



Grade: 3

Subject Areas:

Life Science, Earth
Science, Investigation
and Experimentation

Skills: listing,
modeling, describing,
predicting,
experimenting

Duration: 1 hour

Connections:
ecosystems, erosion,
land management, plant
science, food webs

Vocabulary

dominant
ecosystem
Coastal prairie
grasses
forbs
erosion
stabilize
producers

Cool Coastal Prairies

Objective:

Students will learn about the coastal prairie ecosystem and the benefits it has to the overall landscape including erosion control.

Materials

- paper and pencils
- list of plants and animals of the coastal prairie
- pictures of coastal prairie habitat
- paint roller trays or baking pans (2 per group)
- gardening soil (enough to cover 8-10 pans)
- fake grass or other alternative covering like carpet
- beakers of water (2 per group)
- rags and sponges for clean-up
- BLM video on erosion (optional)

Standards

Strands: Excellence in Environmental Education Guidelines

Strand 1 — Questioning: F Working with models and simulations: Learners understand that relationships, patterns, and processes can be represented by models.

Strand 2.2 — The Living Environment: A) Organisms, populations, and communities: Learners understand basic similarities and differences among a wide variety of living organisms. They understand the concept of habitat. **C) Systems and connections:** Learners understand basic ways in which organisms are related to their environments and to other organisms. **D) Flow of matter and energy:** Learners know that living things need some source of energy to live and grow.

Strand 2. 4 Environment and Society: A) Human/environment interactions: Learners understand that people depend on change, and are affected by the environment. **B) Places:** Learners understand that places differ in their physical and human characteristics.

California State Educational Standards:

Physical Sciences 1a: Students know sources of stored energy take many forms, such as food, fuel, and batteries.

Life Sciences 3a: Students know plants and animals have structures that serve different functions in growth, survival, and reproduction. **3b.** Students know examples of diverse life forms in different environments, such as oceans, deserts, tundra, forests, grasslands, and wetlands.

Investigation and Experimentation (I and E) 5d: Students will predict the outcome of a simple investigation and compare the result with the prediction.

Background

Coastal Living

Most people think of northwestern California with its majestic redwood forests, wild river systems and pristine coastline. Nestled within these natural treasures is an often overlooked ecosystem, the Coastal prairie—the focus of this lesson.

Different **ecosystems** are often categorized by their dominant vegetation types. A **dominant** species is the most numerous. An ecosystem is a system formed by the interaction of a community and the physical environment. It includes both the living and non-living components of an area. How these components interact potentially differ from place to place. For instance, coastal salt marshes are influenced by plants that get rid of excess salts. Forests are dominated by conifers and hardwoods such as, coast redwood, Douglas fir, tanoak, and Sitka spruce. Oak woodlands are dominated by oaks, and so on.

Coastal prairies are sunny places prized for their beautiful wildflowers and are dominated by grasses.

Grasses are flowering plants with a fibrous root system and a unique floral arrangement. Some grasses live year after year and are called perennial grasses. Examples include Idaho fescue, blue wild rye, and California oatgrass. Many native grasses of California belong to this group, but have historically been replaced by invasive, non native annual grasses through introduction by early settlers in combination with the effects of over-grazing.

Coastal prairies are found within 100 kilometers or 160 miles from the ocean and extend from Santa Cruz northward to the Oregon border and generally below about 1000 m or 3,280 ft in elevation. Coastal prairies are open places often winding their way around oak woodlands and coniferous forests. A host of small **forbs** or non-woody plants often accompany these increasingly rare ecosystems such as checker mallow, western dog violet, and yarrow. This ecosystem often neighbors another called coastal scrub.

Coastal scrub, like the name implies, includes soft, woody shrubs less than 2m or 7 ft tall such as coyote brush, poison oak, California blackberry and

sticky monkey flower. Unfortunately, prairies are often overtaken by shrubs and other fast growing plants like bracken fern if grazers (elk, deer, etc.) and fires are eliminated.

Slippery Slope

Some areas within the King Range NCA are prone to landslides and other erosional features like slumps and gullies. **Erosion** is the loosening, transportation and relocation of sediments or soil. On steep slopes or where vegetation has been removed, erosion can lead to problems. High rainfall amounts accelerate the problem. Coastal prairies are particularly susceptible compared

Local Connection

Seeds have evolved clever ways of transporting themselves. Some seeds are carried by the wind. These are airborne seeds. Some airborne seeds have “wings” like maple seeds or are carried on a piece of “fluff” like dandelion and thistle seeds. Some seeds are so “fluffy” one may not recognize them as seeds; the “cotton” of cattail or the fluff of milkweed are examples of these. Others seeds have ways of “hitchhiking”. If you look closely at hitchhiking seeds, many have hooks, barbs and other sharp points that allow them to stick to hair, feathers, and clothing. Many non-native grasses were introduced into California and other locations this way by hitchhiking on the legs of cattle and other livestock. For example the grass seeds of foxtail are notorious for sticking into an unwary traveler’s socks. Cleaver, a small green forb with a dainty white flower was the model used for the manufacturing of Velcro, one of the most famous sticky materials. The seeds of plantain, a common weed found in lawns produces a sticky jelly-like substance created after a rainy day. Animals can also transport seeds by eating them. They deposit seeds that survive the passage through their digestive system in their poop. Other seeds travel on water because they can float. The coconut is a floating seed so well protected it can travel on water for years before it is washed onto a distant shore.



to forested habitats, for instance, because they lack large roots like those belonging to trees and shrubs. Because of this, grasslands can slip out more easily. Road building, the plowing of fields and overgrazing are human activities that can increase erosion. In the King Range NCA, efforts are made to reduce erosion.

One way to prevent erosion on exposed slopes is the planting of grasses. They grow very close together and have a lot of roots. Like other plants, their roots hold soil and moisture. Because grasses are so abundant and spreading, their leaves and root systems act as ground cover. In this way they help slow the flow of water over land and help **stabilize** or hold the soil in place, reducing erosion.

amphibians also make the Coastal prairie their home. Besides the larger animals, a host of smaller organisms may live in a coastal prairie. Many of these are important pollinators including bees, flies, butterflies and beetles. Others include spiders, mites and grasshoppers. All of the various organisms that live in an ecosystem are important components in the web of life.

Not only does wildlife depend on coastal prairies, but people enjoy them too. This unique ecosystem offers important open spaces which acts as corridors for wildlife and are visually pleasing to people. Many people come to these places for recreational opportunities and solitude. Hiking, photography and bird watching are just a few enjoyable pastimes practiced here.

Eating Greens

Plants need light, water, space and minerals to survive. As long as those requirements are met, they will flourish. Plants, including grasses, are known as primary **producers** and are the start of all land-based food chains. As the first step in a **food chain**, plants provide energy or food for the animals that eat them. No matter what the dominant vegetation type is, all plants are fueled by the sun. Plants are able to absorb sunlight and convert it into sugars which they use as food in a process called **photosynthesis**. Many animals then eat the plants (herbivores) and are provided energy.

Remote and picturesque, the King Range NCA offers some of the most dramatic examples of the coastal prairie ecosystem in northern California. Another large preserve includes Pt. Reyes National Seashore near the San Francisco bay area. No matter where one goes to enjoy this unique ecosystem, it is truly a jewel to behold and worth saving.

Coastal prairies provide homes for many animals big and small such as elk, deer, jackrabbits, coyotes, and a wide array of rodents. Common rodents include pocket gophers, deer mice, and California voles. Some rodents burrow under the soil and help aerate it. Birds, reptiles, and

Activity 1: Building a Coastal Prairie Ecosystem

Procedure

1. Show some pictures of the coastal prairie ecosystem. Write the definition of ecosystem on the board. Ask the students questions to find out what they already know about coastal prairies.

- *What is a ecosystem?*
- *Who can give me an example of an ecosystem?*
- *What is a grassland?*
- *Are grasslands the same as prairies?*
- *How do plants get their food?*
- *What else do plants need to grow?*
- *Do we have prairies around us?*
- *What types of plants are a part of a coastal prairie?*
- *What types of animals live in a prairie?*
- *What do all plants and animals need to survive?*
- *What else could you find in a coastal prairie?*

2. Explain to the students that today they are going to build a coastal prairie. Their prairie has to have all of the things necessary for the plants and animals to survive in it. Next, explain that in order to build their prairie, they are going to make a list of 10 things that they would put into their prairie (there is not right or wrong responses at this point).

3. Pass out paper and pencils to all students. Have them make their list of 10 things (they can have no more than 10). Assist where necessary. If a student is stuck, you can help by giving broad categories of things they might want in their prairie like grass, rock, water, etc.

4. After the students have made their list, have them put their pencils down. Explain that is your turn to make a list, but you want their help. Write down 10 things as they raise their hands giving you suggestions (there is still no right or wrong responses). Once you have a list, explain that there are four things a prairie must have to live. Emphasize that you cannot have a prairie without these vital things. Have them predict what these four things are. Allow several students to respond. You are hoping for: the sun, water, soil (or

Materials

- paper
- pencils
- list of plants and animals of the coastal prairie
- pictures of coastal prairie habitat

minerals) and space. Remember, as long as there is sunlight and a plant, there will be air (in a simplified way). The process of photosynthesis makes oxygen. If one of these was not on the original list, add it. Every time you add a term, you have to delete one, so that your list does not exceed ten things.

5. Now that the four basic thing have been discussed (food, water, space, and air), move on to the next item in the list. For discussion purposes, you want to make sure every item on the list has what it needs. For example, if a deer is listed, you must also list one or more plants and soil, since deer eat plants and plants need soil. Remember that if you need to add something missing from the list, another item must be removed. Once the list of 10 things is complete, ask the students what it is that you have all just created. Answer: an ecosystem! Finish up by having each of them look at their original list and make corrections. These lists can be displayed around the classroom.



Activity 2: Land on the Run (an investigation in erosion)

Preparation

Pat down soil in all of the trays so that the level is just below the edge of the tray and 3/4 of the surface is covered. This can be done ahead of time by an adult or by the students. The covering needs to be cut to fit over the surface of half of the trays. Once cut to fit, lay the carpet over the soil in half of the trays. An alternative is to plant real grass in half of the trays. This needs to be done **two weeks before** the activity.

Procedure

1. Explain to the students that they are going to compare two slopes: one with grass and one without, during a rainstorm. This is to model the importance of grass in the prevention of erosion.
2. Break the students up into groups of 4-5. Situate the two trays side by side for each group. If baking pans are used, prop them up to model a slope or have them hold them up at a slight tilt. Have one pan with bare soil and the other with a covering over the soil modeling the role of grasses. Students can share in the tasks. Have them slowly pour one beaker of water over the soil in the tray with no covering to see what happens to the soil. They all need to closely observe what happens. Have them repeat by pouring another beaker of water over the covered soil. Ask them to pour the water at the same rate. This is a simple exercise demonstrating exposed soil is easily moved.

- *What do we mean when we use the word erosion?*
- *Does erosion happen around here?*
- *What kinds of erosion have you seen?*
- *What kinds of problems can erosion cause?*
- *What are some human activities that cause erosion?*
- *How do you think grass helps in the slowing of erosion?*

Materials

- paint roller trays or baking pans (2 per group)
- gardening soil (enough to cover 8-10 pans)
- fake grass or other alternative covering like carpet
- beakers of water (2 per group)
- rags and sponges for clean-up
- BLM video on erosion (optional)

3. After each group has poured water over each tray once, have them repeat it. This time try have them hold the tray up at a steeper slope or pour at a faster rate. This may get a little messy and can easily be done outside. Have them share their observations and then clean up. Wrap this exercise up by showing a video on erosion.



Extensions

- Sing songs about soils: A great list is available at: <http://soil.gsfc.nasa.gov/songs/songs.htm>
- Connect the sun's energy and its importance to plant growth to other energy sources.
- Make wildflower books, pressed displays or notepads during the spring or fall seasons.
- Role play different sized plants and how shade influences them.
- Have the students model rain and the importance of plants and rocks on a slope by acting out the parts outside on a hillside. (See Just Passing Through from Project WET)
- Put perennial grasses and annual grasses into a safe fire to see which one survives the best.
- Take a field trip with the Mattole Restoration Group to collect grasses. Compare native grasses with non-native ones.

References

- Antonio, C, Bainbridge, S, et al, Ecology and Restoration of a California Grasslands, www.californiarangeland.ucdavis.edu
- Coastal prairie and rangeland, <http://www.sfsu.edu/~geog/bholzman/ptreyes/tripcpr.htm>
- Coastal Praire, <http://www.cruzcnps.org/CPrairieTxt.html>, 2010
- Keeping Soil in Its Place, http://extension.usu.edu/aitc/lessons/pdf/dirt Keeping_soil.pdf, Utah Agriculture in the Classroom pg 46-52, 2010
- King Range National Conservation Area Draft Resource Management Plan and Draft Environmental Impact Statement, U.S. Department of Interior, BLM, Arcata Office, Jan. 2004,
- Terrestrial Vegetation of California, pg. 491-510 and .pg. 733-745, California Native Plant Society, UC Davis, 1989
- Travelling Seeds, Lesson 1 Growing Plants in the Garden, <http://www.extension.iastate.edu/growinginthegarden/pdf/travel.pdf>, revised Sept. 2000

FOSS Connection

Grade 3

Earth Science: Earth Materials



