Red Butte Garden
THE UNIVERSITY OF UTAH

ETHNOBOTANY: PEOPLE AND PLANTS

Lesson 6: Ties That Bind

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.	• Record data accurately when given the appropriate form and format. • Use scientific language appropriate to grade level in oral and written communication. • Use available reference sources to obtain information
Objective 2c. Describe some of the **interactions** between animals and plants of a given environment.	

Enduring Understandings

Humans are an important part of the web of life because of their interactions with other organisms in an ecosystem. There is documented evidence of the presence of humans for over 10,000 years in the geographical area known as the State of Utah. Native plants found here have been used as rich resources for survival over time by various groups of humans residing in this area.

Essential Questions

What is the role of humans in the web of life? Who are the people who have inhabited "Utah"? How did different groups of people interact with the native plants found here over time?

Background Information

People have always made use of available resources in the environment for survival. We have traditionally used plants for food and beverages, dyes, personal ornamentation, shelter, medicine, ceremonies, utensils, game pieces, furniture, cleaning, musical instruments, fuel, clothing, thatch for rooftops, and to make tools. We continue to need and use plants even though we have created many synthetic materials. The wide range of plant uses listed here emphasizes our dependence on plants for our survival.

Early humans were hunter-gatherers, foraging the habitat for edible plants and hunting animals. Many of the same plants and their uses by early people have endured to the present day. Some examples are sumac for baskets, sagebrush, oak bark and rabbitbrush for natural dyes, herbs as medicines, and wood for furniture and homes.

As people began to domesticate and manipulate the growth of plants from the seeds they gathered, a more agrarian (farming) lifestyle developed. One of the most important early cultivars (a selectively bred and grown plant) that has endured to the present day is corn. The wild grain called teosinte was crossbred and cultivated by Central American tribes over 7,000 years ago. It then made its way to the southwest United States about 2,000 years ago. Tribes living in Utah had also become largely agrarian and began growing corn for food. Beans and squash were grown as "companion" plants to corn and the three plants became known as the "Three Sisters" in Native American cultures. By the time Columbus and other European explorers and settlers arrived in North America, cultivated corn was a staple of most Native American diets across the North and South American continents. Corn was exported to Europe by the explorers to become an important commodity, not only in Europe and the Americas, but worldwide. Cultivated varieties of corn have survived up until today, and have over 500 different uses - from food to adhesives!

Humans are a vital link in the web of life, interacting with the other organisms in a habitat both passively (exhaling carbon dioxide), and actively (moving plants outside their native habitat, clearing land, damming rivers, growing crops, etc.). The decisions made by humans about their interactions in an environment have been largely to benefit their survival or to improve their lifestyle. As time goes on and the effects of some of those decisions are seen, we have realized how important it is to take responsibility for maintaining the natural balance in an ecosystem. Otherwise, a species may go extinct, harmful pests may overrun an area, or soils may be depleted and become barren, thus, upsetting the balance. Educated decisions must be made, keeping in mind the needs of other organisms in the ecosystem. We all must be vigilant and maintain stewardship over our habitat; always thoughtful about the effects our interactions with the other organisms can have on the ecosystem as a whole. Over time, humans have changed the environment in dramatic ways; the current and future decisions we make will, hopefully, benefit all species in our environments.

The previous lesson can be used to activate students' prior knowledge, and the enclosed Native American Uses of Plants Indigenous to Utah can be used to enhance discussions of people's interactions with plants.

Lesson Plan

NOTE: This lesson contains two main lesson plans with additional Extension Activities. Both main lessons should be taught previous to the Extension Activities.

Materials

BB = Materials included in Botany Bin

- BB Photos of Native Plant Uses, laminated
- BB Lesson 5, Native American Uses of Plants Indigenous to Utah Table
- BB Lesson 5, Immigrant Uses of Native and Introduced Plants
- BB blackline: Web of Life. Make one copy per student.
- BB plant specimens in rikers
- BB *Utah Wildlife Viewing Guide*
- BB Lesson 2, Photos of Organisms by Biome, laminated
- drawing materials: markers and pastels, drawing paper
- computers
- BB historytogo document: Paleo-Indians
- BB Map of Utah Indian Tribal Lands
- BB Utah Environments Map (from UEN)
- Utah topographical map
- Colored pencils or crayons
- Optional: Drawing materials (markers, pencils, pastels, and drawing paper)
- Optional: Essay paper or journal

Procedure – Lesson A

Warm-up – Lesson A

Explain that today students will be learning about the interdependence of organisms in a given environment. The discussion will begin with human interaction with plants. Ask students to think about the ways humans used plants in the past and how they are used today. As students come up with ideas, hang the laminated pictures on the board. If there are ideas for which there is no picture, write these responses on the board. Ask students if they think humans could survive without plants. Why or why not?

Activity – Lesson A

Discuss interrelationships between organisms in a community. How do plants help animals and how do animals benefit the plant world? How does a particular biome where he resides affect man's interactions with the organisms found there, especially plants?

Give each student a copy of the blackline Web of Life. Ask students to look it over briefly and then ask how they think the organisms are connected. The following information can be used to clarify any misconceptions they might have:

> The web of life begins with the sun and the energy it emits. Since plants make their own food using the energy from the sun, they are the producers in the web of life. Humans, along with other omnivores (meat and plant eaters), carnivores (meat eaters), and

herbivores (plant eaters) are consumers. Plants are also dependent on the consumers for carbon dioxide and for the dispersal of seeds. Microorganisms such as bacteria and fungi help decompose organic waste material and return nutrients to the ecosystem for reuse. They are called the decomposers. The way organisms are tied together in an ecosystem is called interdependence. These organisms are bound to one another in an intricately balanced web of life that ensures the survival of individual species.

Have students watch the graphic "Web of Life" at: www.kidsplanet.org/wol/page_21.html on a computer.

Have available for students to use:

- plant specimens (in rikers) from the Botany Bin
- enclosed book, *Utah Wildlife Viewing Guide*
- document, Native American Uses of Plants Indigenous to Utah Table
- Lesson 2: photos of plants and animals in each biome

With this background information, have them create a web of life diagram of one of the three Utah biomes (wetland, desert, forest), showing (1) producers, (2) consumers (herbivores, carnivores, omnivores), and (3) decomposers. They should also label the predators, prey and scavengers in their drawing. Give them a choice of a wide variety of art media from which to create their diagram. Organisms they draw should correctly represent those found in the Utah biome they have chosen to diagram. Display the finished diagrams and allow students to have time to have a "gallery walk," to view one another's creations. Finish with a brief review and discussion.

Procedure – Lesson B

Warm-up – Lesson B

Use a topographical map of Utah. If it is large enough you can hang it on your white board. A smaller one can be projected. Ask: In what areas of Utah do you think people would be most likely to congregate and settle? Why? Activate students' prior knowledge by asking what they remember about Utah's biomes (from Lesson Two)? Using the enclosed historytogo documents, give students a brief overview of Utah's inhabitants over time. (If you have completed Lesson Five, students will have a great deal of background knowledge from which to draw, so you can use this as a review.) What plants would each of the groups have utilized in their different habitats? (For example, resources available in the southeast corner of the state might not be available in the west central area.) Why not?

Using the document, Immigrant Uses of Native and Introduced Plants, discuss briefly any effects these uses by different groups might have had on the different ecosystems.

Activity – Lesson B

Give each student a copy of the Utah Environments Map, which shows the three major biomes of Utah and where each is located; have them color it according to the key.

Give each student a copy of the Tribal Lands Map. Have them compare these two maps.

Discussion

(If your students have completed Lesson Five, you may need to adjust this discussion to include only new information you may not have already covered.) Point out the fact that different Native American tribes occupied different areas over most of the state before explorers and settlers came here. Discuss what takes place when there is competition for the same resources. The tribal lands shown are the reservations where the U.S. government assigned Native Americans in Utah through a series of wars and treaties during the 1800s. This is the current area of lands or reservations that belong to each tribe. In the enclosed history document, it states that "Nationwide, Indians [Native Americans] lost more than eighty percent of their lands by 1930," as a result of the U.S. government treaties and placement of Native Americans onto reservations. How would this have affected the availability of resources for the different Native American tribes? For the settlers and explorers?

Using the enclosed historytogo documents, discuss in more detail the various groups that immigrated to Utah, such as the Spanish and other European explorers and various immigrant settlers. Would they have relied on Native Americans to inform them about plant uses? Or would they have tried to bring with them everything they needed for survival? How would their interactions and relationships with the Native Americans affect their ability to adapt to their new home? Discuss how the environment where one resides affects the resources available to be used for survival.

Extensions

- Discuss symbiosis, where two or more organisms live in close physical proximity and have an interrelationship that is sometimes beneficial. Have students generate ideas of organisms they think are symbiotic. Ask students to offer opinions, thoughts or questions about three different types of symbiosis. Clarify their responses. The three main symbiotic relationships between organisms are: (1) mutualism - organisms live physically close together and benefit one another; an example is algae and fungi that form lichen (2) parasitism - one organism is host to the other organism that gets its nutrients from its host; an example is rust fungi that destroys grains, (3) commensalism - organisms live together harmoniously, one deriving benefits from the other without harming it; an example is Spanish moss that grows on oak trees without any seeming harm to the oak.

  Give students instructions to create and sketch two invented organisms demonstrating one of these types of symbiosis. Let them be as creative as possible. Have them label the type of symbiosis the organisms share and a short description of how they are interdependent.

- Have students write a short essay or write in a Social Studies journal about their experience of attempting to survive in this new area from the point of view of a Native American, an early explorer, or an early settler from the 1700 or 1800s. These questions might guide their writing: What challenges would you face? What resources would you find on your own to use for food, shelter, medicine and your other needs? How would you make use of the plants found here? Would you have felt welcome here?