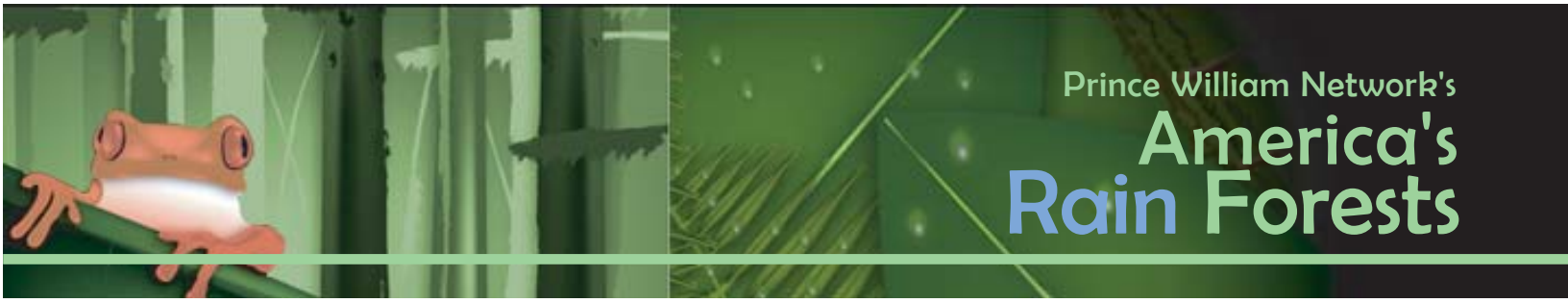


Planet of Plenty

Rain Forest Ecology

National Science Education Standards

- Standard C: *Life Sciences* — Structure and function in living systems.
- Standard C: *Life Sciences* — Populations and ecosystems.
- Standard C: *Life Sciences* — Diversity and adaptations of organisms.

OVERVIEW

In this activity, students will pretend they are visitors from outer space, viewing life on Earth for the first time. By describing, in minute detail, all the life they find in a small plot of land they will become more aware of the diversity of life on Earth and will better understand its importance.

OBJECTIVES

Students will:

1. Investigate the diversity of plants and animals on a small plot of land.

2. Explain the value of a diversity of life forms in a particular ecosystem.

SUBJECTS

Science, Language Arts, Visual Arts

VOCABULARY

Diversity, adaptation

TIME

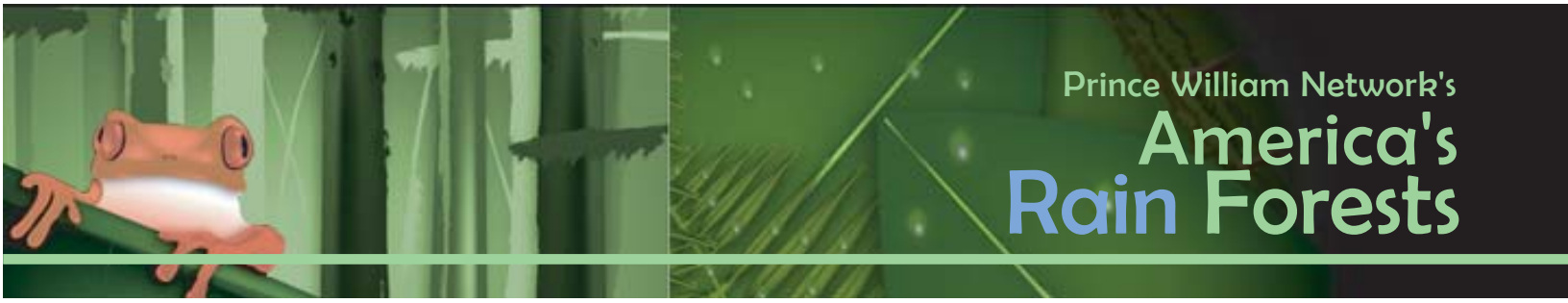
Two 50-minute periods

MATERIALS

Part A: None

Part B: (per team of four students) Clipboard or writing tablet, paper fasteners and magnifiers (optional).

Part C: (per team) Paper and poster board.



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.

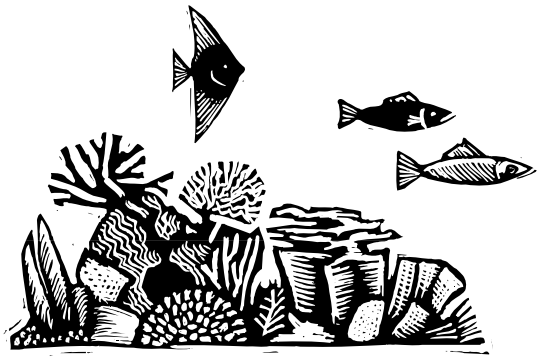
One of Earth's most valuable resources is its biological diversity, or biodiversity. This resource is made up of three components: genetic diversity, species diversity, and ecologi- cal diversity. Genetic diversity is the variability in the genetic makeup among individuals within a single species. Species 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

Find an area on or near the school grounds where groups of four students can set up study plots 20-foot (6-m) square. (You can adjust the size to suit your conditions.)



ACTIVITY

Part A—MISSION TO PLANET EARTH

1. Divide your group into teams of four.

2. Tell students to imagine that they're scientists from an overpopulated, polluted planet called Deevoid. Deevoid has a similar atmosphere, climate, and mineral composition to Earth but has very little diversity of life (though it once had great biodiversity). Deevoid scientists have long hypothesized that planet Earth is rich with a variety of life forms. To test this hypothesis, several teams of scientists have been sent on an exploratory mission to Earth. By studying the life on Earth, the Deevoid scientists hope to discover ways to improve the biological diversity and the quality of life on their own planet.

3. Explain that each team of scientists will set up a plot and study it for its variety of life forms. They will record, describe, and try to classify all the life forms they find. They can also draw conclusions about the diversity of life on Earth.

4. Have team members work together to devise methods for sampling, recording, and organizing their data. For example, they can create a chart indicating whether an organism is a plant or animal, whether it can fly, how many legs it has, and so on. Or they can make an "explorer's journal with notes about each organism. One or more team members should be official recorders, or everyone can take notes. Encourage the students to make sketches as well. When the research is complete, the data sheets and sketches should be evaluated to see what trends emerge.

5. Explain that, when the scientists arrive back on Deevoid, they will present their findings at a conference. Since Earth organisms are completely unknown to their colleagues back on Deevoid, the scientists must be careful to make detailed observations while on Earth. For example, they may want to record detailed information about what the organism looks like, its size, where they found it, how it behaved, and so on.

Part B—DIVERSITY DATA

1. Take the students outside and give each team a tape measure or measuring stick. Also give them string, ribbon, or other materials for makring the boundaries of their plots. (This material can be saved for use in other activities.)

2. Assign each team an area in which to set up a 20-foot (6-m) square study plot. (You can scale the plot size up or down to suit location or time constraints. For younger students, use smaller plots.) Try to arrange teams so that they are spread out and cover a variety of microhabitats. For example, one team might be in a wooded area, another on a grassy lawn, and another right next to the school building.

3. Each team should first predict what forms of life, if any, they expect to find at which locations in their plot. They should write down their predictions.

4. When the students are ready to begin examining their plots, tell them to be carfeful not to pick up creatures like centipedes or wasps that could bite or sting. In fact, they should carefully avoid handling any creatures. They should keep their hands away from the underside of any rocks and logs that they turn over. Finally, remind the students to take care not to harm any plants or animals, and to leave things exactly the way they found them.

ACTIVITY-Continued

5. Allow students ample time to examine their plots and record their data.

Part C—BACK ON DEEVOID

1. Once the students are back inside (back on Deevoid), they should hold a conference to discuss the Earth expedition. Give each team time to prepare its presentation. Encourage the students to use posters, data charts, drawings, movements, sounds, or anything else to describe the life forms they encountered.

2. Ask students to take notes on all the presentations and then compare and contrast other teams' data with their own. Did any organisms appear in several plots? Were any organisms unique to a single plot? did any plots seem to have a wider variety of animals than other plots? If so, how might different environmental conditions have contributed to biodiversity? (Guide them toward discovering that, in general, areas with a greater variety of plants have a greater variety of animals. For example, a plot on the edge of a wooded area would tend to have a greater variety of insects than a plot on a lawn.)

3. After considering all the data and making comparisons, teams should try to draw conclusions about what factors influence the abundance or lack of biodiversity. Did the mission to Earth provide enough data for teams to draw conclusions? What future study missions do the teams recommend?

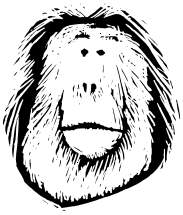
4. Ask the students how their predictions compared with their actual findings? Do they think their investigation and collection methods were thorough and accurate? How would they do things differently next time?

5. Have the students brainstorm ways that biodiversity on planet Earth fits the lives of its people. How might the people of Deevoid begin to improve their planet's biodiversity for the future? Answers will vary, but could include ideas such as decreasing pollution, increasing the abundance and variety of vegetation, and so on. What additional information would they like to have about Deevoid to help solve this problem?

6. Ask the students to imagine a place on Earth that is teeming with plant and animal life, and have them share their reflections. Explain that Earth has many communities rich in biodiversity, such as rain forests, coral reefs, swamps, and Everglades. Explain that every species is an integral part of a community (*let students give examples*) and that the stability of a community depends on the diversity of its species.

EXTENSIONS—Interplanetary Pen Pals

Write names of plants and animals on separate slips of paper. Mix them up, and let each person pick one randomly. Tell the students to imagine they have a pen pal on a different planet. Have them write a letter to their pen pal describing the animal or plant they picked. Afterward, have the students read their letters to the rest of the group (being careful not to say the name of the animal or plant.) the "audience should try to figure out the name of the organism that each letter is referring to.



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.