Red Butte Garden
THE UNIVERSITY OF UTAH

ETHNOBOTANY: PEOPLE AND PLANTS

Lesson Two: Exploring Utah's Biomes

Utah Core Curriculum Alignment 4th Grade Science Standard 5:	Intended Learning Outcomes: Science
Students will understand the physical characteristics of Utah's wetlands, forests, and deserts and identify common organisms for each environment.	• Demonstrate a sense of curiosity about nature.
Objective 1b: Describe Utah's wetlands (e.g., river, lake, stream, and marsh areas where water is a major feature of the environment) forests (e.g., oak, pine, aspen, juniper areas where trees are a major feature of the environment), and deserts (e.g., areas where the lack of water provided an environment where plants needing little water are a major feature of the environment).	• Sort and sequence data according to a given criterion • Make simple predictions and inferences based upon observations
Objective 2a: Identify common plants and animals that inhabit Utah's forests, wetlands and deserts.	• Compare things. • Record data accurately when given the appropriate form and format.

Enduring Understandings

Biomes are large geographic regions that are classified according to the soil and the climate and the species of plants and animals living there. The organisms residing in a biome have adapted to the soils, the temperature and precipitation of the region. Three major biomes are found within the state of Utah. Each has unique characteristics and is inhabited by diverse and unique organisms.

Essential Questions

What are three major biomes found in Utah and what are the characteristics of each of these biomes? What plants and other organisms live in each biome?

Background Information

There are three major biomes in Utah: desert, forest, and wetlands (a subclass of the larger aquatic biome).

Generally, a **desert** is a large, dry area with varied soils and sparse vegetation. Typically deserts average less than 10 inches of precipitation each year, which usually falls in the form of brief localized cloudbursts. Extreme temperature variations are typical of deserts.

In Utah there are two different desert environments **hot deserts** and **cold deserts.** They cover approximately one-third of the state.

- A **hot desert** has temperature extremes that can range from below freezing to over 115 degrees F. It is dry and warm throughout the year with very hot summers and less than 10 inches of precipitation a year. The hot desert loses more than this amount of precipitation from water evaporation and transpiration. Vegetation found in the hot desert includes the Joshua tree, creosote, yucca and mesquite. The Mohave corridor in southwest Utah around St. George is Utah's hot desert.
- A **cold desert** has temperature variations ranging from below freezing up to 95-100 degrees F. Typical elevation is from 4,000 to 6,500 feet. It often snows in winter and is dry in the summer. It usually gets about 6-10 inches of precipitation a year but occasionally can receive as much as 18 inches. It is interesting to note that Utah is the second driest state in the United States, Arizona being the driest. The vegetation includes sagebrush, shadscale, greasewood, saltbush and cactus.

A **Forest** is an area of land characterized by mature trees larger than about 16 feet and either a tree density or the tree crown cover or shading of more than 10%. A natural forest is comprised mainly of indigenous native trees not planted by man.

In Utah, we have deciduous forests whose trees shed their leaves each year, or coniferous forests comprised largely of cone-bearing trees. The elevation, temperature and the face of the slope of an area are the elements that define the particular vegetation and animals of each forest type. Generally, forest biomes are found at mid-to-high elevations. Our forest biomes are mainly in the Wasatch Mountains, which run north and south along the mid-line of the state, and the Uinta Mountains, which run east and west along the Wyoming border. The three forest types described here are defined by their dominant tree species.

- Transitional **pinyon-juniper coniferous forests** are found at mid-elevations, 3,500 to 8,000 feet, in the areas between the desert and the montane or mountainous forests. Sometimes referred to as the foothills, this is the driest forest and most common throughout the state, with about 10 to 20 inches of precipitation a year. It is often called a "pygmy" forest since the trees grow to an average height of just 20 feet; trees are of medium density with no canopy cover. Most other trees in a coniferous forest usually do not grow taller than 30 feet, although there have been some recorded as tall as 70 or 80 feet.

  Oak-maple deciduous forests are also found in mid-elevations, from about 5,000 to 8,000 feet in more moist areas (north and east facing slopes) of the foothills. They sometimes grow alongside mountain mahogany and chokecherry trees and cottonwoods. As you go up in elevation, plants and trees begin to blend together, so you may see stands of aspen trees as low as 7,000 feet elevation.

- **Coniferous spruce-fir forests** are found at even higher elevations, from 6,000 to 10,000 feet elevation. The temperatures at these elevations are cooler and there is more precipitation. Summers are cool and pleasant and winters are long and cold with substantial snowfall. Vegetation at the lower end of this elevation range consists mainly of Douglas fir and white fir, lodgepole and ponderosa pine, and spruce. At higher elevations, Engelmann spruce, subalpine fir, and white fir are the main conifers. Deciduous aspen trees that provide the striking yellow colors on our fall mountainsides grow interspersed with the conifers from about 7,000 feet to 10,000 feet elevation.

A **wetland** (subclass of the larger "aquatic" biome) is an area saturated by surface or ground water for a good part of the growing season. The area is able to support plants that are adapted to survive in water-saturated soils. This type of plant is called a hydrophyte. The water in the ground soil of wetlands never completely drains, and includes swamps, marshes, and bogs. Wetlands help prevent flooding, filter ground water, offer recreation opportunities, and contain the highest species diversity of all the biomes. **Riparian environments** in and near wetlands and alongside rivers and streams are important habitat for a great diversity of wildlife, especially birds. These areas can be found in many parts of the state, at all elevations.

Utah's various wetland environments are often found within other biomes. A wetland area found in the desert will host different organisms than a wetland area found in the high elevation forests due to differences in soil, temperature, and precipitation.

- **Wet lake margins**, also called **marshes**, can be found in many areas of the state at lower elevations next to lakes and ponds. These are fresh water marshes.
- Utah has a unique **wet lake margin** with a very high saline level surrounding the Great Salt Lake. The organisms found here have adapted to the high salt levels in the water and in the soils.
- **Mountain wetlands** and **wet meadows** can be found at mid- to high-level elevations. These wetlands are typical habitats for moose and colorful mountain meadow flora.

Lesson Plan

Materials

BB = Materials included in Botany Bin

- BB Photos of Organisms from Utah's Biomes, laminated
- BB Lists of Organisms from Utah's biomes
- BB Key to Organisms by Biome
- BB Blackline Biome Recording Table (make one copy per student)
- BB "Four Corner" labels (Wetland, Forest, Desert, Undecided), laminated
- three large poster boards

- pencils
- Post-it notes
- optional: coloring art materials (colored pencils, pastels, crayons), scissors
- optional: blank 8 ½ x 11 sheet of paper

Procedure

Warm-up

Hang three large posters lengthwise or 'landscape-style' on wall or white board. Explain that today the students are going to explore three major biomes found in Utah. Ask students to help define a biome; write all ideas on whiteboard. Their ideas should include: (1) a large geographical area; (2) an area that contains plants and animals that exist together in a community; (3) an area that is characterized by organisms that have adapted to the region; (4) an area in which the climate is similar throughout the region.

Now that they have defined a biome, ask students to brainstorm which biomes might be found in Utah. Prompt them to think about what they already know about the different areas they have visited in Utah. Again, be sure to record all ideas. As they respond, label each of the posters with the headings: Desert, Wetland, Forest. Explain that although there are two other major biomes of the world, tundra and grassland, this lesson will focus on deserts, wetlands and forests.

Have students write one characteristic they believe describes each of the three biomes of Utah on three separate Post-it notes. Have them hang their responses on the appropriate poster. When all are finished, discuss the responses. Using their Post-it notes, help students create a cohesive definition for each biome and write it at the top of each poster. (You may want to use Background Information and Core Standard V1b. to help refine the definitions). Encourage students to justify their responses and keep the discussion open to varied ideas.

Activity

Four Corners: Put the laminated photos from the Botany Bin on two or three tables in the classroom (be sure the photos are mixed up). Explain that now students will choose a photo of an organism from one of the tables and decide in which of the biomes their organism resides. Ask them to think critically about why they chose the biome and be ready to discuss their reasoning. Remind them that there is an "undecided" category.

Practice

Select four students to hold up one of the four signs (Wetland, Desert, Forest, and Undecided) in each of the four corners of the room.

Have all other students go to the tables and choose one photo to take to the corner where they believe the organism is most commonly found. Tell them to discuss with their "corner-mates" what made them choose the biome.

Discussion

When everyone has found a corner and had a few minutes for small group discussion, have each group explain why they believe the organism they chose inhabits the biome where they are standing. Give prompts, clarifications and explanations, including moving any organism to another biome as needed, especially the Undecided group.

Have student sin each group record the names of the organisms and their reasoning for choosing a particular biome on the enclosed Biome Recording Table. The pictures should be left at each corner where they belong. As they finish recording their own biome, have them go to the other corners and record organisms from the other biomes.

Assessment

Informal assessment can be made by evaluating students' choices, verbal responses and explanations, and by evaluating their Recording Tables.

Extensions

Give students 15 minutes to sketch, color and cut out a plant or animal of their choosing and then hang the sketch on the large poster in the appropriate biome. Save posters for students to embellish throughout the next lessons.