

**LEVEL:** Grades 3-12

**SUBJECTS:** Science, Language Arts, Physical Education.

**PROCESS:** Through a physical activity, students discover the components and relationships of ecoregions and the role of ecosystem management in these ecoregions.

**OBJECTIVES:** The student will:

1. Describe some non-living and living components of an ecoregion (a geographic area where the combination of climate and soils produce a distinct plant community).
2. Demonstrate a component of an ecoregion.
3. Describe how each living component in an ecoregion is related to the sun and to other ecoregion components.
4. Describe how different ecoregions are related to each other and how they form a larger ecosystem.
5. Identify and demonstrate the role of ecosystem managers.

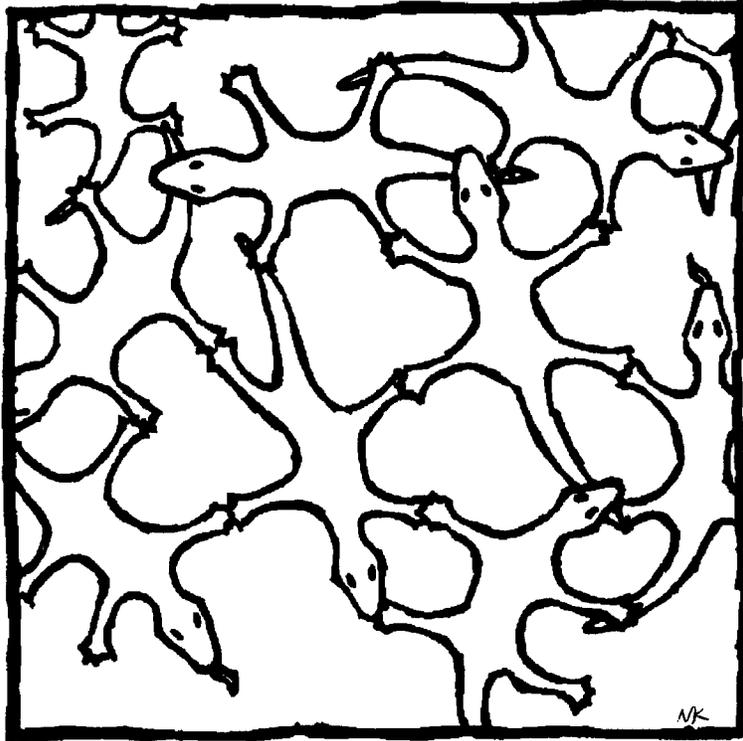
(Note: Younger students may only accomplish the first three objectives, while all five objectives are appropriate for upper grade levels.)

**TIMEFRAME:** 30 to 50 minutes.

**SKILLS:** Analyzing, comparing similarities and differences, critical thinking, demonstrating, describing, discussing, generalizing, identifying, listening, observing, predicting, role playing.

**MATERIALS:** A 3" x 5" index card and 12" string for each student, scissors, tapes, pencils or markers, large piece of yellow paper, yarn or string (two colors 200 ft. of one color cut into ten 20-ft. lengths (yellow yarn is ideal), and a 100-ft. length of the other color rolled into a ball), "Ecoregion Chart" (attached). (Extensions: Camerecorder or video camerecorder.)

**VOCABULARY:** Biodiversity, biosphere, ecoregion, ecosystem, ecosystem management, natural resources, predator, topography.



## SPINNING THE ECOWEB

**OVERVIEW:** Ecosystems are systems formed by the interaction of a group of organisms with each other and their environment. Ecosystems include interdependent plants, animals, the physical environment, and the ecological processes (such as exchange of matter and energy) that connect them. Areas of different sizes can be considered ecosystems, depending upon who is drawing the lines of distinction. A jar of pond water, a rotting log, a grassland, or the entire earth can each be considered an ecosystem. In this activity, the term ecosystem will be used to represent the entire earth. The entire earth's ecosystem is commonly referred to as the biosphere.

On earth, there are geographic areas in which the combination of climate, topography (lay of the land), and geology determine what types of plants and animals grow and live there. These areas are called ecoregions. A desert, with its characteristic dry climate, sandy

soils, and unique wildlife is an example of an ecoregion. Other examples include grasslands, rainforests, coniferous and deciduous forests, oceans, arctic areas, fresh water streams, riparian zones, and wetlands. All of the ecoregions on earth interact to form one large ecosystem.

Human cultures have developed within different ecoregions and have been sustained by them. All of the resources humans have depended on for survival and comfort have come from natural resources. Over time, attitudes and beliefs about the natural world and the use of natural resources have changed. In the not-too-distant past, the human population was sparse compared to the natural resources available. Human impact on ecoregions was minimal. As human populations have increased, so have demands on various ecoregions. Some parts of the ecosystem are being heavily impacted and some species have

**ecoregions?**

**-What can you tell me about an ecosystem?**

**-Why are ecoregions important to one another?**

**-What helped you know how ecoregions are related?**

**-If ecosystem managers discovered one plant or animal in an ecoregion in trouble, how do you think they would work to help that species?**

12. Choose any organism from any ecoregion and identify that organism as a species in trouble. (Examples: toucans in the rainforest are being collected, clams in an estuary are being poisoned by pollution, the Florida panthers are disappearing due to shrinking habitat, etc.) Pose the problem to the ecosystem managers. Ask:

**-What might they do to help the species?**

**-What information do you need to make a good decision?**

**-What do you need to know about this species and its relationship to other species?**

**-How does knowing that ecoregions are connected influence your decision?**

**-How will your management decision affect other organisms or other ecoregions?**

**-What is the role of ecosystem manager?**

**-What are some other roles humans play in ecoregions besides managers?**

**-In what ways can humans be good caretakers of the ecoregions? The ecosystem?**

**-What can you do to be a good caretaker?**

13. What would happen if one of the ecoregions disappeared? Have one group drop

their strings and discuss the implications for other ecoregions and the ecosystem. Ask:

**-Which ecoregion is the most important?**

**-Is any ecoregion more important than another?**

14. Conclude the activity by asking:

**-What surprised you the most during this activity?**

**-What did you find most interesting?**

**-How might what you've learned in this activity help you in other areas of your life?**

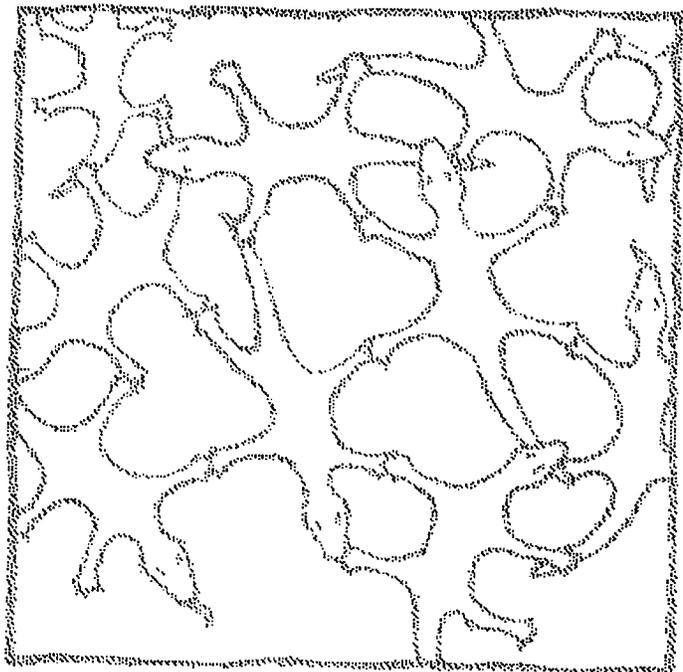
#### **ASSESSMENT:**

Have students:

1. Choose one ecoregion to draw, including both living and non-living components.

2. Take two ecoregions and demonstrate ways they are connected by any method of choice such as drawing, writing, role playing, etc. Students can choose ecoregions not previously discussed: or can discuss soil as an ecosystem and its connection to the total ecosystem.

3. Complete a paragraph, "If I were an ecosystem manager, I would...."



assign organisms ahead of time.

4. When student's cards are completed, have each ecoregion group stand together. Have the groups form a circle. (See diagram.) Students who represent the ecosystem managers remain outside of the circle at this time.

5. Place the large yellow circle in the center of the larger circle of students. Tell students the yellow circle represents the sun. Tape one end of each of the 20-ft. pieces of yarn to the "sun" circle. Ask students what they think the pieces of yarn represent (the sunlight traveling through space to the earth).

6. Standing in their groups, ask students to name the organism from their ecoregion most dependent upon sunlight. Hopefully, they will name the plant in their ecoregion. Hand the "plant" student in each ecoregion the unattached end of the 20-ft. string. All the pieces of yarn are now attached to the sun and stretched out to the ecoregion groups, creating the appearance of the "spokes of a wheel" or the "rays of the sun."

7. Students in each ecoregion must now determine which organism might get the sun's energy next. In other words, which organism might eat the plant? The "plant" student gives the next student (plant-eater) in his or her group part of the piece of string to hold also.

8. The "plant-eating" student now passes a piece of the string along to the organism that eats it, the predator. At this point, all students in each ecoregion will be holding on to their groups' piece of string. Ask:

**-How is each organism in your ecoregion dependent upon the sun?**

**-How do all the organisms in your ecoregion need each other?**

**-What would happen if there were no plants in your ecoregion? No plant-eaters? No predators?**

**-In what ways is the sun important?**

**-Besides the sun, what else do plants**

**need to grow?** (*Soil, air, water.*)

9. Have students in each ecoregion mention one or more of the non-living components on which they depend (water, soil, rocks, wind, etc.).

10. Introduce the ecosystem managers. Ask students sitting in the circle what they think ecosystem managers do. (Ecosystem managers manage the natural resources in ecoregions in order to maintain biodiversity or variety of life in each ecoregion and to protect the larger ecosystem. They assess and evaluate the conditions of an ecoregion considering both living and non-living components. Ecosystem managers make and carry out decisions about ecoregions while making sure people are able to use necessary natural resources.)

11. Ecosystem managers enter the circle with the 100-ft. ball of yarn. Starting with any ecoregion group, the ecosystem managers pose the question written on the board. Write responses on the board. Students, after the first group, can repeat an answer already written on the board or respond with a different answer. One of the ecosystem managers, holding onto the end of the string, gives students in the ecoregion the string and then carries or passes the ball of string to the next ecoregion that was mentioned as being connected in some way to the first ecoregion. Repeat the question and this process of passing the ball of string until there are no further connections. At that time, the other ecosystem managers hold onto part of the string also. You can suggest some connections to the students if necessary. When groups' responses are complete, a large web will have been spun, demonstrating the large ecosystem made up of connecting ecoregions. Students have spun an eco-web! Have students stay in place and ask:

**-How is your string from the sun different from the string to other ecoregions? How is it similar?**

**-What do the strings between the ecoregions represent?** (*The larger ecosystem.*)

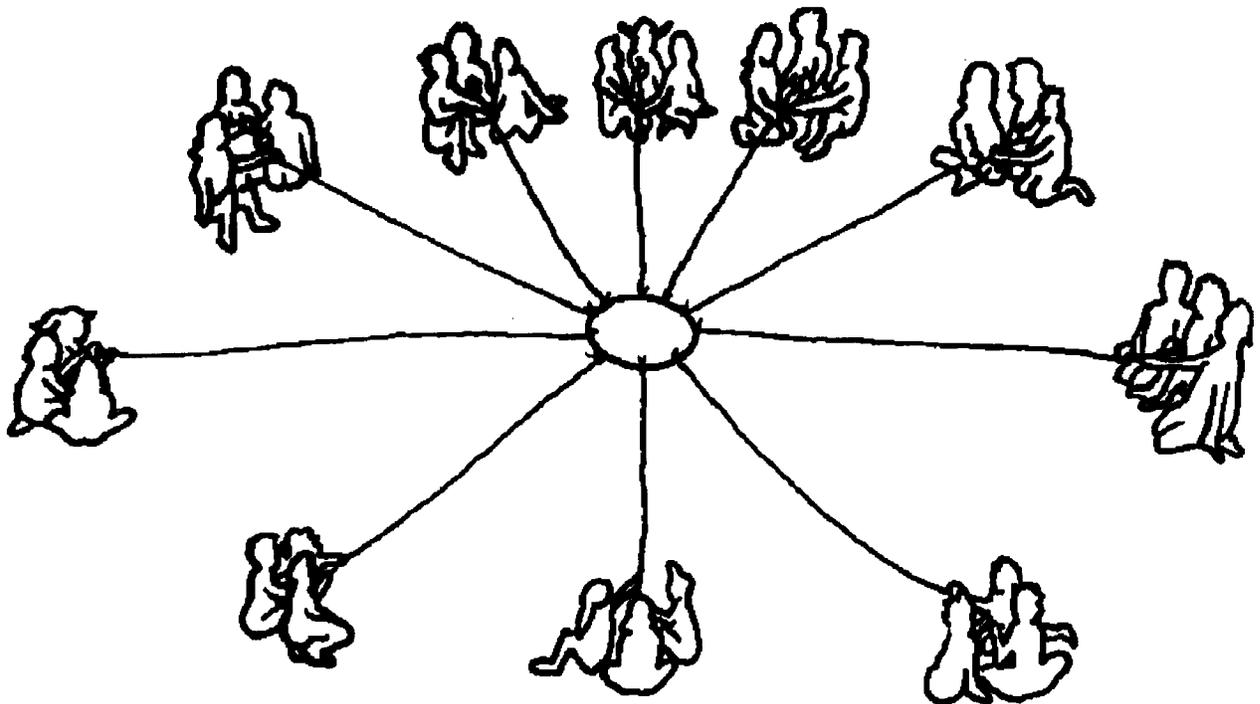
**-What can you now tell me about**

# ECOREGION CHART

ECOREGION	NON-LIVING COMPONENTS AND DESCRIPTORS	POSSIBLE ORGANISM
Grasslands	Escarpment (cliff like), buttes, soil, fire, wind	<b>grass</b> , mice, grasshoppers, prairie dogs, bull snake, red-tailed hawk, etc.
Rainforest	Humidity, heavy rainfall, soil, equatorial, nutrient pool, little temperature variations	<b>fig tree, periwinkle</b> , howler monkey, toucan, beetle, tree frog, jaguar, etc.
Forest-Coniferous* (cone-bearing evergreens)	Granite rock formations, rocky soil, wind, snow, high elevation	<b>pine tree</b> , pine beetle, mosquito, deer, black bear, mountain lion, etc.
Forest-Deciduous* (leaf-bearing) *choose based on your location	Moderate rainfall, fertile soil, low elevation, temperature variation	<b>oak tree, maple tree</b> , squirrel, cicada, white-tailed deer, black bear, etc.
Ocean	Salt, coral reef, rock, sand, waves, wave action, wind	<b>plankton</b> , coral, fish, whale, shark, etc.
Estuary, Tide Pool	Mixing of salt and fresh water, tides, nutrient-rich soil, high humidity	<b>saltgrass, reedgrass</b> , clams, crayfish, fish, heron, seagull, etc.
Arctic	Glaciers, high latitude, permafrost, low temperature, short growing season, wind	<b>forget-me-nots</b> , musk ox, caribou, seal, wolf, polar bear, etc.
Fresh Water Stream	Water, rocks, gravel	<b>algae</b> , mayfly, dragonfly, fish, otter, bald eagle, etc.
Desert	Low rainfall, intense sunlight, daily extreme variation in temperature, sandy soil	<b>cactus</b> , gila monster, kangaroo rat, peccaries, road runner, coyote, etc.
Riparian (streamside)	High water table, moderate temperatures, banks	<b>willow, cottonwood, birch</b> , rabbits, moose, raccoons, owls, etc.
Wetlands	Water, high humidity, water-logged soil, nutrient-rich soil	<b>cattails</b> , redwing blackbirds, ducks, fox, Northern Harrier, etc.

### EXTENSIONS:

1. Invite students to photograph or videotape a local ecoregion to illustrate the non-living and living components of that ecoregion. Have students describe the connections between the components.
2. Construct a classroom ecoregion (on paper, a diorama, a mobile, etc.).
3. Play "Ecoregion Charades." Have groups role play different ecoregions while their classmates guess which ecoregion they are portraying.
4. Have students design advertisements to promote the importance of ecosystem management.
5. Have older students research a real-life situation in which a variety of management decisions are possible. (Examples: Northern Spotted Owl controversy, reintroduction of the wolf and grizzly bear to former historic range, salmon runs in dammed rivers, fishing with drift nets, etc.) They research all sides of the issue, including social and economic connections, and make a management decision. Have them then write a position paper supporting their management decisions and present their decisions to the class.



Ecoweb  
Circle of kids holding string.

the leaf drop. Wildfires do not generally occur when the fuels (trees, shrubs, and grasses) are wet and cold.

Fire was an important tool in Native American cultures and is in other cultures around the world. Some Native American people set fire to prairies knowing that new growth would attract game. Fire has traditionally been used to drive game, reduce populations of unwanted animals, enhance crop growth, and clear forests.

Fire can be an effective management tool for state and federal agencies to manage their wildlands, which include forests, grasslands, and other ecosystems. Over the years, fire management policies and techniques have changed. A controlled, or prescribed burn (one that is lighted by trained fire personnel within prescribed fuel and weather conditions) can prepare a logged area for reforestation, enhance wildlife habitat, protect a native tree species, control insect populations or disease, or reduce future fire hazards by reducing burnable fuels. They are not risk free and they can be expensive.

Fire is an essential component in the lifecycle of several tree species. Some depend on the heat of fire to open their cones and release the seeds, while others simply need fire to open the forest canopy to provide light. In general, fires return nutrients to the soil in the form of ash.

Preventing, controlling, and suppressing wildfires is becoming more vital as more urban people seek woodland settings for their homes. More and more homes, property, and lives are endangered by fire along the wildland-urban interface. Once again, we learn that it isn't easy to balance the needs of humans against the needs of forest systems.

### **PROCEDURE:**

#### *PRE-ACTIVITY:*

1. Make photocopies of the "Fire Triangle" worksheet (student page 1) for each student. Gather materials for the demonstration. You may want to invite a local firefighter or forester who is involved with fire management to visit your class.

2. Variation: You need an outdoor area or large room for the game. Make four green headbands out of construction paper for the "rangers." Make one red headband for "wildfire." Make 20 "fire protection necklaces." These can be made by cutting squares out of blue poster board and tying string through them. (Or, simply make loops or bands of blue construction paper large enough to go over students' heads and rest on their shoulders.)

#### *ACTIVITY:*

##### *PART A: FIRE TRIANGLE*

1. Pass out the "Fire Triangle" worksheets. Have students read and work through it on their own. When everyone is finished, ask the class what three things are needed for fire to burn. Draw the fire triangle on the board. Ask them under what conditions they think it would be easy to start a fire, and when they think it would be hard.

2. Demonstrate how a candle burns in a glass (from a science lab) when each of the three different elements are limited:

A. Place a small, lighted birthday candle in a jar (you may want to mount it in a dab of modeling clay). Then seal the jar with the lid to cut off the supply of oxygen. As the flame consumes the oxygen in the jar's air, the flame will go out. Explain that cutting off oxygen is one way of managing a fire.

B. Open the jar, relight the candle, and put the lid back on. Only this time, when the flame starts to go out reopen the lid to let more oxygen in; the candle will reignite. Explain that this illustrates what happens when the wind picks up during a fire; the fire may reignite or burn out of control.

C. Take the lid completely off and allow the candle to burn until all the fuel (paraffin) is consumed and the fire extinguishes itself. Give the students time to see how long it takes. Set up a wooden match and a paper match (similar size) in bases of clay. Light them both and see which burns longer. How do these two tree products - wood and paper - burn differently? Place a corn or potato chip on a piece of tin foil and light it. See how long it takes to burn. What fuel in the chip made it burn? (Vegetable