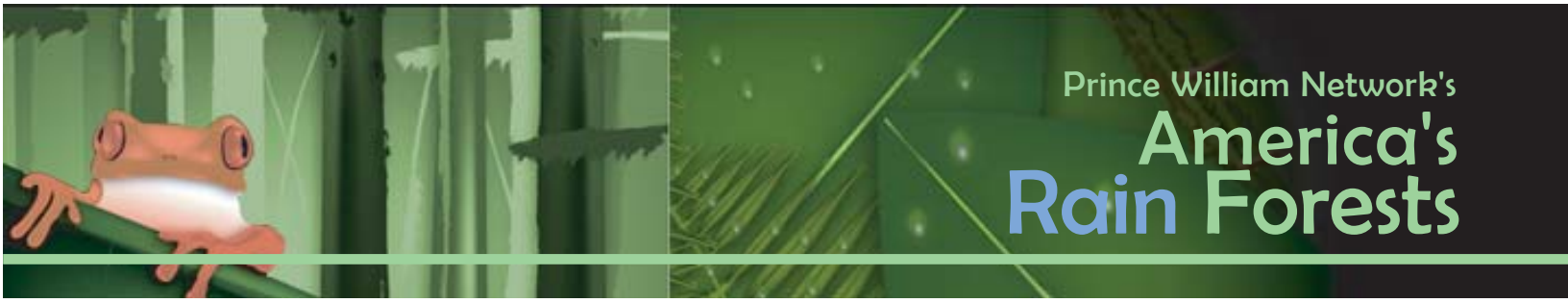


Charting Diversity

Rain Forest Ecology

National Science Education Standards

- Standard C: *Life Sciences* — Diversity and adaptation of organisms.
- Standard C: *Life Sciences* — Populations and ecosystems.
- Standard F: *Science in Personal and Social Perspectives* — Populations, resources, and environments.
- Standard C: *Science in Personal and Social Perspectives* — Populations, resources, and environments.

OVERVIEW

By exploring the amazing **diversity** of life on Earth, your students will discover how plants and animals are **adapted** for survival. This activity provides a basis for understanding why there are so many different **species** and what is the value of biological diversity.

OBJECTIVES

Students will:

1. Organize different species of plants and animals according to various characteristics.

2. Determine how certain characteristics help species adapt to environmental conditions.

SUBJECTS

Science

VOCABULARY

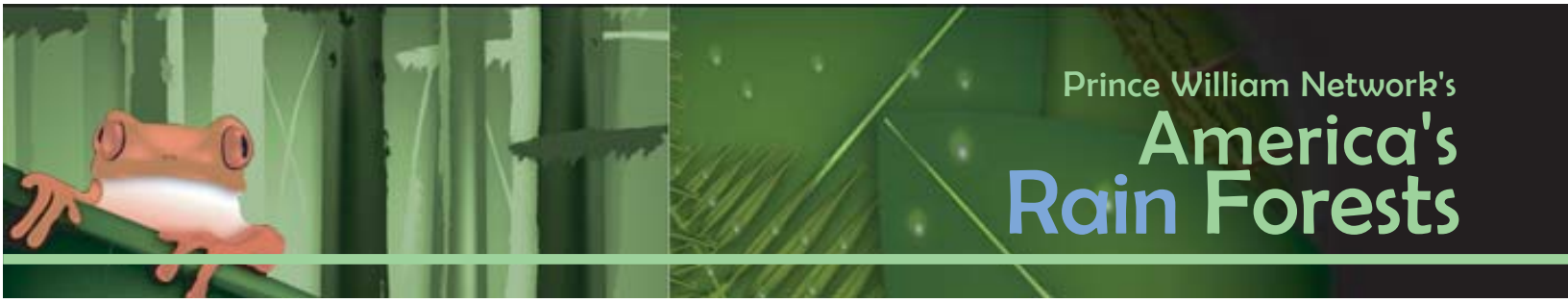
Diversity, adaptation, species

TIME

50 minutes

MATERIALS

Chalkboard or easel paper; copies of student page 29 (one per pair); paper lunch bags or other containers (three per pair); and resources on plants and animals (encyclopedias, dictionaries, field guides)



BACKGROUND

All organisms on Earth can be grouped into different species. A species is a group of organisms that resemble one another in appearance, behavior, chemical makeup, and genetic structure. Organisms that reproduce sexually must also be able to interbreed and produce fertile off- spring to be considered the same species.

One of Earth's most valuable resources is its biological diversity, or biodiversity. This resource is made up of three components: genetic diversity, species diversity, and ecological diversity. Genetic diversity is the variability in the genetic makeup among individuals within a single species. Species diversity is the variety of species on Earth. Ecological diversity is the variety of forests, deserts, grasslands, streams, lakes, oceans, and other biological communities that interact with one another and with their nonliving environments. Biologists estimate that Earth's current biodiversity consists of 40 to 80 million different species, each having variations in its genetic makeup and living in a variety of biological communities. So far, biologists have classified only about 1.5 million species. They know a fair amount about one-third of these species, and the detailed roles and interactions of very few.

Humans are dependent on this biological capital. Diversity within and among species has provided us with food, wood, fibers, energy, raw materials, chemicals, and medicines and has contributed hundreds of billions of dollars yearly to the world economy. Also, every species on Earth today represents stored genetic infor- mation that allows the species to adapt to certain changes in environmental conditions. We can think of biodiversity as nature's "insurance policy" against disasters.

Over billions of years, new species have formed, and ones that could not adapt to changing conditions have become extinct. Extinction is a natural process. The rate of species extinction has increased sharply as human settlements have expanded worldwide, the main reason for this being, the alteration of many organisms natural habitats.

BEFORE THE ACTIVITY

1. Copy a blank chart, such as the one shown below, onto the chalkboard or a piece of easel paper,

2. Make enough copies of student page for each student.

Where It Lives	How It Moves	What It "Wears"	Name of Animal

ACTIVITY

1. Ask students to name different types of environments in which animals live, and write these on thechalkboard (forest, ocean, desert, arctic, others). Ask students if the animals living in these environments have special characteristics that enable them to survive (fish swim, squirrels climb,antelope run fast, etc.). Tell the students they're going to play a game in which they'll look at animals and determine how each is different and how each has a special role in the environment.

2. Have students copy onto a piece of paper the chart you put up earlier.

3. Pass out copies of student page.

4. Divide the group into pairs.

5. Give each pair three lunch bags or other containers. Have the students write one of the following labels on each bag:

- Where It Lives
- How It Moves
- What It "Wears"

6. Make sure the students understand all the words on the student page. Have them cut out the individual squares in the first column and put the squares into the bag labeled "Where It Lives." The squares from the second column go into the "How It Moves" bag, and the squares from the third column go into the "What It Wears'" bag. Have them shake the bags to mix up the squares.

7. To start, have one member of each pair take a square from each bag. Have students write the word on the square in the appropriate column of the chart they made. They should take rums doing this until all the bags are empty and then should put the squares back into the appropriate bags.

8. Explain to the students that they will need to do a little detective work to complete their chartswith the right animal names. For example, if a row lists the words forest, flies, and exoskeleton, the students should do research to find one or more examples of an animal that has all three of these characteristics. (A forest-dwelling insect such as a katydid has this combination of traits.)

9. Give the students time over the next week to research animals and fill in their charts. For combinations that they cannot identify (for example, if the characteristics in one row of their charts require them to find an animal with fur that hops and lives in the water), allow them to pick another characteristic from one of the bags.

10. After they've finished their research, have the students present their findings to the rest of the group. For each species they identify, students should be prepared to say how that species is especially suited for the environment it lives in.

VARIATION

1. Refer to the different environments listed in Step 1 above. Ask the students if plants are specially adapted for different environments as well. *(Remind them to include trees, shrubs, fungi, and aquatic plants when thinking of "plants.")*

Give examples of adaptations such as air bladders to keep plants afloat (seaweed), tasty fruits for animals to eat and spread their seeds (apple tree), structures for storing water (cactus), and so on.

2. Keep the group in pairs. Tell pairs that they will play "Diversity Detectives" using plants instead of animals. Each pair will have to decide on three categories by which to identify plants (similar to the "Where It Lives," "How It Moves," and "What It Wears' " used for animals). You can suggest categories such as "Where It Lives," "How It Reproduces, "How it Gets Food," "How It Looks," "How People Use It," and "How It Protects Itself." They should relabel their three bags for the new categories they decide on.

3. Students then should make cards similar to those used for animals. They will identify four characteristics in each plant category. For example, if they use the category "How It Reproduces," they may to want to list characteristics such as "Has Tasty Fruit" (for spreading seeds), "Has Bright Flowers" (for attracting pollinators), and "Has Seeds that Float or Flutter." They should put these cards in the appropriate bags.

4. Each team should make a blank chart as before but should identify plant categories instead. Each partner takes a turn drawing a set of three cards, while the other partner fills in the appropriate words on the chart. Together, they should try to think of a plant that has those three characteristics, i.e., for "woody," "tasty fruit," and "fields and yards," they might say "apple tree."

EXTENSION

Have the students use the cards they made in the activity to play the “Spice of Life” game described below.

Here’s How to Play

1. Teams of two play one another. Put the set of cards (plant or animal) into the appropriate bags.

2. Have the students create six “wild cards.” They should add two wild cards to each bag.

3. Have each team take turns pulling a set of cards out of the bags (one from each bag). The opposing team must try to think of an animal or plant that has all of the characteristics printed on the cards. If a team pulls a wild card, they can pick any characteristic they want, provided that it fits the category of the bag it came from.

4. To simplify the game for younger students, you may want to have them pick only one card per play and think of a plant or animal with that trait. They can alternate the bag they pick the card from each time.

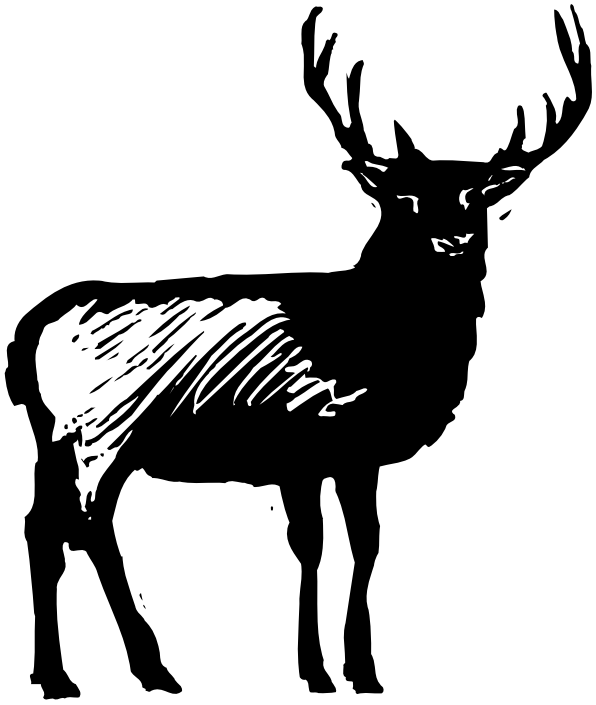
5. Develop your own rules for dealing with disputes. For example, if one team feels that an answer another team gives is inappropriate, they can use books to look up the plant or animal in question.

6. Have the students keep track of their own scores. A “right” answer wins one point, and an inappropriate answer or no answer results in no points.

7. When the bags are empty, the game is over. Have the students add up their points to see which team is the winner.

ASSESSMENT

After they do the activity, ask student if they learned more about the diveristy of life on Earth. Have them work in groups of three or four to come up with value statements related to diversity (i.e., many different plants provide food and shelter for animals, including people, in many different environments). Ask why there is such a diversity of plants and animals. Look for students to come up with the idea that animals are adapted to a variety of conditions.



CREDIT

This activity is adapted with permission from Project Learning Tree (PLT). PLT is a program of the American Forest Foundation. Go to *http://www.plt.org/* for more information about this award-winning environmental education curriculum.

Student Page

Cards For Game


Grassland


Swims


Exoskeleton


Desert


Hops


Feathers


Forest


Crawls, Walks, or Runs


Scales or Slimy Skin


Water


Flies or Glides


Fur

America's Rain Forests