



What is a Biome and Why Should I Care?

Materials:

Activity One:

Optional

- ☆ textbook or other source having biome maps and descriptions

Activity Two:

- ☆ biomes product list

Optional

- ☆ *Biodiversity* from the National Science Teachers Association's Global Environmental Change Series, 1997 National Science Teachers Association, Special Publications, NSTA, 1840 Wilson Blvd, Arlington VA 22201-3000.

Activity Three:

- ☆ Holdridge System Hand-out
- ☆ regional temperature and precipitation measurements from a local weather station

Rationale

To understand why a diversity of biomes is important, students must first understand what factors make up a biome and what biomes exist.

Objectives

1. Students will use an oral/visual presentation to learn about biomes.
2. Students will go on a scavenger hunt to discover products from different biomes that are used in the United States.
3. Students will plot annual precipitation and annual temperature of various biomes, then use these measurements to compare biological diversity of the regions.

Activity One:

The Visual Biome

PROCEDURE:

1. Divide the class into small groups and assign (or let groups choose) a different biome to study. Tell students they are to describe their biome to the rest of the class in such a way that everyone will become familiar with the biotic and abiotic features of each biome, their diversity, and their importance. Students may use one of the following suggestions or devise their own teaching method. The best presentations are usually a combination of oral and vis-

ual effects.

- **Biome Advertisements:** You work for an advertising agency and you are presenting an advertising format to your prospective client, the biome. Your advertisement may be a television or radio spot, a billboard, a magazine feature or newspaper ad. Make sure your format fits your chosen medium.
- **Traveling The Biomes:** You are a traveling reporter like Chuck Dovich in *Traveling Arkansas* or *On The Road With Charles Kauralt*. You travel around the biome interviewing various inhabitants (plants, animals or people) about the finer points of their ecosystem.
- **Ecotourism Lives:** You are the tour leader for a group of ecotourists paying big money to tour this biome. Make sure they go home knowing more than they ever thought they wanted to know about your area.
- **Travel Agency Wars:** You work for a travel agency specializing in trips to a particular biome. Design travel brochures and trip itineraries that will lure people to your agency.
- **Show Biz:** You are in the entertainment business. Write and perform a stand-up comedy routine, song or rap, poem, etc. that describes your biome.
- **Arkansas As The Biosphere:** Do a comparison of Arkansas' natural divisions to the Earth's biomes. How are they similar, how are they different?



Activity Two: Biome Scavenger Hunt

PROCEDURE:

1. Many times students are not aware of the vast array of products in use in their every day lives that come from biomes other than their own. Use one or a mix of the following to boost student awareness and appreciation. A biome products list appears at the end of this activity section. Use it and add to it as students work through their biome study.

- Grocery Store Scavenger Hunt: Out of the thousands and thousands of edible plants over half the food humans eat comes from three plants, wheat, rice and maize. Today however, more and more unfamiliar fruits and vegetables are appearing in the produce sections (and other sections) of supermarkets. Have students visit grocery stores and list the various food products that come from each biome. Each student might select an unusual food and learn how to prepare it leading to a class tasting session. Students might select a plant species that is not yet available but promises to be a food source in the near future. Examples include amaranth that thrives in hot, dry climates, the winged bean (*Psophocarpus tetragonolobus*) of New Guinea known as the one-species supermarket, the wax gourd (*Benincasa hispida*) of tropical Asia and the Babussa palm (*Orbigyna martiana*) an Amazonian tree known as the

vegetable cow. Create a display with pictures or samples of each plant including information about its cultivation and current or potential uses. Students might even obtain seeds or cuttings and try raising some unusual or antique plants. NOTE: be aware of the hazards of introduced exotics.

- Pharmacy Scavenger Hunt: The plant species of some biomes, especially the tropical forests, hold a vast and largely unknown potential for human pharmacology. Even though only a relatively few plants have been well studied, over 25 % of modern medicines are derived from natural sources, mainly plants. Have students visit the drug store and interview the pharmacist, interview their doctor or a drug company representative to get information. Students may choose a drug and research it for its source, its use and how its medicinal properties were



discovered. Examples include atropine, curare, digitoxin, diosgenin, morphine, quinine, reserpine, vincristine and taxol.

- Home Scavenger Hunt: How many products from other biomes can students discover right in their own homes or in retail stores that sell home products (such as Pier I Imports, furniture stores, hardwares, florists or even variety stores).
- Pet Store Scavenger Hunt: Students may find that the majority of animals in pet stores are from other biomes, especially tropical ones. Have them research importation laws and smuggling of these animals into this country, how many animals survive, and their economic impact. Have a representative from the Game and Fish Commission, the Arkansas Wildlife Federation, or the Arkansas Audubon Society talk about regulations protecting nongame species that are being raised or collected locally.

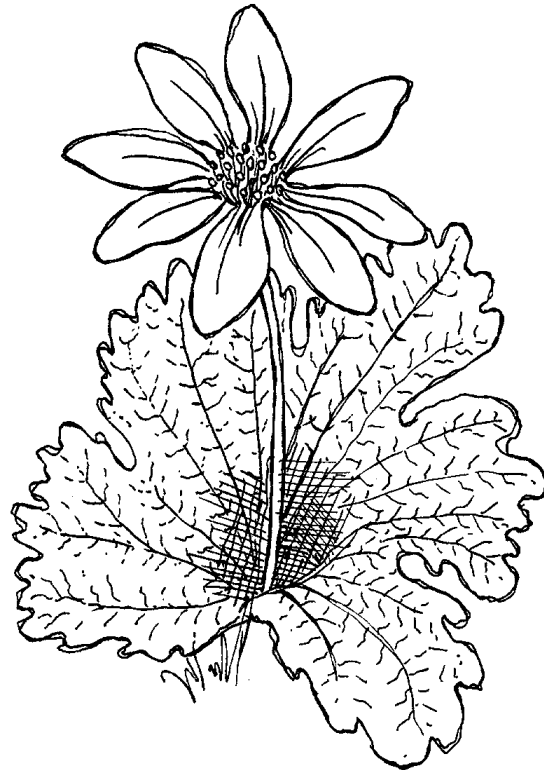
Activity Three Life Zones

PROCEDURE:

1. For each area to be studied students should obtain average annual total precipitation and mean annual biotemperature. These are the two points needed to plot life zone on the Holdridge System. Measurements obtained should be converted to centimeters and Celsius. Measurements for the school's region may be obtained from local

weather stations. Monthly readings should be averaged to annual averages. Any values below zero or above thirty degrees Celsius should be counted as zero since plants are only physiologically active within that range.

2. Have students locate the region's average annual precipitation in centimeters on the chart's appropriate axis and the region's average annual temperature on the other to determine the life zone for that region. Latitude and altitude may be determined from local topographic maps, almanacs, or an atlas.
3. Have students determine areas that might have environmental conditions similar to their own. Discuss what this could mean to product imports and exports.
1. Have students look



Extensions

through plant and gardening magazines to see what plants can grow in certain areas. Most give maps labeling growth zones. Ask: what is a growth zone, and why is it important to gardeners to have information about growth zones.

2. Have students imagine they work for the United Nations. Have them design an appeal to Arkansans that would demonstrate the importance of biomes by comparing them to Arkansas's natural divisions.

***Correlation to
National Science Standards***
Unifying Concepts and Processes
Life Science
Earth Science

***Correlation to
Arkansas Frameworks***
Science: 5-8: LS2.4, LS2.9
9-12: LS3.1, LS3.3, ES2.10

BIOMES

The surface of the earth and the types of life it supports varies drastically from one area to another. Very distinct, recognizable associations of living things are known as biomes. By definition a biome is a particular group of plants and animals (along with their moneran, fungal and protistian cousins) that occurs within a certain geographic area caused by distinctive climatic conditions. Biomes are usually identified by their plant species because plants are normally quite obvious and because the plant type determines the possible animal life. The plants in turn are a product of a number of climatic factors, including precipitation, temperature and available light.

Different ecosystems consisting of interdependent biotic and abiotic factors are found within each biome. Living things are greatly affected by their physical environment which itself is impacted by the presence and actions of the organisms. Biomes may then be subdivided into communities, assemblages of interacting populations of organisms forming identifiable groups. A hypothetical stroll across any biome would show that while the general climate throughout would remain the same, specific groups of plants and animals change somewhat due to variation in local environmental conditions of topography, soils, climate and disturbances (both natural and human caused).

Biomes meet at rather abrupt borders known as ecotones and at more gradual borders known as transition zones. In these areas there may be species from both biomes. The distribution of earth's biomes generally follows latitude. Going north from the equator biomes go from tropical rain forest through desert, grassland, temperate deciduous forest, taiga or coniferous forest and tundra to ice cap. Biomes may also be altitudinal since temperature decreases as altitude increases.

Keep in mind that the factors determining the distribution of living things are quite complex. Your teacher will offer you a variety of activities to help you become familiar with biomes. Put your own twist on each activity used, incorporating creativity with facts and figures.

Impacts and Products

Biodiversity refers to genetic diversity, species diversity and ecosystem diversity. Biodiversity is important for a number of reasons such as its ability to stabilize ecosystems and enhance their ability to recover from damages (natural and human caused). The gene pool, however, may be the most crucial reason that biodiversity matters. By removing some species' genetic contribution, human activity is placing artificial limits on genetic potential. This can cause long-term damage to Earth's overall ecological status. Extinction removes and endangerment reduces the ability of a species to act in a stabilizing role in the energy flow of an ecosystem. Also lost are potential genetic contributions that a species might offer when future environmental changes occur.

Students should visualize and discuss impacts of the exploitation of various products in today's society. This should include impacts on the biome using the product and the biome the product came from. Affected areas would include: food webs, habitat and species loss, cultural influences, spread of disease (human, plant and animal), impact of introduced exotics, bio-geo-chemical cycles, life styles and any others suggested by the students or instructor. Students might think about how their lives would change without some of these products and perhaps suggest substitutes when their use causes problems.

Products List

- ☆ Woods: balsa, mahogany, rosewood, sandalwood.
- ☆ Fibers: bamboo, rattan.
- ☆ Foods: avocado, banana, grapefruit, lemon, lime, mango, orange, papaya, pineapple, plantain, coconut, coffee, sugar, tea, salmon, crab, shrimp.
- ☆ Spices: allspice, black pepper, cayenne, chocolate, cinnamon, cloves, ginger, paprika, vanilla.
- ☆ Fossil fuels.

For Arkansas-specific products, contact the Arkansas Department of Economic Development, One Capitol Mall, Little Rock, Arkansas 72201 or visit their web site at

<http://www.1800arkansas.com/home.html>



The Holdridge System

Biomes are determined by environmental conditions, which are themselves determined by various factors such as the movements of air masses, topography, temperature and precipitation. As geography and climate interact to determine environment, **biodiversity** is affected. The Holdridge System groups ecosystems according to the effects of temperature (geography) and rainfall (climate) on the occurrence and distribution of plants within the ecosystem. You may use the chart to determine the classification of your own biome and that of the biomes researched in Activity I and Activity II. The system and your research may be used to compare the conditions of the biomes, their comparative biodiversities and the reasons why some ecosystems are so much more diverse than others. Keep in mind that an understanding of biodiversity depends on the identification and study of many interactions among a whole range of factors and events. Realize that human impact on any factor or interaction often causes significant changes.

This simplified version of the Holdridge Classification of World Life Zones is from the National Science Teachers Association. In this diagram, the mean annual biotemperature (MAB) is expressed in degrees Celsius.

