leaves. How tall is it? What does it look like?
 - Explain any unique adaptations of the plant you picked. How do these adaptations help it survive in this biome?
 - What abiotic factor of the biome has the greatest effect on this particular plant?
 - Do you think this plant could live in a biome with very different abiotic factors? Why or why not?
 - How does this plant fit into the existing food web of the biome?
5. As a homework assignment, have students complete the Take-Home Activity Sheet: Plant Profile. Students will sketch their plant, identify three adaptations, and color a world map to show the biome they researched and the range of their plant.

Adaptation for younger students:

Introduce biomes to your class, briefly explaining that each biome is unique because of nonliving factors, like rainfall and temperature, and living factors, such as plants and animals that live there. Have students work in groups to research specific biomes and record important facts about nonliving and living factors. Have each group create a diorama of that biome, showing at least two plants, two animals, and one nonliving factor (such as sunshine or snow).

Adaptation for older students:

Have students include in their research biomes in peril. Then have students map the current range of the biome and the area of the biome 100 to 500 years ago. Using clear acetate overlays, students could show on their maps changes that have occurred in their biome over time. Students should also discuss the reasons for the biome's decline and any major species threatened in their biome.

Questions:

1. Compare and contrast the climates of each biome. Which biomes had similar precipitation averages? Which biomes had similar average temperatures?
2. Did students come across any plant or animals common in multiple biomes? Discuss why specific plants or animals can live in more than one biome.
3. Choose an extreme environment of a specific biome and find out what type of plants live there. For example, look at plants that live on a rocky cliff or the frozen tundra. What adaptations help them survive these extreme climates?
4. Consider the biome in which you live. What plants live in this biome? How are they affected by abiotic and biotic factors? What can humans do to protect the plant life in your biome?
5. Compare and contrast the environmental factors that consistently threaten the population size of plants in each biome. Which plants are threatened? Suggest steps

for protection. Is this plant population of concern for the entire world? Support your opinion with scientific information.

6. Choose an area of the world for a road trip and describe the biomes that you would encounter during your trip. For example, you might start a road trip in Washington, D.C., and travel west to California and then up the Pacific coast to Alaska. How could you distinguish one biome from another? What characteristics set each biome apart?

Evaluation:

Use the following three-point rubric to evaluate students' work during this lesson. Students should be able to conduct thorough research, set up an interesting presentation, and have detailed maps and drawings as part of their presentations.

- Three points: students were able to work successfully in their groups to complete the research project; students displayed a thorough understanding of their biome and answered all the questions about their plant; students included complete maps and diagrams in their presentations and were able to convey information clearly to the class
- Two points: students worked somewhat successfully in their groups to complete the research project; students displayed a general understanding of their biome and answered most of the questions about their plant; students included some visual elements in their presentations and were able to convey the information adequately to the class
- One point: students worked in groups to complete the research project; students developed some understanding of their biome and answered half of the questions about their plant; students completed their display and were able to present the information to the class

Extensions:

Mapping Biomes of the World

Use an overhead projector to project a blank map of the world onto a piece of paper hung on a large bulletin board. Have students color-code a key and then shade in biomes on the blank map. Then have students take the information they obtained through their research and design a small poster or card presentation to hang on the bulletin board map in the correct biome.

Biome Food Webs

Have students draw food webs showing the relationships between producers and consumers in their researched biome. Have students present their food webs to the class. You could let them decide how they create their presentation: They could design a poster, a game, or a simulation. For example, by passing a ball of unraveling yarn among students representing different organisms, they can easily illustrate the interactions in a food web.

Climatograms

Have students choose two biomes and conduct research to find the average monthly temperature and rainfall of each one. After collecting the data, have students create a climatogram for the biomes. A climatogram is a graph with a single horizontal axis labeled for each month of the year. There are two vertical axes, one for precipitation, on the left, and one for temperature, on the right. (The numerical values of the two vertical axes do not have to match.) Have students plot both average rainfall as a bar graph and average temperature as a line graph. Using the graphs, students can predict which biomes would have a greater variety of organisms based on these two climatic variables.

Suggested Readings:

Plant Survival: Adapting To a Hostile World

Bruce Capon, Timber Press, 1994.

By finding ingenious ways to provide themselves with nutrients, water, and sunlight, plants have adapted to an amazing variety of harsh environments. This book details how plants survive intense competition and the extremes of harsh winters, bone-dry deserts, and total immersion in water.

Science Fair Success with Plants

Phyllis J. Perry, Enslow, 1999.

You'll find a variety of simple experiments in this book that demonstrate how changes in a plant's environment, such as temperature, amount of light, or soil composition, affect its growth and health. Other experiments show how plants' life processes work, from how water moves within plants to how they reproduce.

Web Links:

Compelling Plant Profiles and Photos

Comprehensive and interesting profiles of numerous plant species; filled with vivid photography and compelling text.

<http://www.ecoworld.com>

Desert Life in the American Southwest - DesertUSA

Many exciting and informative pages about the North American deserts and desert Life in the American Southwest

<http://www.desertusa.com/life.html>

Botanical Society of America

Promoting research and teaching in all fields of plant biology to facilitate cooperation among plant scientists worldwide and to disseminate knowledge of plants, algae, and fungi.

<http://www.botany.org>

Vocabulary:

abiotic

Pronunciation: a bi at ik

Context: The abiotic factors of a biome influence the plants and animals that live there.

Definition: The nonliving parts of an ecosystem, such as rainfall, temperature, hours of sunlight, and the length of the growing season.

adaptation

Pronunciation: ad ap ta shen

Context: Cactus plants do not have leaves, so they perform photosynthesis in fleshy stems. This adaptation helps these plants store water and make their own food in the dry desert habitat.

Definition: A characteristic or behavior of an organism that helps it survive in its given biome.

biome

Pronunciation: bi om

Context: Earth's surface is divided into a number of terrestrial and aquatic biomes, each with a specific climate and distinctive vegetation.

Definition: A continental scale region with distinctive vegetation and climate.

biotic

Pronunciation: bi at ik

Context: The lush vegetation and unique wildlife within the tropical rain forest represent a few of the biotic factors of that biome.

Definition: All the living parts of an ecosystem, such as the plants and animals.

ecotone

Pronunciation: ek o ton

Context: When passing from one biome into the next, you might cross an ecotone region, which has characteristics of both biomes and organisms that tend to compete with one another for food and shelter.

Definition: Transition area between two distinct biomes characterized by organisms common to both biomes and in competition with each other.

food chain

Pronunciation: fud chan

Context: Ecologists use the term food chain to explain the relationships between animals and plants in terms of what eats what.

Definition: An arrangement of the organisms of an ecological community according to the order of predators in which each uses a lower member as a food source.

habitat

Pronunciation: hab e tat

Context: Although both the canopy bird and coral snake are part of the tropical rain forest biome, they live in different habitats.

Definition: The place where an organism lives in an ecosystem.

Academic Standards:

Grade level:

6-8

Subject area:

Life Science

Standard:

Knows about the diversity and unity that characterize life.

Benchmark:

Knows that animals and plants have a great variety of body plans and internal structures that serve specific functions for survival (e.g., digestive structures in vertebrates, invertebrates, unicellular organisms, and plants).

Grade level:

6-8

Subject area:

Life Science

Standard:

Knows about the diversity and unity that characterize life.

Benchmark:

Knows evidence that supports the idea that there is unity among organisms despite the fact that some species look very different (e.g., similarity of internal structures in different organisms, similarity of chemical processes in different organisms, evidence of common ancestry).

Grade level:

6-8

Subject area:

Life Science

Standard:

Understands how species depend on one another and on the environment for survival.

Benchmark:

Knows factors that affect the number and types of organisms an ecosystem can support (e.g., available resources; abiotic factors such as quantity of light and water, range of temperatures, and soil composition; disease; competition from other organisms within the ecosystem; predation).

Credit:

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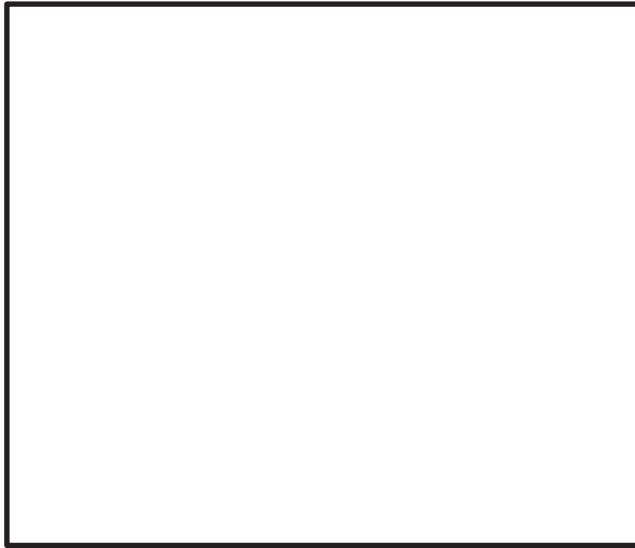
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Plant Profile

First, sketch the plant you selected in the space below, numbering three adaptations that help it survive. Next, shade in the biome you studied on the world map below. Finally, use a pattern (dots or lines) to shade in the range of the plant.

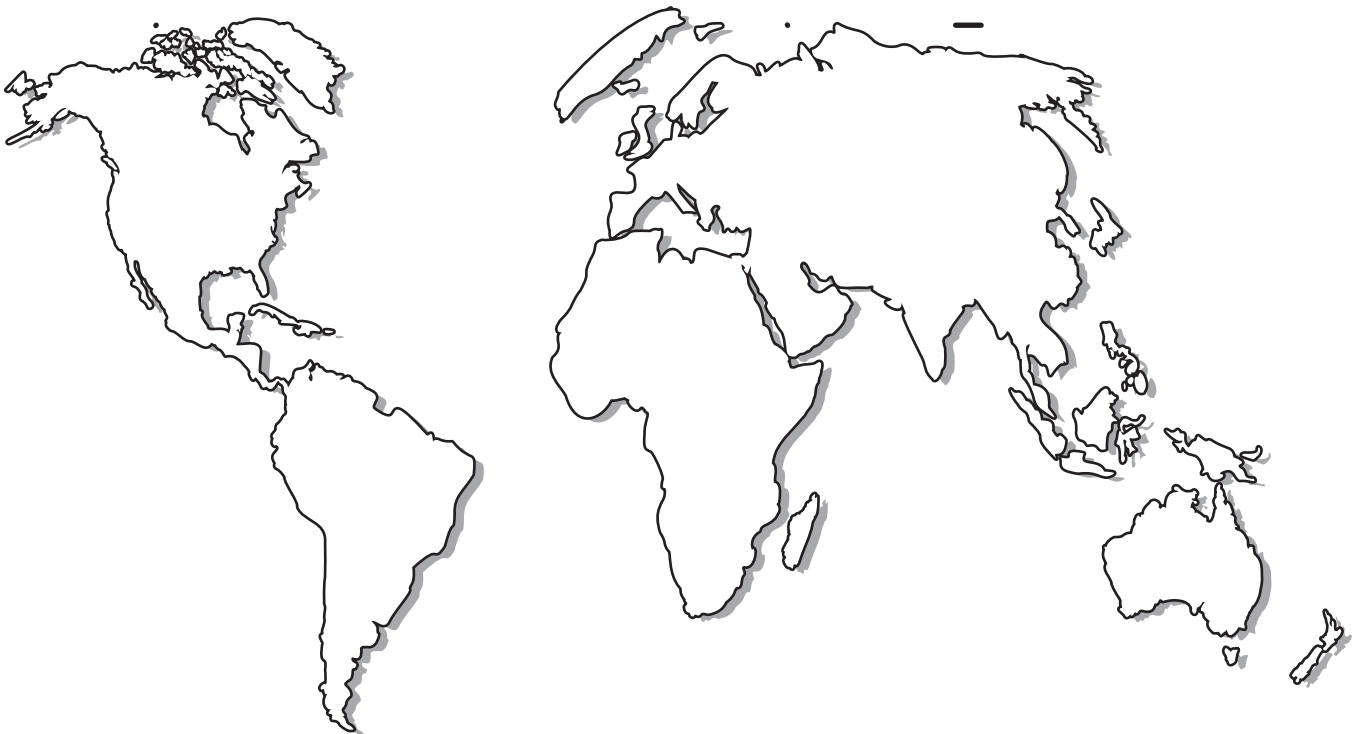


Plant name _____

Adaptations

1. _____
2. _____
3. _____

Biome and Plant Range



Plant Data

Choose one distinctive plant from the biome you researched and complete the following questions. All questions should be answered in complete sentences.

Biome name _____

Plant's common name _____

Plant's scientific name _____

1. Describe the abiotic factors of the biome.
2. Describe a unique characteristic of many of the plants living in the biome.
3. Describe the structure of your plant's roots, stems, or leaves. How tall is it? What does it look like?
4. Explain any unique adaptations of the plant you picked. How do these adaptations help it survive in this biome?
5. What abiotic factor of the biome has the greatest effect on this particular plant?
6. Do you think this plant could live in a biome with very different abiotic factors? Why or why not?

How does this plant fit into the existing food web of the biome?