

Nature Rangers

**Field Trip and Classroom Kit Overviews, Plus
Supplemental Activities**

**A hands-on learning experience in
the Pogonip Open Space**



SANTA CRUZ MUSEUM
of natural history

TITLE: Nature Rangers

TOPIC: Students practice being naturalists by making observations and comparing natural communities and different ecosystems as they hike through them.

Why is this a relevant and interesting topic? In the process of developing observation skills in nature, students also build and apply foundational knowledge in the fields of biology, ecology, geography, and history. This unique learning environment allows students of multiple learning intelligences to thrive and connect to nature and science. Repeating observations, finding patterns, and making connections as they move through different habitats is an engaging and rewarding way for students to develop common science practices that will benefit their science education in the classroom. Thinking about nature as a system, and physically connecting these ecosystems by walking through them, helps students to come closer to the environment and begin to realize that they too are a part of natural systems.

Theme Statement: This field trip program offers students the opportunity to make observations and develop questions about the natural world. They practice science skills while comparing natural communities and ecosystems in a local park, and explore the relationships between the living things, the environment, and themselves.

Guiding Question: How do the communities of pogonip compare and connect?

Stewardship Goals: Students create a concrete connection to the natural world through observation and exploration and be inspired not only to return to a local natural setting, but to look closely at it and realize their role in it. They will be prepared to:

1. Make choices that demonstrate an understanding that the health of their environment influences their own health and that of their community.
2. Notice plants and consider their value/use for food, tools, shelter, etc.
3. Take action to conserve resources with an understanding that all animals, including humans, are connected and need clean food, air, water, and space to survive.

Primary Objectives

By the end of the program, students will:

1. Correctly identify three local natural communities, the features that distinguish them, and how they fit into a model of ecological succession.
2. Understand how both living and nonliving factors cause change in these communities, as well as the role of water in shaping the characteristics of each.
3. Share examples of how humans affect these ecosystems, including management and historical use.
4. Identify edible and medicinal plants, and plants that were used by native people in the area thousands of years ago.

Next Generation Science Standards

Disciplinary Core Ideas Supported	Science and Engineering Practices Supported	Cross-Cutting Concepts Supported
<p><i>ESS2.E Biogeology:</i> Living things affect the physical characteristics of their region.</p>	<p><i>Analyzing and interpreting data:</i> -Analyze and interpret data to make sense of phenomena using logical reasoning</p>	<p><i>Cause and Effect</i> -Cause and effect relationships are routinely identified, tested, and used to explain change</p>
<p><i>ESS2.A Earth Materials and Systems</i> Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and moves them around</p>	<p><i>Constructing explanations and designing solutions:</i> -Construct an explanation of observed relationships -Use evidence to construct or support an explanation</p>	<p><i>Patterns</i> -Patterns of change can be used to make predictions. - Patterns can be used as evidence to support an explanation.</p>
<p><i>LS2.C Ecosystem dynamics, functioning, and resilience:</i> When the environment changes, some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die.</p>	<p><i>Asking questions and defining problems:</i> -Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationship.</p>	<p><i>Stability and Change</i> -Change is measured in terms of differences over time and may occur at different rates. -Some systems appear stable, but over long periods of time will eventually change.</p>
<p><i>ESS3.C Human impacts on Earth's systems:</i> Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth's resources and environments</p>		
Performance Expectations		
<p>4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p>		

The Nature Rangers program has been aligned to the current Next Generation Science Standards. We incorporate the three dimensions of the standards throughout the program's activities, which are taught by trained docents and staff along the 5E Teaching Model.

Nature Rangers Program Outline and Dynamics

Pre-Trip Preparation:

The Pogonip open space is an exciting place to explore, but it is not an urban park. There are no accessible bathrooms or water fountains in the area. We recommend you have your students use the restroom and fill up water bottles before leaving school; our docents have toilet paper and hand sanitizer in their field backpacks for emergencies on the trail. Parking is fairly limited, so it is best to consolidate space as much as possible if your group is carpooling. You may also want to go over the topic of poison oak and ticks ahead of time with your class, although our experienced outdoor education team runs through a safety talk on these subjects at the beginning of every field trip.

Field Trip Structure:

Upon arrival, our experienced staff and docents will greet your class at the Pogonip parking lot and escort them up to the beginning of our trail. We will give an introduction that outlines the theme of the day and our expectations for maintaining student safety on the trail. Your class will then split into two groups to hike the same 2 mile loop in opposite directions with a docent guide. Docents have planned activities (listed below) that happen on every tour and allow for hands-on learning about subjects related to communities and ecological interactions. Because our outdoor setting provides many unplanned learning experiences, your docent may not get to every activity. We culminate with a full-group wrap-up as we meet back at the entrance. In total, the tour is 3 hours long with a 15 minute introduction and a 15 minute conclusion.

Nature Rangers Tour Activities:

1. **Predator-Prey** -- Students spend hands-on time observing, discussing, and asking questions about two animal skulls (a coyote and a deer). They are engaged in conversations about how animals from different communities interact.
2. **Food Chain Game** -- Students learn about different ecological interactions and their influences on each other through a game.
3. **Meet a Tree** -- Students spend time observing a tree in partners and developing their ability to focus on interesting minutiae and practice asking questions.
4. **Woodrat Nesting** -- Students discuss the lifestyles of woodrats and attempt to build different nests out of materials around them in the evergreen forest.
5. **Golden Moments** -- Throughout the hike docents engage students in moments of observation that help them discover the differences and similarities (and sources of change) in the three communities. At three locations they measure and document temperature, canopy cover, and ground composition.

Nature Rangers Classroom Kit Outline and Supplemental Activities

Why do we provide the Classroom Kit?

This activity kit is designed to familiarize your students with topics presented in the “Nature Rangers” field trip, and to provide a depth of experience and opportunity to apply knowledge after the trip. The activities within this kit will give your students a better understanding of such topics as adaptations, community connectivity, human influences and change over time using unique artifacts and hands-on exploration. They are designed to build a strong background for the field trip itself, thereby enhancing your students’ outdoor experience.

How does it work?

We provide different activities that will help students build a more comprehensive understanding of relevant concepts. These activities can be adjusted to different age or learning groups by adjusting the level and amount of reading and writing, and choosing appropriate vocabulary. For example, if you feel that there are too many words for a younger age group, you can omit the included worksheets and focus purely on observational activities. Conversely, if you feel that your students would benefit from more written analyses, the kit’s curriculum includes extensional writing prompts with particular activities, which help to further understanding and scientific observational skills.

Classroom Kit Contents

1. Supplemental Activity Curriculum Descriptions
2. Materials to support curriculum
3. Visual Aids to support curriculum, including photos, diagrams, and worksheets
4. Artifacts to foster hands-on learning

List of Activities and Key Concepts Covered

1. Pogonip Timeline - community connectivity and human influence
Students learn the history of Pogonip from first inhabitants to modern time, exploring how people and the environment have been connected and how it has changed.
2. Bill Nye Rock and Soil DVD - rock cycle and environmental change over time
Students learn about the rock cycle and soil types, then follow up with discussion questions.

3. **Pogonip Pandemonium -adaptations and connectivity**
Students explore animal adaptations and how animals, plants and the environment are connected.
4. **Peek inside the Bean Seed - adaptations and biology**
Students observe a bean seed as it starts to grow into a bean plant.
5. **Stuck in the Web of Life* - connectivity and web of life**
Students play an interactive role in the food web using string to explore connectivity and the effects of population on the food web.

* This activity is described below. The Classroom Kit includes the visual aids and materials for all activities, but many can be recreated with materials in most classrooms.

Stuck in the Web of Life

Learning Objectives

Through this activity, students will:

- Become familiarized with the interconnectedness of living and nonliving things.
- Understand how different organisms play different roles in an ecosystem
- Learn how removing an organism from an ecosystem can affect other parts of it.

Background Information

Every organism on the planet depends on a variety of other organisms, as well as non-living things, for survival. Organisms interact with their environment and each other in many ways. The study of these interactions is called ecology. Some interactions are *exploitative*, like carnivores eating other animals, herbivores eating plants, or parasites living off of host organisms. The basis of exploitation is that one organism benefits while the other is harmed. Other interactions are *facilitative*, where one organism benefits and the other is either unharmed or benefits as well. Examples include a cattle bird eating the bugs being scared up by cattle trampling around, or cleaner fish eating parasites out of the mouth of a large-mouthed wrasse. Organisms interact with non-living things as well -- plants use the sun for energy, animals need water to live, and geological shapes can change the suitability of habitats.

Materials:

- 3x5 notecards with organism or component titles
- Marker
- Large ball of yarn, string or rope

Directions:

1. Have the class form a circle around a large open space.
2. Give each student a 3x5 card with names and or pictures of living and nonliving things. Let students assume the part of their picture and try to think as if they truly embody the role that they are playing.
3. Give yourself a role as well and start the game by holding the loose strand of yarn and tossing the ball to a student that you have a relationship with (i.e. competitor, predator, etc). Explain type of interaction that you have with that student once you have tossed them the yarn. The relationship can be something you eat, or a habitat that you need to live in, or something that eats you, or something you are affected by.
4. Now students can throw the yarn ball to other students and explain their interactions one by one. Indirect interactions are acceptable if adequately explained by the student.
 - a. Make sure that no one gets the yarn twice, go around until everyone has the yarn and then have the last student throw it back to you.
5. Now you can tell the students that you are going to tug on the yarn and that they should pull on it as soon as they feel the tug. This will allow them to feel their connectedness to everyone around them.
6. Now you can introduce an extinction event. Boom! An asteroid hits and wipes out all the mammals! Have all mammals let go of the yarn and "die". Have students pull on the string and see the big mess left behind once these animals were removed from the ecosystem.
7. Have the class discuss what they have lost now that the mammals (or other roles) have been removed. Has everyone been affected by this extinction event? Why is it important for ecosystems to have high levels of diversity?

Possible Roles:

Living: Deer, squirrel, rabbit, coyote, bobcat, mountain lion, wolf, cow, hawk, song bird, salmon, redwood tree, grass, oak tree, human, bat, bear, elk, lizard, moss, lichen, salamander, newt, wildflower, bee, fly, mushroom, etc

(sticking with one type of biome may make it easier to determine connections for students)

Non-living: Water, wind/air, dirt, cave, the sun, the ocean, a lake, a river, rock, light, temperature, humidity, cloud, rain, etc.