



Eye Opener Worksheet 1

Getting to Know a Habitat

Although you can not really get to know a habitat unless you return to it frequently, there is much you can learn in one visit by careful observation. Use this worksheet to help you record your observations.

Name of Site _____ Date _____
Location (City) _____ County _____
Size of the Area _____ Altitude _____ (m)
Boundaries _____

Circle the choices which best describe the site.

Weather

Season

winter, early spring, late spring, early summer, midsummer, late summer, early fall, late fall

Condition

sunny, cloudy, rainy, snowy, windy

Temperature _____(C) _____(F)

What is the weather like in the city of Albuquerque at the time?

If it were different from the weather at the site, what would account for it?

Are there any signs of recent rain or snow in the area?

What is the average annual precipitation for that area?

How much of this precipitation is snow and how much is rain?

Habitat Type

Forest

young, mature, recently lumbered, recently burned, considerable windfall damage, evergreen, summer green (deciduous), mixed

Thicket

low shrubs, tall shrubs and a few trees

Grasslands

short grass prairie, open meadow, cultivated cropland, pioneer weed community with annual plants predominating, lowland meadow, upland meadow with perennial grasses and herbs predominating, permanent pasture, unkept pasture with scattered trees and shrubs, old field reverting to thicket or marsh

Aquatic environments

marsh, pond, river stream, lake

Landform

mountain, mesa, plain, canyon, valley, arroyo, bosque, hill

Slope

Facing Direction

N, NE, E, SE, S, SW, W, NW

Degree

nearly level (0-3° degrees), gentle (3-8°), moderate (8-15°), steep (15-25°), very steep (25-35°)

Soil Type

sand, clay, loam, rocky

Fertility

high, moderate, fairly low, low

Drainage

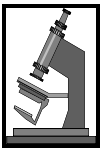
excessive, excellent, good, imperfect, very poor, permanently wet

Erosion

little or none, moderate sheet erosion, occasional gullies, severe erosion, deeply gullied, subsoil exposed

Light Intensity

_____ at _____ o'clock. Device used for measuring _____

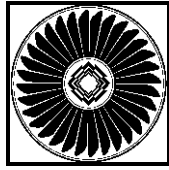


Plants and Animals

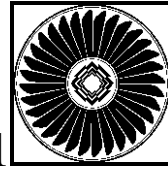
List the animals, seeds and plants identified Describe plants you can not identify. Record any animal signs or homes observed, like droppings, tracks, nests, feathers, webs, etc. How do observed *abiotic*, non living, conditions influence kinds of plants and animals found?

Plants	Animal Signs and Animal Homes

Discuss how the actions of people have affected the biotic or abiotic features of this habitat.



Eye Opener Activities 1



Habitat

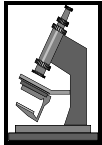
Discuss what a habitat is. Draw a habitat of your choice, make dioramas, or make a class bulletin board of several different kinds of habitats.

What are the basic components of a habitat?

How do our own homes serve as a habitat for us?

What adaptations do some plants have which enable them to live in specific habitats?

What happens to plants or animals if there is a change in the availability of proper food, water, shelter, air or space in a habitat?



Plant Succession

Take a field trip to a natural area and look for ecological plant succession. Keep a record of the stages observed and indicate their order in the succession pattern of the particular habitat.

What are the pioneer organisms for this community?

How does any one stage make conditions unfavorable for itself and favorable for the next stage?

What are the dominant species observed? How will this habitat look when the climax community is reached? What events could take place that would prevent this from happening?

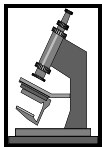


Four Life Zones

Draw a map of the Sandias showing the four life zones. On a map of North America, show the location of these same four zones.

What is a life zone? What factors determine the plant and animal life in these zones?

What is the general relationship between altitude and latitude in life zone changes?



Natural Waste Disposal

Examine a rotting log or pile of leaf litter. Look for evidence to explain how the waste disposal system operates in a natural community.

What kinds of organisms are found? What role does each play in the decaying process?

What other examples of recycling can be found in a natural community?

How is waste from the human community disposed of in Albuquerque? How much recycling is done?

Which system is more efficient in its waste disposal, the natural or the human? Explain.

What can citizens do to increase the amount of recovery and recycling of solid waste?

Water for Forest Animals and Plants

Using words or diagrams, explain how a forest animal gets water. How does a forest plant get water?

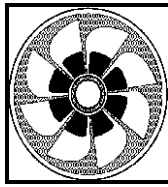
What would happen if the forest animals or plants were placed in a desert? What adaptations would they need to survive?

What problems arise when people try to grow non indigenous plants in their gardens?

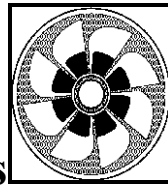
What kind of system could a person design to get water in a forest? In a desert?

Field Trips

Walk through a habitat and look for three samples of the Abiotic/Biotic/Cultural Triangle. In each case show the interrelationships between the abiotic (physical) factors, the biotic (plants and animals) and the cultural (human actions).



Additional Activities



Predator Control

Conduct a panel discussion about the topic of predator control.

What animals are considered undesirable by some farmers and are sometimes controlled by a bounty?

What role do coyotes, mountain lions and snakes play in maintaining stable and balanced communities?

How is the mule deer population in the Sandias determined? What natural controls of the mule deer exist in the Sandias? How do people control the mule deer population? What is the carrying capacity of the Sandias for mule deer? What would be the result of permitting the mule deer population to get out of control?

Geological History

Construct a timeline of Albuquerque's geological history. Use the computer program Timeliner for this project.

What did the Albuquerque area look like before the mountains were formed? How were the mountains formed?

Is the trough shaped area between the mountains and the west mesa more correctly termed a rift or a valley? Why? What is the inner valley? How was it formed?

Good News/Bad News Bulletin Board

Create a bulletin board about Albuquerque's natural environment.

Collect newspaper or magazine articles about the natural environment around Albuquerque.

Classify these articles according to whether they contain good or bad news.

Collect pictures which show changes taking place in different parts of the city's undeveloped areas. Do they show good news or bad news? Would different people answer this question in different ways?

Mini Environments

For each of the local area habitats below, name the mini environment(s) it surrounds: mountain uplands, mountain lowlands, alluvial fans, volcanic, sand plains, valley sides and terraces, river, or valley flood plains. Then, match the plants and animals from the list with the local areas in which they are most likely to be found.

Area	Mini Environment(s)	Plants	Animals
Sandia Mt Natural History Center			
Rio Grande Nature Center			
Juan Tabo Picnic Area			
Petroglyph State Park			
Doc Long's Picnic Area			
Elena Gallegos Picnic Area			

	Plants		Animals
ponderosa pine	Cattails	bighorn sheep	coyote
mountain mahogany	Russian olive	gopher	duck
piñon pine	Cottonwood	ground squirrel	Stellar's jay
Russian thistle	white fir	mountain lion	antelope
winter fat	Yucca	hawk	scorpion
scrub oak	salt cedar	Norway rat	amphibians
cholla	Snakeweed	prairie dog	quail
prickly pear	black grama grass	roadrunner	mule deer
juniper	Sagebrush	rattlesnake	lizard
salt grass	alkali sacaton	turkey	bobcat
Douglas Fir		kangaroo rat	muskrat
		shorebirds	mice

Construct food chains for each area to show how energy is transferred.

Which organisms in the food chain are producers? Which are primary consumers?

Secondary consumers? Top level consumers? Scavengers?

What factors in a habitat influence which plants and animals can live there?

What characteristics of each of the plants and animals in the above lists equip them for the habitat to which they were assigned?

What environmental changes might occur which could kill the plants or animals or drive the animals away? What could be done to prevent these changes?

What animals and plants in the Sandias are considered endangered? What, if anything is being done about these endangered species?



Forest Service and Fire Information

Contact the Forest Service for information on the various responsibilities they have for the management of the Sandia Mountains. What are the major issues the Forest Service must decide?

What is clearcutting? What arguments can be presented for and against it?

Forest rangers do not share the public's blanket concern about fires. Explain.

What percentages of forest fires are natural? What percentages are caused by man?

What role does fire play in plant succession?

What other beneficial functions do fires perform? Under what circumstances does the Forest Service permit a fire to burn?

Geologic Formation

Make a poster of Albuquerque during the different geologic times in its formation.

Could Albuquerque be covered by water from the ocean again?

What impact would this have on the ecology of the area?

What kinds of changes might occur if the water again receded, forming land masses?

A 1984 study at the University of California at Los Angeles indicates the Rio Grande is widening. Why might this be occurring, and what could the effects be?

Is there any evidence supporting the idea that there might again be volcanic eruptions in the Albuquerque area?

What other major geological changes might occur in the distant future and how would they affect Albuquerque's area?

What other major geological changes might occur in the distant future and how would they affect Albuquerque's landforms?



Geothermal Plants

Using a map of the Rio Grande basin from the Jemez mountains to Socorro, indicate the location of possible sites of future geothermal plants.

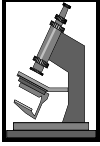
What geological conditions are necessary to obtain geothermal energy? What are tectonic plates?

What is the Rio Grande Rift? What evidence can you present to defend or dispute the prevalent theory about the Rift's origin?

What process is used to obtain geothermal energy? What, if any, possible dangers are associated with the production of geothermal energy?

What are the advantages of geothermal energy as an alternative to other energy sources?

What attempts were made at developing geothermal energy in the Albuquerque region? What was the outcome of these efforts? What were the pros and cons which led to this outcome? Take a position on the decision and defend it.



Soil Study

Make soil in as many different ways as you can. Grind rocks together. Allow leaves and twigs to decompose. Use vinegar to dissolve limestone. Scrape bits of soil off rocks covered with lichens.

Which soil takes the most energy to form? How does nature provide the necessary energy?

Which soil takes the longest to form?

Which soil is the most fertile? Experiment to find out.

Which soil holds water best?

What is the pH of each kind of soil?



Base Map Study

Use the base map technique to determine which areas in and around Albuquerque are most and least suited to urbanization. Prepare a transparency of the political boundaries and major landforms over the base map. Use other overlays to show sources of water, soil conditions, slope, flood plains and areas subject to flooding.

To what extent is land which is well suited for agriculture now being used for other purposes?

What areas are best suited for home or commercial construction? Which are least suited? Explain.

How much of the city is built on land which is susceptible to flooding? What steps have been taken to prevent further development in flood prone areas?



Cost/Benefit Analysis

Conduct a cost/benefit analysis of the environmental and economic impact of the Cement Company in Tijeras upon its immediate neighborhood and upon the Albuquerque area. After studying the data, set up a panel of students with differing viewpoints to discuss the pros and cons of this industry in relationship to the community's well being.

What is quarried in Tijeras? Where are the gypsum and coal used in the manufacturing process obtained? How are they transported to Tijeras?

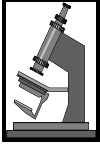
What environmental impacts does the plant have? What effect, if any, does the dust have on the health of the workers? Of the residents of Tijeras? What other potential pollutants may be emitted?

What action is taken by the plant to reduce the dust? The gaseous pollutants emitted?

What problems are associated with revegetation of the disturbed land?

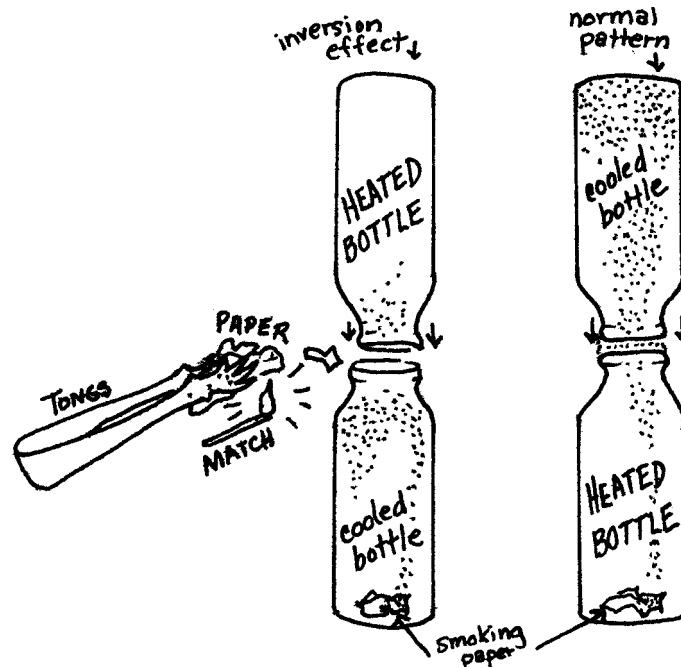
How does the community benefit from the company's economic gains? What portions of these gains are returned directly or indirectly to Albuquerque? How many local people are employed by the plant?

In what ways could the plant further reduce its effect on the immediate environment? What would be the economic consequences of these anti-pollution measures?



Thermal Inversion

Demonstrate thermal inversion by using four bottles as shown in the diagram below.



Chill two bottles by placing them in the refrigerator or shady spot outdoors on a cold day. Warm two bottles by placing them in hot sun or in a warm place. Then, drop a piece of burning paper into a cooled and a heated bottle, as shown.

What is thermal inversion? How does the bottle experiment demonstrate the causes of thermal inversion?

At what times of the year do the thermal inversions occur? Why?

In what parts of the city? Why?

Are thermal inversions, in themselves, hazardous? Explain.

What role do cars play in causing air pollution in Albuquerque? What alternatives are there to the use of the car in Albuquerque?

What action should the city take to cut back on the use of the private car? Why is it difficult to carry out this kind of action? How can the average citizen help?

What are the consequences in Albuquerque if population increases and automobile use patterns do not change?

What role do wood burning stoves or fireplaces play in causing air pollution in Albuquerque?

Longitude Study

Use a globe to locate and compare cities on the same longitude as Albuquerque.

Compare winter and summer temperatures.

Compare clothing, recreational activities, altitudes and agriculture.

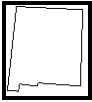
Compare natural plants and animal communities.

Compare drinking water sources.

What is the major difference in plant communities?

Compare average daily temperatures during each season.

Why does Albuquerque have four seasons?



Newspaper Weather Maps

Collect newspaper weather maps for a period of a week to ten days.

Predict weather daily. Compare with the newspaper prediction and the actual weather.

Note the directions in which fronts move.

Discuss how yesterday's weather in one location can become our weather today.

Examine the maps for clues as to what fronts,

high/low pressure cells, winds, etc. have affected Albuquerque's weather.

What global weather patterns influence our winter weather?

Use a computer program, CDROM or the World Wide Web to study weather.

Life Cycles

Study the life cycle of the mosquito and the flea.

What conditions encourage the growth of these insects?

What effect do these insects have on your life?

What can you do to control their population?

What kinds of mosquitoes and fleas are there? Which are the most troublesome?

Contact the City's Environmental Health Department to get more information.

Native Plants

Compile a list of native plants.

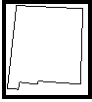
For what animals do these plants provide food and shelter?

How long have these plants been in this area? How did they get here?

Which of these plants have edible parts?

Which of these plants were or are now used medicinally?

Which of these plants are used as dyes in the making of yarn for rugs?



An Albuquerque Atlas

Create an Albuquerque atlas. Some maps to be included are:

- Average Temperature
- Average Annual Rainfall
- Natural Vegetation
- Rivers, Lakes, and Major Springs
- Land Elevations
- Crops

Games

Play a glossary game using ecological terms found in the Glossary of this book. Write each of the 40 or 50 words (habitat, consumer, decomposer, niche, etc.) on a small card. Each student in a small group circle gets a card and takes turns defining her word. If you fail to define a word, pass all cards to the left. Add new cards to replace those removed.

Play Stump the Experts. Set up a panel of experts. Mention ways man modifies his environment to meet needs. Challenge the panel of experts to mention an animal adaptation for that same condition. Example: keeping warm in winter - polar bear's fur.

Classroom Habitat

Get to know a mini habitat by setting up classroom environments for a variety of small animals, like fish, earthworms, mealworms, chameleon, mice, gerbils, ants, hamsters.

What factors must be considered in planning a suitable habitat for an animal?

What conditions (amount of proper water, food, space, shelter, light, air) are most critical for different animals?

The classroom itself is a mini habitat for the human beings in it. Do you consider the room a suitable habitat? If it is lacking in any way, how could this be improved? Do humans have requirements for their habitats which go beyond those of other animals?

Albuquerque Landforms

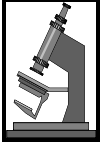
Construct a three dimensional table model of Albuquerque showing its various landforms, like mesa, alluvial fans, mountains, valley, arroyos, canyons. Bring in samples of rocks found around the city. Place them on appropriate parts of the model.

In general, what kind of rocks are found in the northeast heights? The west mesa? on the escarpment near the volcanoes? In the inner valley? In each case, where did the rocks originate? How did they get to their present location?

What kinds of igneous, sedimentary and metamorphic rocks are found around Albuquerque? Where is limestone most apt to be found? Granite? Lava and cinders?

In what kinds of rocks are fossils found? How are fossils formed? What is alluvial fill?

What is meant by the Great Unconformity?



Study of the Wind

Conduct a study of wind. Keep a record of your wind observations for several days at a time, at different seasons of the year. Use the Beaufort Scale and, if possible, set up an anemometer and wind vane on the school grounds.

Beaufort Scale

Signs	Name of Wind	Miles Per Hour
Flags hang down; smoke goes straight up; leaves do not move.	Calm	0
Wind moves leaves on trees; is felt on face; blows out lightweight flags.	Light Breeze	1-5
Wind moves branches of trees; blows dust and loose papers about.	Gentle Breeze	5-15
Wind sways branches; raises whitecaps on water.	Fresh Breeze	15-25
Wind makes it hard to use umbrellas; whistles in trees and wires; sways whole trees.	Strong Wind	25-35
Wind breaks branches; uproots trees; damages houses; is hard to walk against.	Gale	35-75
Wind damages houses, blows down utility poles and trees; causes great damage.	Hurricane	75-100

How do your findings compare with those of the local Weather Bureau and the weather reports on the media?

What causes wind?

Does the amount of wind vary at different times of the day? Explain.

Which months or seasons have the strongest winds? Explain.

What is the wind chill factor? How is it determined?

What are some of the advantages of wind? The disadvantages?

How extensive is the use of wind as a source of energy in New Mexico? In the Albuquerque area?

Compile a list of adjectives to describe wind. Compile another list of references to wind in song, poems, stories, movies. What emotions are often associated with winds? With breezes? With severe storms such as hurricanes or tornadoes?



Be imaginative. Write a story, poem, song, or draw a picture about people and winds, like gentle breezes, gentle winds, or heavy wind storms.

Careers in the Natural Environment

Compile a Careers in the Natural Environment book. Invite representatives of the U. S. Department of Agriculture, U. S. Fish and Wildlife, the Bureau of Land Management, State Department of Game and Fish, and other federal, state and local agencies to speak to your class. Consult your school librarian, guidance counselor and the Resource Organizations in this book.

What aptitudes and training are required for each career listed?

What are the rewards, both measurable and immeasurable, of careers in the natural environment?

What are the opportunities for advancement?

What are some of the interesting and appealing aspects of each of the jobs? The negative aspects?

What other information might be useful for people planning careers in these fields?

What might be the most helpful way of organizing such a book? Alphabetically? By broad science topics such as biologist? In some other way?

A Natural Environment Video or Slide Show

Produce a slide show or video depicting people's effect on their natural environment. Learn to use a computer slide show program and create your slide show on the computer also.

Describe outstanding ways in which people are using natural environment in a manner that is good both for humans and the ecology of the area.

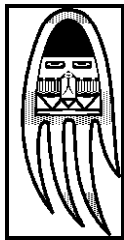
What are some of the ways in which people have abused the natural environment, such as off road vehicles, litter, others?

What steps has the city taken to manage our Open Space properly?

Where can you find examples of effects on the environment that result from sincere differences of opinion as to how our land and river are best used?

How do economic or political priorities sometimes adversely affect our environment?

What recourse is available to citizens who differ with official opinions about ways to use the natural environment?



Activities for the Senses and Sensibilities

Moods



Working in small groups, write down descriptive or mood words that come to mind in any of the following situations:

walking in the bosque at the Rio Grande Nature Center

climbing the rocks at the Juan Tabo Picnic area

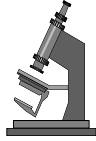
picnicking at Doc Long's

standing in mid Albuquerque and looking at the Sandias or the Volcanoes

Use the words compiled by the groups to write a poem in free verse or Haiku. Share these poems with the other members of the class.

Sit quietly with closed eyes at the Rio Grande Center or in the Sandias and listen to the music created by the natural things around you.

Select an animal whose movements appeal to you. Note its habitat, mannerisms, shape, feeding habits, and any other characteristics which make you want to simulate its movements. Let your body express how you feel. Select music to accompany your dance.



Watch the changing colors of the Sandias during the day. Paint an abstract picture with the colors you like best and the colors of the sky; express the mood you associate with the mountains.

On a field trip to the mountains, mesa or bosque, take time to make tactile discoveries. Feel a variety of smooth or rough objects and textures somewhere between smooth and rough. Describe these textures any way but verbally. Use bodily expression; graphic art forms such as rubbings, drawings, subtle washes of color or sketches in clay; or use sounds.

React to the joyful sensory experiences in the natural areas around Albuquerque by using a sense other than the one directly involved in the experience. Respond to a beautiful view through body movement, through the use of mood words. Express reactions to the sounds of nature by painting or drawing a picture. Or play music that expresses the majesty and power you see when you look at the mountains.

Use natural dyes such as onionskin, juniper, chamisa, and sage collected in open areas around the city to color yarn. Use these fibers to weave small rugs or mats. Check with the County Extension Agent before collecting to make sure none of the plants is an endangered species.

Make collages of natural materials gathered in the mountains, on the mesa, or in the bosque. Create designs that reflect the mood of each of these areas. Check with the County Extension Agent before collecting.

Bring in natural clays of different colors and use them to make paints. Paint pictures with these locally gathered materials. Find out about Indian paintings which use natural materials such as colored sand.

Using a buddy system, blindfold one person at a time and take a trust walk. Have the blindfolded partners describe differences in terrain and surfaces encountered on the walk as well as any heightened awareness they may experience in the sense of smell, sound or touch.

Find an object, a rock, stick, plant, etc. with which you identify in some way or which is appealing to you. Sit in a circle with classmates and take turns explaining why this object was selected.

"The Indian view is that man is part of a delicately balanced universe in which all components - all life forms and natural elements - interrelate and interact with no part being more or less important than another. Further, it is believed that only man can upset this balance." Tom Bahti

MISSING PICTURE AND TEXT

Lava Escarpment