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Mountain habitat activity guide

Gina Glock

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MOUNTAIN HABITAT ACTIVITY GUIDE

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Education: Environmental Education Option

by
Gina Glock
May 1992
MOUNTAIN HABITAT ACTIVITY GUIDE

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Presented to the
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Approved by:

Advisor: Dr. Darleen Stoner
Date: May 18, 1992

Second Reader: Dr. Iris Riggs
Date: May 18, 1992
Abstract

Mountain Habitat Activity Guide

Gina Glock

California State University, San Bernardino, 1992

The attention given to activity-based instruction has warranted the need to provide teachers with materials to enhance science instruction including that about local fauna and flora. Thus, an activity guide with supplementary activity materials was developed to support activity-based instruction when utilizing the San Bernardino County Museum's Mountain Habitat Kit. This kit originally only contained mountain animals and pressed plants. This kit, of which there are 12 replicates, is used by local schools. The activities in the guide were compiled from several sources, including Project Learning Tree, Project WILD and NatureScope. The activities were aligned to the Science Framework for California Public Schools, Kindergarten through Grade Twelve (1991). The activities were field tested by 6 teachers with 212 students in five school districts during March and April 1992. The activities received favorable ratings.
Acknowledgements

I thank Dr. Darleen Stoner for all her encouragement, direction and support.

I would like to thank Gene Cardiff of the San Bernardino County Museum for use of the museum specimens and his involvement in the field testing.

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I would especially like to thank my husband, Bill Glock, for taking photographs, encouraging and having faith in me throughout my program and project.
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Introduction

The San Bernardino County Museum, with grant funding, has compiled eleven different Environmental Study Kits that are used by the community. Available through a check-out program, the kits are part of a community outreach program and are used by preschools, public and private schools, scouting and 4-H groups. Groups wishing to use the kits reserve the kits a year in advance and have them for a two week period. Each different museum kit contains information and museum specimens on a particular topic.

In the past the kits have not included lesson plans which teachers could use in order to engage their students in activity-based learning while using the kit. Thus, the goal of this project was to develop learning activities to accompany one of the Museum's Environmental Study Kits.

The kit chosen for this project was the Mountain Habitat Kit. This kit originally consisted of mounted plant and animal specimens which occur in our local mountains and a notebook with background information. This project enhanced the kit through the addition of an activity guide and some of the materials needed to conduct the activities.

To achieve scientific literacy for all students, science programs must present science in connection with students'
own experiences and interests (Science Framework for California Public Schools, Kindergarten through Grade Twelve, 1991). The revised Mountain Habitat kit can easily be utilized to provide experience based science learning.
Review of Related Literature

Activity-Based Science

The elementary science program holds great potential for enabling students to explore the natural phenomena in science. Children are most curious about the world; teachers can capitalize on this curiosity in ways that make science enjoyable and meaningful (Science Framework for California Public Schools, Kindergarten through Grade Twelve, 1991). This framework supports student learning through constructivism, whereby children learn by actively constructing their own knowledge through discovery and exploration (O'Neil, 1992).

The 1991 Science Framework suggests that students should actively experience science rather than passively read about it. Instructional materials should involve students in science through problem solving and decision making. Programs should encourage learning in which students are actively engaged in the doing of science, rather than treating students as passive learners. Part of this approach is to use hands-on, manipulative, and experimental materials to solve problems (Science Framework for California Public Schools, Kindergarten through Grade Twelve, 1991).

The active learning emphasis by the Science Framework has been supported by research studies. In a study done with
Elementary Science Study (ESS), Science Curriculum Improvement Study (SCIS), and Science-A Process Approach (SAPA), which were hands-on, activity-based programs developed in the 1960's, research showed that students in those programs achieved more, liked science better, and improved their science process skills more than did students in traditional textbook-based classrooms (Shymansky, 1982).

Hough and Piper (1982) studied the learning of scientific concepts of elementary students. Their study concluded that an activity-based program will lead to greater student achievement.

Story and Brown (1979) studied the link between the elementary students' attitude toward science and the method of instruction. The study showed a significant increase in attitude for students involved in an activity-based science program.

Research conducted by Yager and Penick (1984), concluded that an elementary teacher's interest, attitude, and method of instruction play a major role in motivating students to want to learn about science. The teachers who actively generate enthusiasm and employ activity-based science programs, stimulated students to want to learn about science.

Activity-Based Environmental Education

Engleson (1985) stated that the objectives of environmental
education are to help students: become aware and knowledgable of the environment; acquire a set of values and feelings of concern for the environment; and acquire skills to identify, investigate and contribute to the resolution of environmental problems. At the lowest grade levels, activities should concentrate on the development of awareness by helping children become skillful in the use of their senses in investigating the environment.

Three programs that are exemplary in environmental education are Project Learning Tree, Project WILD, and NatureScope. Project Learning Tree helps students understand their interdependence with the total forest community. Project Learning Tree has been designed to provide experiences and skills about plants and the forest. The activities are based on a conceptual framework for environmental education designed to engage students in interdisciplinary explorations of concepts underlying all of the major academic disciplines (The American Forest Council, 1990).

Project WILD is also an interdisciplinary, supplementary environmental education program that emphasizes wildlife. The goal of Project WILD is to assist learners in developing awareness, knowledge, and skills which will result in constructive actions concerning wildlife and the environment upon which all life depends (Western Regional Environmental Education Council, 1986).
NatureScope is a creative education series dedicated to inspiring in children an understanding and appreciation of the natural world while developing the skills they will need to make responsible decisions about the environment. It includes information and activities about plants and animals (National Wildlife Federation, 1988).
**Statement of Goals and Objectives**

The goal of this project was to develop an activity guide to enhance the San Bernardino County Museum's Mountain Habitat kit, which would be used by teachers with their students in grades first through sixth.

Objectives for student learning through completing the activities included:

1. Identify local plant and animal species.
2. Illustrate a local food chain.
3. Identify interdependence of local plants and animals.
4. Relate human and wildlife needs and characteristics.
5. Categorize different types of animals.
6. Categorize living and non-living components of an ecosystem.
Design of Project

The Mountain Habitat Kit chosen for this project originally included a notebook with background information and mounted specimens of plants and animals which occur in our local mountains. The objective of the original kit was for students to be able to identify some common plants and animals in the local San Bernardino mountains. The activity guide, developed for this kit, expands the original objective to include the new objectives as stated in the goals and objectives section.

The activity guide was developed primarily utilizing activities from Project Learning Tree, Project WILD, and NatureScope to extend student learnings about the specimens in the museum's Mountain Habitat kit. These curriculum guides were selected since they are nationally implemented, award-winning environmental education programs, which emphasize activity-based learning. In addition to the activity guide, materials needed for some of the activities were provided as appropriate. Thirteen activities were developed. (See Appendix A.)

Activity A - The Mountain Habitat book is a color illustrated narrative of animal and plant species in the museum kit. (See Appendix B.) Included is a cassette tape of approximately 15 minutes to allow
students to learn about the species at a listening center. This activity was author produced.

**Activity B**- Bird 'n' Worms is an activity from *Project Learning Tree*. Students are able to describe the value of protective coloration to living organisms utilizing this activity.

**Activity C**- In a Food Chain, students make a paper food chain utilizing plants and animals in the Mountain Habitat kit. This activity was author produced.

**Activity D**- Forest Concentration is a game adapted from *Project Learning Tree*. The game pieces provided depict plants and animals of the forest ecosystem. Students are able to practice their recognition of the species by matching names and pictures.

**Activity E**- The Under Cover activity was adapted from *Naturescope*. It enables students to identify ways that animals are dependent upon a tree.

**Activity F**- In the activity Oak Tree Life Cycle, students make a mobile using an acorn and oak leaf with the patterns included and show the life cycle of an oak tree.

**Activity G**- Plant Personification, adapted from *Project Learning Tree*, enables students to portray their feelings about the forest environment through creative dramatics.
Activity H- Tree Cookies, adapted from Project Learning Tree, allows students to use a cross section of a tree to compare the growth of themselves to the growth of a tree.

Activity I- With the Touchy-Feely box, from Project Learning Tree, students are able to identify non-living components of the forest ecosystem. The box includes acorns, pieces of bark, dead leaves, pine needles, and a pine cone.

Activity J- You and a Shrew, adapted from NatureScope, allows the students to compare a shrew to a human. Included is a game in which students match human facts to corresponding shrew facts.

Activity K- In Web of Life, adapted from Project Learning Tree, students use a ball of yarn to describe the interdependence of forest organisms with other components of the forest.

Activity L- With the activity, Tracks, adapted from Project WILD, students make plaster casts of animal tracks and identify common animal tracks.

Activity M- In constructing an Outdoor Manners coloring book, adapted from Project Learning Tree, students recommend appropriate behaviors for the out-of-doors, specifically forests and public parks.

The Mountain Habitat Guide activities were correlated with the Science Framework for California Public Schools.
Kindergarten through Grade Twelve (1991). A correlation was done to assure the alignment of the activities with the framework. (See Appendix D.)

Twelve Mountain Habitat Activity Guides were made to be used by the San Bernardino County Museum. A guide was included with each of the Museum's Mountain Habitat kits which were checked out by teachers. Included was an evaluation to rate the guide. (See Appendix C.)
Results and Discussion

The evaluation was designed to analyze the effectiveness of the project developed activity based science materials (See Appendix C). Six teachers, who taught a total of 212 students, participated in the evaluation. They represented four different school districts (Barstow, Beaumont, Chino, and Riverside) and a private school (Keppel).

Of those teachers participating in the evaluation, three were first grade teachers, one a second grade teacher, and two were first-second combinations. Four of the six teachers had previously used the Mountain Habitat Kit before the guide was added.

The three rankings used were excellent, average and below average. Out of three possible rankings, all six teachers ranked "the extent to which the activity guide enhanced the museum kit" as excellent. Five ranked "the extent to which most of the materials were appropriate to grade level" as excellent; one marked average. Five ranked "the extent to which the activities gave opportunity for hands-on" as excellent; one marked average. All six ranked "the extent to which the quantity of activities provided as sufficient for use with the students" as excellent.

An average of three activities was done by the
teachers with activity I, the Touchy-Feely Box, being used the most. The most utilized activities were those for which the materials were provided in the kit. None of the activities which required materials to be duplicated by the teacher were used.

The amount of time spent utilizing the activities with students varied widely. Two teachers used them for one hour total; one teacher used them for six one-half hour lessons; and one teacher used them for two weeks.

The listed children's literature, recommended to engage students in interdisciplinary learning, was utilized by four of the six teachers. There were no suggestions given to improve the activity guide.
Implications for Educators

The activity guide was developed for one of the museum's 11 environmental kits. Educators interested in developing activities for other kits or museum specimens might consider the following recommendations. These recommendations are supported by the information received from the evaluations.

1. All materials needed for every activity should be included since activities needing preparation were not utilized.

2. The kits provide an excellent way for dissemination of environmental activities and thus acquaint teachers with *Project Learning Tree*, *Project WILD*, and *NatureScope*.

3. Children's literature is an excellent resource for use with activity kits.

This project should also be of interest to other museums when considering excellent ways for community outreach to the schools.
Bibliography


Western Regional Environmental Education Council. (1986). *Project WILD Elementary.* Boulder, CO.

Appendix A

Mountain Habitat Activity Guide
INTRODUCTION

The enclosed Mountain Habitat Activity Guide is meant to enhance the San Bernardino County Museum's Mountain Habitat Kit with hands-on activities. Depending upon the length of time you are using the kit you might not complete all the activities that you would like to. Please feel free to copy the materials and use at your convenience after returning the kit.
MOUNTAIN HABITAT ACTIVITY GUIDE

TABLE OF ACTIVITIES

ACTIVITY A-MOUNTAIN HABITAT BOOK & CASSETTE
ACTIVITY B-BIRD 'n' WORMS
ACTIVITY C-FOOD CHAIN
ACTIVITY D-FOREST CONCENTRATION
ACTIVITY E-UNDER COVER
ACTIVITY F-OAK TREE LIFE CYCLE
ACTIVITY G-PLANT PERSONIFICATION
ACTIVITY H-TREE COOKIES
ACTIVITY I-THE "TOUCHY-FEELY" BOX
ACTIVITY J-YOU AND A SHREW
ACTIVITY K-Web OF LIFE
ACTIVITY L-TRACKS
ACTIVITY M-OUTDOORS MANNER COLORING BOOK

RELATED CHILDREN'S LITERATURE
ACTIVITY A-MOUNTAIN HABITAT BOOK AND CASSETTE

The cassette is a narrative of the illustrated Mountain Habitat book. The cassette runs approximately 15 minutes. The book can be used by itself, with the cassette in a large group, or individually at a listening station.
OBJECTIVE

Students will be able to describe the value of protective coloration to living organisms.

ACTIVITY

Introduce students to the meaning of the words "camouflage" and "protective coloration."

Obtain colored (green, red, blue, yellow, brown) pipe cleaners from a local store or craft shop. Cut each cleaner into three pieces. Ask the students to twist or bend these into "worms."

Scatter a known number of pipe cleaner "worms" of each color over an area on the playground, in the grass, on the parking lot, or on bare soil. Give each student the name of a bird to impersonate. Suggestions are: robin, thrush, meadowlark, bluebird, flicker, and crow.

Then, one at a time, call out the names of these birds. As each species is called, the student representing the species can "fly" out over the area where the "worms" were scattered and pick up the first worm which catches the "bird's" eye.

As students return from their flights, ask them to lay out on a large piece of white butcher paper their worms in the order picked up. Repeat this process until all the students have made at least one "flight" returning with the first worm they see.

Then ask the students to consider the color sequence of the "worms" captured and placed on the paper. Discuss with them any trends or patterns that occur. For example, if the worms were scattered on grass, one would expect the green "worms" to be picked up toward the end of the game rather than in early flights. If the "worms" appear to be too visible, you may wish to conceal them deeper in the grass rather than just on its surface. Be sure the students discuss the relationship between coloration and the usual habitat of the worms. Can they suggest similar relationships for other animals? After some discussion, ask each of the students to describe the value of protective coloration to living organisms.

VARIATIONS

1. After explaining to students how to play "Bird 'n' Worms," ask them to predict what colors they think will be picked up first. Then play the game as described and compare their predictions with what actually occurs.

2. This activity can also take place in a classroom. One way is to use a hole-punch to make a number of small circles of bright- and muted-colored paper, or cut small strips of different colored paper with a scissors. Scatter these different paper "worms" on the classroom floor, and proceed as described above.
ACTIVITY C-FOOD CHAIN

Plants capture the sun's energy to make food for all living things. When animals eat plants or other animals they get energy. You get energy from eating food. Your food may be from plants or animals. A food chain shows how food energy is passed from one living thing to another. All food chains start with plant life.

To make a food chain, you will need paper the size of this page cut in half the long way, crayons, pencils, tape and pictures of plants and animals. Try to use just the ones in the Mountain Habitat Kit or other plants and animals of the mountain area.

1. Draw a picture of a plant on a strip of paper.
2. With a piece of tape, loop the ends of the paper together. You now have the first link in your food chain.
3. Draw a picture of something that can eat your plant. Tape this to a new strip of paper. Loop the strip through the first link and tape the ends.
4. Draw a picture of something that can eat your second link, make a third loop and keep going.
Example: ladybug-shrew-rattlesnake.
OBJECTIVE

Students will become familiar with the components of a forest ecosystem.

ACTIVITY

In this activity, students make a deck of cards and then play a game with them.

To make the cards, students first identify a picture of an object or activity that is part of a forest's ecosystem. They cut out the picture and paste it on a playing card-size cardboard rectangle; or they might draw their own pictures directly on the cards. Then, on matching cards students write a word which names or describes each picture. To avoid any confusion, students also should write the same number on each card of a pair, placing the number below the picture and the word. The picture card and the word card make a pair or a match.

The number of pairs in the deck and the words used will depend upon the sophistication and knowledge of the students. Suggestions for pairs are:

- Picture of an animal — Name of the animal
- Picture of a plant — Name of the plant
- Picture of a type of recreation — Name of the recreation
- Picture of animal tracks — Name of the animal leaving the tracks
- Picture of a mine — The word “mine” or the name of the mineral being mined
- Picture of logging — The word “logging”
- Picture of a stream or river — The word “river” or “watershed”

How to play the game:

Put all cards face down on the floor, a table, or any other working surface. The cards may be placed in rows or scattered in a random pattern. The first player turns over two cards. If he or she has a match, that player keeps the cards and has another turn. If there is no match, the player turns the cards face down again and the next player draws two cards. When all pairs have been matched, the winner is the player with the most pairs.

Note: Students can increase their chances of winning by concentrating on where the various cards are placed after they have been exposed the first time.
VARIATION

Pick any other ecosystem, make the deck of cards, and play the same game. Different groups of students might play the game using different decks of cards representing different ecosystems. By using different decks, students may be able to identify similarities and differences in ecosystems.

Using a definition of ecosystems that includes cultural settings, you might have decks of cards representing the school, a city you know, and a farm. Other natural ecosystems for which decks of cards could be made are a desert, a tidepool, and a salt marsh.

Even if each group of students uses only one deck of cards representing one ecosystem, it can be useful to have additional decks so that more students can play at one time. Up to four students seems to be most workable for each deck.
Activity D
Activity D

SHREW

RATTLESNAKE

CHIPMUNK
<table>
<thead>
<tr>
<th>LADYBUG</th>
<th>SQUIRREL</th>
</tr>
</thead>
<tbody>
<tr>
<td>STELLER JAY</td>
<td>PINE NEEDLES</td>
</tr>
<tr>
<td>WOODPECKER</td>
<td>LIZARD</td>
</tr>
</tbody>
</table>
ACTIVITY E- UNDER COVER

Take a look at the animals that use a tree. Make copies of Under Cover sheet A and B. Pass out sheet B and discuss that all the animals in the picture use trees or the areas around them for shelter, food or as a nesting site. Explain all the animals would not be in the tree at the same time. Use the background information, provided below, for discussion. Then pass out sheet A and have the students color both sheets. Using pointed scissors cut the rectangles on sheet A on the dotted lines and fold on the solid lines. Staple sheet A on top of sheet B. Open the doors to see what is underneath. Under the door with the chipmunk on it, draw a picture of a creature that might live in or on a rotting log.

Background Information:

HIDDEN BY THE LEAVES-

A PLACE TO REST: Many birds use trees as resting spots.
NESTING HIGH: A fork in a tree may be a perfect place for a bird or squirrel to build their nests.
A TREETOP SMORGASBORD: Animals feed on the treetops. The squirrel feeds on nuts, seeds and fruits.
BLENDING IN: Some animals are camouflaged by leaves, thorns, or bark.

BENEATH THE BARK-
GROWING UP INSIDE A TREE: Bark beetles lay their eggs in wood underneath the bark. After the eggs hatch, the larvae form patterns in the wood as they eat their way through it.

NESTING WITHIN: Many animals nest inside trees. Birds such as woodpeckers chisel their nesting hole in trees. Other animals use the cavities after the woodpeckers abandon them.

FRUITING FUNGI: Many types of fungi grow on trees.

AROUND THE ROOTS-

FEEDING ON THE ROOTS: Many insects spend part of their lives in the ground feeding on the sap from the tree's roots.

BURROWING, FURROWING: Shrews and chipmunks dig tunnels beneath trees. They may store a cache of nuts in the ground near the base of the tree.
IN THE LEAVES
- BARRED OWL
- ROSE-BREASTED GROSBEAK NESTLINGS

WALKINGSTICK
- HONEY BEE AND HIVE
- HARRY WOODPECKER NESTLINGS

BENEATH THE BARK
- BARK BEETLE TUNNELS
- MYCELA

AROUND THE ROOTS
- CHIMPUNK
- EARTHWORMS
- SHORT-TAILED SHRELL

CACHE OF NUTS
- MILLIPIDE
- OR CADA NYMPHS

RANGER RICK'S NATURESCOPE TREES ARE TERRIFIC!
ACTIVITY F - OAK TREE LIFE CYCLE MOBILE

1. Reproduce the oak leaf and acorn patterns.
2. Cut out the oak leaf and glue it onto a 9" square of red, yellow or orange construction paper. Cut around it leaving a 1/2" border.
3. Cut the acorns and glue onto 6" squares of dark brown construction paper. Trim leaving a 1/2" border.
4. Trace the caps onto light brown construction paper.
   Glue these to the top of each acorn.
5. Punch holes in the oak leaf and top of each acorn.
   Use 10" pieces of yarn to tie the acorns to the leaf.
6. Tie a 10" piece of yarn through the hole in the top of the leaf. Attach a large paper clip to the end of the yarn to make a hanger for the mobile.
In the spring, a tiny seedling inside the acorn begins to grow. The seedling sprouts a root. As the root grows, it splits open the shell of the acorn. Then the root grows down into the soil. At the same time, the stem and new leaves begin to grow upward.

Buds appear on the stem. Shoots grow from these buds. The shoots grow and become branches. The stem thickens and becomes a trunk.

After many years of growing, the oak tree has a strong trunk. The branches are covered with many oak leaves. Acorns grow in bunches on the oak tree. In the fall, the acorns drop off the tree, and once again the squirrels gather them.
Many oak trees have leaves shaped like this.

Acorns are nuts that grow on oak trees. In the fall, acorns drop to the ground.

Squirrels gather acorns for food. They bury the acorns so that they will have food during the winter. Sometimes the squirrels forget to dig up the acorns.
Activity G

Plant Personification

OBJECTIVE

Students will be able to portray their feelings about the forest environment through creative dramatics.

ACTIVITY

Ask your students to use both large- and small-muscle activity to move like the emotions trees might feel when there is a:

- Gentle breeze
- Violent windstorm
- Gentle rain
- Hard rainstorm with thunder and lightning
- Snowstorm
- Forest fire
- Squirrel running up their trunks
- Bird nesting in their branches
- Person climbing them
- Person carving on their bark
- Person planting them
- Person harvesting them

Your students may participate as one large group during each of these different activities; in small groups with the others observing; or singly with the other students observing and possibly guessing what activity is taking place.
Tree Cookies

Activity H

OBJECTIVE

Students will be able to perceive time from the perspective of tree growth.

ACTIVITY

Obtain a large cross section of a tree which has recently been cut. Using large map pins, mark the annual rings and connect by string to a bulletin board indicating important events in a particular year of the tree's growth. How large was the tree when the school was built? When the class entered school? When the last president of the United States was elected? When the students were born? Identify differences in sizes and spaces between tree rings. Discuss with the students various reasons for these differences (drought, lack of light, etc.).

Note: The more sophisticated the class, the greater the time span that might be dealt with in this lesson.
Activity H
(Continued)

VARIATION (Especially Appropriate for Younger Students)

Using 2 to 3 inch (5 to 8 centimeter) diameter tree limbs (cross section), ask students to count the rings. (Use polished pieces with no more than 10 rings.) Explain that each ring equals approximately one year of growth for the tree or tree limb, depending on where your tree section was located on the tree. Ask:
• How old is the tree (or limb)?
• Do we have a tree (or limb) as old as you?
• How many rings would you have if you were a tree?
• Is the cross section you have “more than” or “less than” the number of rings you are old?

EXTENSION

Foresters often use a tool called an increment borer to extract a core of wood from standing trees, logs, poles, or timbers. Students could also take such cores for study. Using the technique of taking a core of wood, the age and condition of trees can be determined without destroying the tree. Students could also study such cores and analyze growth rate of trees or the penetration of wood preservative solutions on posts, pilings, or timbers. For information about the increment borer and suggestions for its use, write to: Forestry Suppliers, Inc., 205 W. Rankin St., Jackson, MS 39204.

RESOURCES

A tree (or limb) cross section can usually be obtained from a local tree-trimming service, forest industry, or utility company that is clearing or trimming trees for power or telephone lines.
Activity H
Objective

Students will be able to identify one or more living and nonliving things using only their tactile perceptions.

Activity

Make a covered box (a large ice cream container, hatbox, or even a shoe box will do). Cover and decorate the box, making a round hole so that students can reach into the box easily. For example:

Find an area where a number of different kinds of trees and plants grow (possibly the schoolyard, a park, or other nearby and vegetated area). From this area, choose three quite different leaves to put in the box: one with jagged edges, one very smooth, one that is fuzzy. (Example: conifer needles, magnolia, flannel-leaf mullein).

Take the class to the place you found the leaves. Ask each of the students to reach in, feeling each of the leaves in the box. Then, when all have felt the leaves, ask them to find leaves outside that match the ones they felt. If they wish, let them come back to feel the leaves in the box.

Other things that might be put in the box are:

- Varied textured rocks
- Various fruits and nuts such as pine cones, acorns, walnuts, butternuts
- Various examples of living and nonliving things from any area, even from the classroom.
EXTENSIONS

1. Establish a simple scheme for classifying objects in the box by the way they feel; for example, rough, hairy, soft, smooth.

2. Mosses, dry leaves, various twigs, barks, and rocks can be rubbed together in the box, with a discussion to follow about how soil is made. Two or more rocks of the same kind can be rubbed together also, showing some aspects of how soil is made. (Sandstone works best.)

3. Each student can make a "Touchy-Feely" Box of his or her own, filling it with three or more interesting and different examples of living and nonliving things. Once completed, all of the boxes can be displayed in the classroom in such a way that the students can take turns reaching into each of the boxes to try to determine what is inside. Older students can write down their guesses on a sheet of paper by each box. Again, be sure students do no harm to their environment by gathering things to put in their box. For safety's sake — the animal's as well as the student's — prohibit any student's putting a live animal in a box.

4. In order to share their learnings, the students can make bulletin boards or displays from the contents of their "Touchy-Feely" Boxes. Two classrooms of students could also exchange boxes.
ACTIVITY J - YOU AND A SHREW

Teach the children how humans are different from shrews. In this activity compare a shrew to a human. Ask the students to describe the shrew. On a chart paper make a list of the words. Explain that like humans, shrews are warm-blooded, give birth to live young, and nurse their young with milk. These are characteristics of almost all mammals. But in many ways shrews are different from humans.

Pass out the human shapes with facts on each one. Read the facts on each shrew and see if the students can match the human fact that corresponds. Older students can be given the shrews and people and match them or you can give them blank human shapes and ask them to write in the corresponding fact.

<table>
<thead>
<tr>
<th>HUMAN FACTS</th>
<th>SHREW FACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I weigh about 70 pounds.</td>
<td>1. I weigh less than a penny.</td>
</tr>
<tr>
<td>2. Most people are not color-blind.</td>
<td>2. I am colorblind.</td>
</tr>
<tr>
<td>3. I breathe about 20 times a minute.</td>
<td>3. I breathe about 850 times a minute.</td>
</tr>
<tr>
<td>4. People starve to death in about 20 to 30 days.</td>
<td>4. I can starve to death in about 6 hours.</td>
</tr>
<tr>
<td>5. My heart beats about 80 times a minute when I'm</td>
<td>5. My heart beats about 600 times a minute when I'm</td>
</tr>
</tbody>
</table>
resting and about 120 times a minute when I'm active.
resting and about 800 times a minute when I'm active.

6. I will probably live about 70 or more years.
6. I will probably live about a year.

7. I am about 54 inches tall.
7. I am about 3 inches long.

8. I eat less than 1/14th of my weight in food each day.
8. I eat about 1-1/2 times my weight in food each day.
1. I weigh less than a penny.
2. I am colorblind.
3. I breathe through my nose.
4. I can starve to death in about 6 hours.
5. My heart beats about 600 times a minute when I'm resting and about 800 times a minute when I'm active.
6. I will probably live about a year.
7. I am about 3 inches long.
Most people are not colorblind.

I breathe about 20 times a minute.

My heart beats about 80 times a minute while I am resting and about 120 times a minute when I am very active.

People starve to death in about 20 to 30 days.
I will probably live about 70 or more years.

I am about 54 inches tall.

I weigh about 70 pounds.

My weight in food each day, I eat less than 1/4th of
Activity J
Web of Life

OBJECTIVE
Students will be able to describe the interdependence of various forest organisms with other components of the forest.

ACTIVITY
Materials:
Enough large sheets of cardboard box materials to construct a mural 4 feet by 8 feet (1 meter by 2 meters).

Procedure:
Ask each student to select a particularly interesting forest animal (mammal, insect, bird, or reptile). If duplicates occur, the students may differentiate by labeling the animals young, old, male, and female.
Ask each student to collect as much information about the animal as possible, attempting to respond to each of these questions:
Where does the animal live? Why does it live there?
What must it have available in order to live successfully? (In other words, what are its habitat requirements?)
What does it prey upon (eat)? How much does it eat?
What shelter (cover) does it require?
Where does it perch, hibernate, breed, sleep?
Does it live on the ground, in trees, at the edge of the forest, in the forest?
Where does it get its water?
Does it migrate? If so, when and where?
What animals prey (eat) on it?
What animals does it live with? What plants?
How does the animal influence its environment?
Activity K
(Continued)

Ask your students to try to find photographs or drawings of each animal. Those showing the animal in its natural habitat are especially desirable. Photographs taken by the students can be excellent.

Now ask the students to create a mural of a forest ecosystem on the cardboard sheets. They may use pictures cut from magazines or their own drawings to show hills, valleys, streams, and other topographical features. They could cut paper silhouettes to resemble trees and other forest plants and add them to indicate forests and meadows.

When the mural is finished, students could glue or pin on pictures or drawings of the animals they have studied. The animals should go in appropriate habitats and each student should tell the class his or her reasons for placing the animal in a particular spot. While the students are sharing the information they have gathered, you might ask them, and they might ask each other:

What did you discover about the animal which surprised you the most?
Why did you select the species you did? Have you ever seen the animal you selected before? Would you know where and when to look for it?
Did you know before you studied it?
Is it a member of an endangered species? If so, what reasons are there for its being endangered? Is anything being done to help or harm it?

When all the animals are in place, discuss the “web of life” concept which can be described as “who eats whom?” Saying there is a web of life is to suggest that all living things are connected to all others. No matter how distant the relationship may seem, all things are connected.

Place a push pin or tack next to each animal. Then use yarn to connect each animal to the other animals and plants with which it “interacts” (for example, eats, is eaten by, needs for habitat). Students can help by acting as wildlife experts on the species they have researched.

Ask each student to make sure that his or her animal is directly attached to all of the other appropriate components of the forest ecosystem depicted on the mural. Each animal can be connected using a different color or size of yarn or heavy thread. Upon completion, you will have a “web of life” for this forest ecosystem.
EXTENSION or VARIATION

Ask each student to sit on the floor and choose from the mural an animal or plant he or she would like to be. (Again, if duplicates occur, have them be young or old, male or female, or select another role.) Ask the students to make a visual name tag, picturing and labeling the role they are playing. Then, starting with one “plant,” ask that student to hold on to the end of a spool of string. Using the mural as a guide, connect a second student to the first. The second student wraps the string around his other hand and passes it along to a third. This process is continued until each “organism” is linked to the ecosystem, and the spool is given back to the first student.

Now, have students move back and out until all of the slack is taken up and then jiggle the string to feel the system’s “vibrations.”

Ask students to decide which link in the system is the least important and have that link drop out. Take up the slack again.

Continue to remove links which the students feel are unnecessary to the system or which cannot survive when other links are removed.

As the links are removed, discuss:

What happens when we remove a link in the ecosystem?
Can the system withstand the loss of these links forever? Why or why not?
What will eventually happen to a system which becomes less and less complex? Why?
Were the changes more dramatic when the system was composed of many parts (links) or when it had fewer parts?
What generalization might we make about the relationship between a system’s complexity (diversity) and its stability?
Can you think of any systems which people have or are creating which might be considered ecologically unstable because of their lack of diversity? What might be done to reduce the hazards of such systems?
Objectives  Students will be able to identify common animal tracks.

Method  Students make plaster casts of animal tracks.

Background  Looking for evidence of wildlife is one method of determining what types of animals are around. Signs such as burrows, nests, droppings, or food litter can be identified—but the easiest signs to interpret are animal tracks.

Animal tracks can be the basis for several types of investigations. Identifying the tracks you find will help fill in a species list of those animals found in your area. Wildlife population estimates can be made from observing the number of tracks found during a specified length of time. Habitat requirements of individuals can be determined by finding their tracks in certain areas and not finding them in others.

Track hunting is really very easy. Just find a spot of level ground with fairly soft, fine, textured soil. Smooth it over, and come back later to see what has been there! Obvious places for your smooth spot would be near water or on well worn trails. Larger animals will use the more open areas, while a small spot the size of your hand cleared under some bushes will reward you with many different little tracks of mice, shrews, and reptiles.

Tracks can be preserved and collected by making plaster casts of them. This simple procedure will allow you to “collect” tracks and add them to other evidence like bones, nests, or scats that you already may have collected.

Once these tracks have been observed or preserved, a lot of information about the animal that made them can be discovered. For example, all mammals have basically the same foot structure. They just use the parts in different ways. If we look at an animal’s foot in relation to the human hand, we find that some animals walk on their hands—like raccoons and bears. Others walk or run on their toes, like cats and coyotes, while some walk on their “toenails” or hooves like deer and elk.

Materials  plaster of Paris, containers for mixing, spray shellac or plastic, vinyl line, cardboard, knives, sandpaper, loops of wire (optional), black ink or paint

Procedure
1. Take your class on a field trip to a nearby lake, stream, or wildlife refuge area—somewhere where there will be lots of tracks!
2. Divide into small groups to find tracks. You may want to divide the students into groups according to areas in which they will look for tracks; e.g., one group under bushes, one group at a meadow’s edge, one group near a pond’s edge. Prepare the students in advance to assist them in looking carefully and responsibly.
3. Once a track is found, clean it to lose particles of soil, twigs, leaves, and other litter.
4. Spray the track with shellac or plastic from a pressurized can if available.
5. Form a two-inch wide strip of cardboard or tin into a ring surrounding the track. Press firmly into the ground to give support, but allow at least one inch to form the edge of the mold for the plaster. Square forms can be made by cutting milk cartons horizontally—one of the easiest ways to make the forms!
6. Mix about two cups of plaster of Paris in a tin can or plastic bowl, adding water slowly until it is about as thick as heavy cream. Pour carefully into the mold until the plaster is about to the top. Allow plaster to harden at least 15 minutes before lifting it out of the track. If the soil is damp, hardening may take longer.

7. When the cast is hardened, lift the cast out, remove the ring, and clean the cast by scraping it with a knife blade and washing.

8. Back in class, apply a thin coating of vaseline to the track and surface of the cast. Place it on a flat surface and surround the casting with a two-inch strip of cardboard or tin as before.

9. Mix plaster of Paris and pour into the mold, making certain that the top surface of the casting is smooth and level with the mold. If you plan to use the casting as a wall plaque, place a loop of wire in back of the casting while the plaster is still soft. Allow two hours for plaster to harden.

10. Carefully remove the mold when the plaster is dry. Separate the two layers and wipe the excess vaseline from the face of the cast and track. Scrape any rough places with a knife blade, or use fine sandpaper to smooth the surface. Wash the completed cast in running water.

11. When the cast is thoroughly dry, paint the inside of the track with India ink or black poster paint. Label each cast with the name of the track, and the student's name. A coat of clear shellac or clear plastic may be applied to protect and preserve the casting.

### Evaluation

Draw and label tracks of animals common to your area.

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**Activity L**

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![Diagram showing steps of the activity with labels like: circle the track with a cardboard dam, fill the dam with plaster of Paris, once hardened, remove the dam and clean the plaster, paint the finished track so it looks realistic, make a larger dam and fill with plaster of Paris, don't forget a vaseline coating, check the size of the first, clean track and spray with shellac or clear plastic, staple, once the plaster hardens, remove the dam and separate the parts, once hardened, remove the dam and clean the plaster, coat the cast with vaseline.]
Activity M

Outdoor Manners
Coloring Book

OBJECTIVE

Students will be able to recommend appropriate actions to take while in the outdoors and specifically in forests and public parks.

ACTIVITY

Initiate a discussion with your students on the effects human actions can have on the outdoors. You might begin by showing a film or reading aloud a story on behavior in the forest or public parks.

List on the chalkboard or on a chart short statements which express the ideas of your students. Ask the students to offer ideas in the form of behaviors they would recommend. Examples are:

- Be careful not to litter. If possible, pick up any litter left by others.
- Use the trash can.
- Don't carve or abuse any living trees or plants.
- Respect all wildlife.
- Be careful with fire.
- Stay on the marked trail when asked.

Ask each student to choose one statement, draw a picture to illustrate it, and write the statement at the bottom of the picture. You can transfer the pictures with the accompanying statements to stencils and duplicate them. Help your students collate and staple the pictures together to make coloring books to share with other classes in your school.
RELATED CHILDREN'S LITERATURE

Appendix B

Activity A-Mountain Habitat Book
MOUNTAIN HABITAT
LIFE ZONES

Boreal-Canadian
7,000-10,000 feet.

Transition Zone
5,000-7,500 feet.

Sonoran Zone
Sea level-5,000 feet.
MOUNTAIN HABITAT

The three ranges that dominate the mountain landscapes of southern California, are the San Gabriel, the San Bernardino and San Jacinto. Within their boundaries are all types of country, from high, rock-ribbed peaks etched against the sky to gentle flatlands and rolling hills. There are sparkling lakes, boggy meadows and rushing streams that run throughout the dry season. Hot slopes covered with dense, thorny chaparral contrast with cool forests of pine and fir.

The journey upward would start with the brushy slopes of the Sonoran Zone. Indicator species are the Scrub Oak and the Coast Horned Lizard. The next community is the southern oak woodland of the foothills. Associated with this habitat is the Acorn Woodpecker.

At an elevation of 5,000 to 7,500 feet is the open forest of the Transition Zone. Incense cedars are found here where the calls of the Steller's Jays are often heard. Dark-eyed Juncos and Gray Squirrels can be seen in this area.

The Boreal-Canadian Life Zone is at an elevation between 7,000 to 10,000 feet. A typical resident of this area is the Chipmunk.
SAN JACINTO MOUNTAINS

SAN GORCIONIO MOUNTAINS
STELLER'S JAY

The race of Steller's Jay found in the mountains of Southern California is called "Blue-fronted" Steller's Jay because of the pale blue streaks on the forehead. They travel in flocks of a dozen or more foraging in tree tops and on the ground eating acorns, pine nuts, grasshoppers and other insects and sometimes young and eggs of birds. Often they plunder the stored acorns of Acorn Woodpeckers.

The Jay is the first bird to discover a hawk or an owl in its hiding place and to complain with angry cries. They can imitate the screams of the Red-Tailed Hawk or whistles of the Northern Pygmy Owl so well it deceives the listener.

The nest is a bulky foundation of sticks cemented together with mud and includes a cup lined with pine needles and rootlets. It is usually built in the crotch of a tree. In the spring three to five greenish-blue eggs spotted with brown are laid.
ACORN WOODPECKER

A common woodpecker in our local mountain oak-woodlands, the Acorn Woodpecker, is a noisy, talkative bird. Its clown-like pattern of red, black and white distinguishes it from all other woodpeckers. It has a fondness for acorns. One giant sycamore tree in California reportedly contained 20,000 acorns in its trunk. This woodpecker also feeds by catching insects on the wing. With its chisel-like bill, stiff tail used as a prop and specialized feet to hang onto the side of a tree with efficiency, this bird is well adapted for forest living. The bill is used as a chisel to peck into bark and wood to facilitate feeding on insects, drilling holes for storing acorns and excavating nest holes. They also use the bill for drumming on trees as part of their courtship ritual.
DARK-EYED JUNCO

To anyone visiting the San Gabriel, San Bernardino or San Jacinto Mountains, the black hoods, pink sides and white outer tail feathers of juncos are a familiar sight. Juncos feed and nest on the ground. They hop about in open spaces among the pine needles looking for seeds or insects. All through the mountain forest the bright trill of the junco song is a familiar sound in spring and summer. Their nest is usually built on the ground, often in the bank of a stream by the female. She incubates three to five speckled eggs for 11 to 12 days. During the fall and winter, the juncos gather into flocks and migrate to lower elevations in the foothills and valleys.
CHIPMUNK

Chipmunks have storage pouches in their cheeks. They become active at sunrise and return to their nests which are holes in the ground in the afternoon. They eat nuts, berries and seeds. Their favorite is the seeds from cones. In the spring they mate and usually have a litter of three to six babies. Hawks and rattlesnakes feed upon chipmunks. The weasel is probably their worst enemy.
WESTERN GRAY SQUIRREL

Gray squirrels are beautiful as they race about their favorite Black Oak or Jeffrey Pine. Gray or Tree Squirrels, as they are often called, have two distinct types of nests. One is a den in a hollow tree and the other is a bulky nest high up in the branches. The nest in the branches is built when tree cavities are scarce. Two to four young are born in late spring. They are blind, hairless, pink and about the size of the tip of a little finger. Gray squirrels must learn how to bury acorns and pine nuts in the ground, one in each hiding place, and then must find them again. If the Steller's Jay should find too many of the hidden treasures, it would be serious because the Gray Squirrel does not hibernate during the winter and depends on the stored food for survival.
SHREW

The primitive shrew family includes the smallest North American mammal, the Desert Shrew, found in San Bernadino and Riverside Counties. There are also two species that live in the mountains, the Ornate Shrew and the Mountain Shrew. They are found near streams or in damp meadows.

Its appetite is enormous; the equivalent of its own weight is eaten about every three hours. Its prey is largely insects, but may be anything up to weasel size that crawls, swims or flies. Sometimes they eat nuts and berries.

A covered, ball-shaped, leaf and grass nest, is constructed under a log, in a hollow stump or in a burrow near the surface of the ground. There will usually be six to seven pink, wrinkled young about the size of honeybees. At three to four weeks they are out on their own to live between 14 to 16 months.

Shrews have value because they control detrimental insects and meadow mice.
SOUTHERN PACIFIC RATTLESNAKE

The southern Pacific rattlesnake is found in mountainous areas of southern California, where brushy slopes, stream beds, and rocky outcrops are their favorite haunts. Rattlesnakes shed their skins periodically to provide for growth and wear. They do this by crawling through it so that the skin peels backward over the body, turning inside out as it goes. The old skin comes off in a single unbroken piece. Since they have no internal means of temperature regulation they must find refuge against cold or heat. In winter they hibernate in groups in dens. They live to a large extent on small mammals, lizards, and birds (including eggs and nestlings). An on-going decline in rattlesnake population is caused because protective cover is being eliminated and food supply is reduced. Rattlesnakes need to be treated with respect. If you should hear one, stand still until you are able to locate it. Watch where you put your hands and feet, and do not pick up snakes.
SAGEBRUSH LIZARD

The Sagebrush Lizard is found on the mountain slopes of southern California. It requires a habitat which has good light, open ground and scattered low bushes. This lizard is primarily terrestrial, but occasionally climbs trees, brush heaps or rocks in pursuit of insect prey or when seeking protective shelter. At any time between June and August, one or two clutches of two to eight eggs are laid. They will hatch a month or so later. It resembles the Western Fence Lizard, but is smaller and has blue belly patches.
INCENSE CEDAR

Incense Cedar is one of the most beautiful conifers of our forest. It does not have needles like the pine trees but has flattened branchlets covered with small, dark green, overlapping, scale-like leaves. It produces small nut-like fruits which split open to reveal two winged seeds which are eaten by many kinds of wildlife.

The wood of the cedar is used for making shingles for roofs, pulp for paper and pencils. People line their closets with cedar wood to prevent damage from moths.
JEFFREY PINE

Jeffrey Pine is the most common tree in the Southern California mountains. The beautiful reddish-brown bark separates into large plates. The sweet vanilla-like odor in the furrows between these plates is characteristic of the Jeffrey. Layers of small soft scales, resembling pieces of a jig-saw puzzle, form on the outside of the bark. It is often referred to as the Puzzle Bark tree. Large reddish cones cling to the branches, then, when mature drop to the ground in the fall. They produce small, winged seeds which are a good food for many forms of wild life. While walking through the forest you may encounter a "Storage Tree", a Jeffrey Pine with its bark entirely riddled with small holes which are filled with acorns. This is the work of the Acorn Woodpecker.
Appendix C

Mountain Habitat Activity Guide

Evaluation and Questionnaire
Please rate the following areas of the activity guide.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
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<tbody>
<tr>
<td><strong>1. The extent to which the activity guide enhanced the museum kit.</strong></td>
<td>1</td>
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<td><strong>2. The extent to which most of the materials were appropriate to my grade level.</strong></td>
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<td><strong>3. The extent to which the activities gave opportunity for &quot;hands on.&quot;</strong></td>
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<td><strong>4. The extent to which the quantity of activities provided were sufficient for use with my students.</strong></td>
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5. Circle the letters of the activities that you did with your students.
   A B C D E F G H I J K L M

6. Approximate amount of time spent using the materials in the activity guide.

7. Did you utilize any listed children's literature?

8. Which activities did your students like the best and why?
   (Use back of paper if necessary)

9. Suggestions to improve activity guide

10. Have you previously used the Mountain Habitat Kit?

Please return this evaluation form with the guide. Placing this form at the top of the box, just underneath the lid would be best. Thank you!
Appendix D

Mountain Habitat Guide Correlations With
Science Framework for California Public Schools
# Mountain Habitat Guide Correlations with Science Framework for California Public Schools

## Appropriate Elements from the Science Framework

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Section</th>
<th>Question(Themes)</th>
<th>A</th>
<th>B</th>
<th>C</th>
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<tbody>
<tr>
<td>Life Sciences</td>
<td>A. Living Things</td>
<td>1. What are characteristics of living things? (Energy, Systems &amp; Interactions, Scale &amp; Structure)</td>
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<td>2. How do structures of living things perform... interact... and contribute...? (Scale &amp; Structure, Systems &amp; Interactions)</td>
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<td>3. What are relationships of living organisms and how are living things classified? (Systems &amp; Interactions)</td>
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<td>4. How do humans interact with other living things? (Systems &amp; Interactions)</td>
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<td>C. Ecosystems</td>
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<td>1. What are ecosystems and how do organisms interact in ecosystems? (Energy, Scale &amp; Structure, Systems &amp; Interactions, Patterns of Change)</td>
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<td>2. How does energy flow within our ecosystem? (Energy, Systems &amp; Interactions)</td>
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<td>3. How do ecosystems change? (Systems &amp; Interactions)</td>
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<td>4. What are the responsibilities of humans toward ecosystems? (Systems &amp; Interactions)</td>
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