Flipbook Succession

Rain Forest Ecology

National Science Education Standards

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

OVERVIEW

As students walk (or crawl) along a transect line, they will observe differences in the types and abundance of plants, draw these changes, and make a flipbook to show stages of succession along a transect.

OBJECTIVES

Students will:

1. Students will identify and record the successional stages of a local forest or natural area.

SUBJECTS

Science, Social Studies, Art

VOCABULARY

Herbs, pioneer, sere, shrubs, succession, successional stage, transect, biomass,

TIME

1-2, 50-minute sessions.

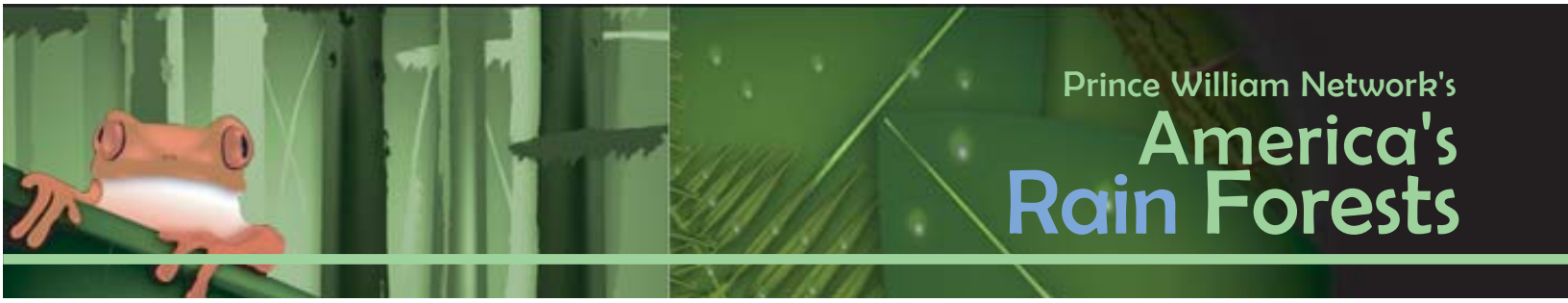
MATERIALS

Enough 3 x 5 cards (or 5 x 7) for each student to have at least 10 cards, two brass fasteners per student, one clipboard or cardboard for drawing surface per student, pencils, hole punch, rope long enough to signify a transect from pioneer stage to climax forest (several hundred feet maximum).

OPTIONAL: *Alaska Ecology Card*s, separate cards or construction paper for booklet covers.

TEACHER TIPS

This activity works well if you familiarize yourself with local plants prior to doing the activity with students. You may also invite a botanist, forester, naturalist, knowledgeable community member, or elder into class to assist you with this activity.



BACKGROUND

Plant succession is a repeatable, directional change in the types of plant species that occupy a habitat through time after a disturbance. Scientists have classified many different types of succession. In the majority of these successions types, the initial plant community is dominated by small, short lived weed species that have the ability to produce many seeds. The species found the late stages of succession tend to huge, long lived species that produce only a few large well developed seeds. A number of mechanisms have been identified as the causal mechanisms responsible for succession. The mechanisms involved in succession include: facilitation, abiotic modification and resource competition; differential competition of resources by the plant species; and differential competition of space by the plant species.

Primary Plant Succession

The process of plant succession begins just as soon as a land area capable of supporting plant life is formed. Some examples:

- accumulation of sand dunes at the edge of the ocean or a lake
- exposure of rock by a retreating glacier
- cooling of a lava flow

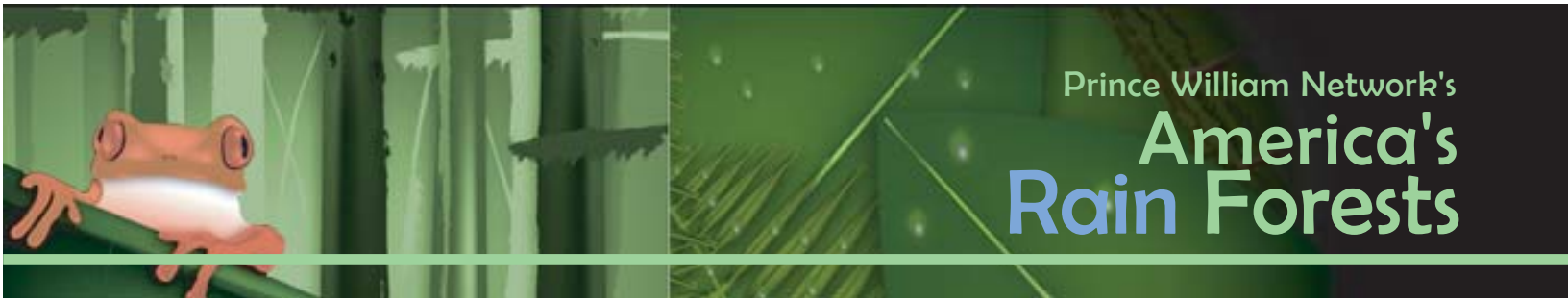
Secondary Plant Succession

Lumbering, grazing, farming, fires, and hurricanes interrupt the process of succession by removing the dominant plants in the community. Their elimination sets the stage for a new succession to begin.

The colonization of bare rock, the filling in of a pond, and the secondary succession that follows the abandonment of a field each involve different species in the early stages. In any given region, though, the species in the final, self-sustaining climax forest are the same. The tendency for all plant communities to end in the same climax community is called convergence.

In general, plant succession is a reflection of the increasing efficiency of the community at intercepting the energy of the sun and converting it into chemical energy. As one stage of succession follows another,

- the **biomass** of the community increases. This is the outcome of the increasing amount of
- **net productivity** — calories stored by the plant community.
- This, in turn, provides calories for a larger community of **consumers**.
- As succession continues, the diversity of species in the community increases — at least for a time.
- When the system approaches its **climax**, the **rate** of increase in net productivity of the plants is consumed by its own heterotrophs.
- The system comes into equilibrium and reaches peak efficiency at channeling the energy of the sun into the food web of the community.



BEFORE THE ACTIVITY

IN ADVANCE, locate an area with plants ranging from **pioneer** stage through as many **successional stages** as possible to **climax** forest. Spring, summer, or fall will give more successional clues. *Look for such areas* where gravel pits, dirt parking lots, or abandoned fields meet a forest.

ACTIVITY

1. *IN CLASS,* review your forest's (coastal or boreal) **succession charts** with students before making a visit to the site. These charts will vary from region to region. Explain that students have new jobs as foresters, botanists, or biologists. Their first assignment is to describe the **successional stages** at a nearby site.

2. *AT THE OUTDOOR SITE,* students number the cards to match the number of knots/markers on the transect line. An ancient tree still lives in Alaska. Fossil records tell us that the plant, horsetail or *equisetum*, was once a mighty tree. It grows about a foot tall now and is no longer a true tree. You can see horsetail in many disturbed areas. (#25 of *Alaska Ecology Cards*)

3. Set up the **transect** by laying the rope along the ground across the area. *For example, start one end of a 100-foot rope on the edge of an abandoned dirt parking lot and stretch it into the adjacent woods.* The rope becomes a visual cross-section.

4. Make knots in the rope at spots where you want students to draw a picture of the successional stage, *OR* put flagging tape or other marker at the observation spots.

5. Students draw as much as they can on an index card at each station. Encourage students to observe all the kinds of herbs, shrubs, and trees at each spot, and to make their drawings in profile, as if they were lying on the ground looking head-on at the plants *(as in the succession charts)*.

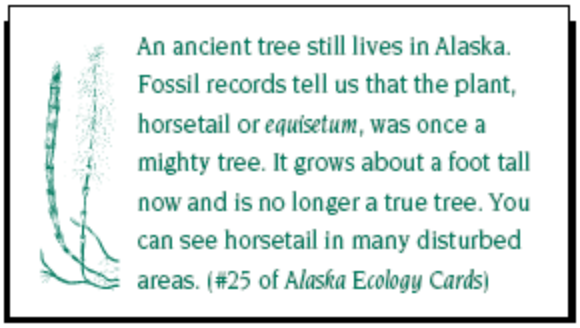
6. *As students move along the rope, they will notice that the* numbers and kinds of low growing annual plants like fireweed decrease. As they move into the forest, small trees may begin to appear. By the time they reach the forest, they might find tall spruce, hemlock, or birch with thick sphagnum moss on the ground.

7. *BACK IN CLASS,* give students time to complete the details in their drawings.

8. Students arrange the cards in successional order, punch holes in the cards, and fasten them with the brass fasteners. Covers are optional. Students may work in groups of 2 or 3.

9. Students refer to their succession charts to label the various stages or **seres** they observed.

10. Practice flipping through the stages of succession, and watch the forest grow!



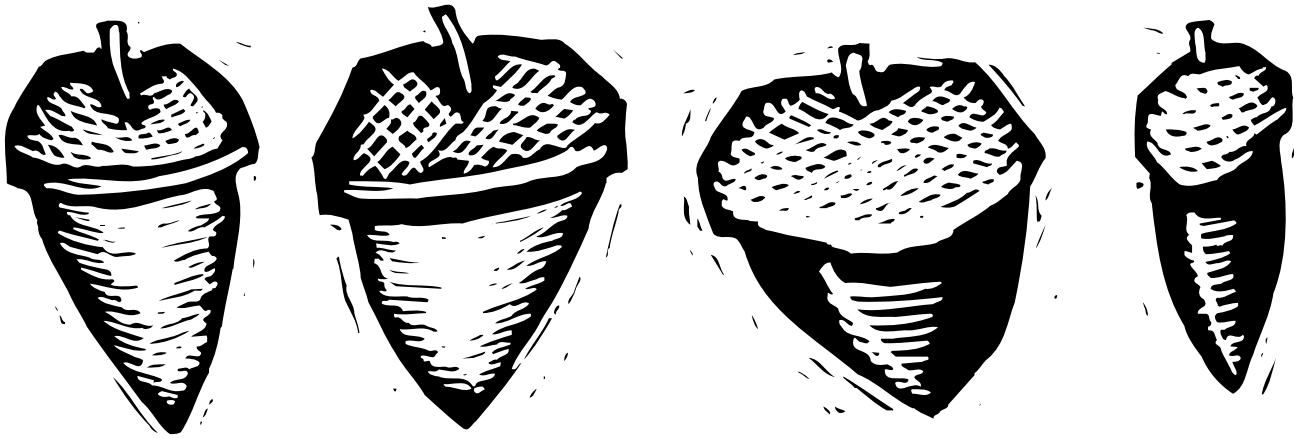
EVALUATION

1. Students put a new set of pictures in successional order and label the stages.

2. Students arrange a set of written forest descriptions in successional order, adding a drawing, and label to each one.

EXTENSIONS

Make puzzles out of the succession cards. Students cut their succession cards into puzzle pieces for classmates to reassemble.



CREDIT

This activity is adapted with permission from the Alaska Wildlife Curriculum (AWC). AWC is a program of the Alaska Department of Fish and Game. Go to *http://www.wildlife.alaska.gov/education/wilded/awc.cfm* or *http://www.adfg.state.ak.us/* for more information about this award-winning environmental education curriculum.