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AUTHOR Brooks, B. Wayne
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ABSTRACT

One major intent of learning in the outdoors is to integrate intellectual and emotional understanding. In this light, the outdoor education activities suggested in this document may be artificial unless they are incorporated within the child's discovery of his role in the total, natural scheme of things. The introductory section of the document explains the importance of developing an adequate school site which uses natural resources. Section A lists 6 simple activities, covering such areas as sound, touch, and temperature. Section B explains scavenger hunts; Section C, trail-type activities. Nearby outdoor activities are given in Section D, with concepts, problems, and long range studies for each. Section E lists 36 additional outdoor activities. Reference and library books comprise Section F. (KM)

THE HASTINGS COUNTY BOARD OF EDUCATION

OUTDOOR EDUCATION
B W BROOKS
2 WOOLER RD TRENTON, Ontario
392-2954

PRIMARY & INITIAL EXPERIENCES IN OUTDOOR ENVIRONMENTS

IT'S CLOSE & SIMPLE

PREAMBLE

There are many, many complete cookbooks, and a further myriad of of single recipes itemizing the necessary ingredients for outdoor experiences. The needs of your children, and the needs within your school's total curriculum will determine when, and in most cases, how to most beneficially employ the outdoor Educational Method.

One major intent of learning in the outdoors is to integrate intellectual and emotional understanding.

The suggested activities on the following pages may be very artificial unless they are incorporated within the child's discovery of his role in the total, natural scheme of things.

Grateful Acknowledgement is made to the teachers of North Hastings, especially Mrs. Pat Foster, whose planned workshop in May, 1970 prompted the original of this booklet. To Miss Phyllis Beatty, who assisted with several of the activities herein; to Glassboro State College and Dr. Thomas J. Rillo whose committee compiled much of the enclosed material; to Rockford Outdoor Education Department, Rockford Illinois whose committee composed a booklet entitled Outdoor Education Tips which has also offered much to the following pages; and to Mrs. Louise Donaldson, elementary school teacher, Oregon, Illinois, and George W. Donaldson, Professor, Northern Illinois University, Taft Field Campus, Oregon, Illinois, who offered most helpful suggestions during compilation, we say thank you.

B. Wayne Brooks,
Co-ordinator
Outdoor Educational Activities

SOME THOUGHTS ON SCHOOL SITE DEVELOPMENT

The school building and site are the hub of the ever-expanding school community. Therefore, care should be taken to acquire, organize and develop both building and site so as to produce maximum aesthetic values, academic, and recreational possibilities.

The outdoors is an extension of the indoor classroom and an enhancement to the indoor curriculum.

A hard-surfaced play area for rainy days, always in use by oil trucks and delivery vans; formal playground equipment, exactly the same as that found in amusement parks; soccer and softball fields, used by community leagues in the evenings; is not sufficient to allow the school, freedom for total programming. School sites should allow teachers outdoor freedom. Primary children who have experienced many, varied academic and recreational activities on the school site will be prepared for more advanced, away from school activities, in their junior and intermediate years. Teachers who hesitate to become involved in outdoor programming are more likely to 'step-outside' if they can stay within the confines of the school yard.

What is necessary?

A Acquisition of large sites -- up to fifty acres and more.

B Careful development of and supplemental additions to the natural environment.

What do we need on location?

1. Trees and Shrubs.
2. Stumps and Posts.
3. Logs and Boulders.
4. Grass and Other Vegetation.
5. A Garden.
6. A Stream and Pond.
7. Sidewalks
8. Animal Life.
9. Variation in Soils.
10. A Sand Pile or Box.

An excellent reference book is: Creative Outdoor Play Areas by Peggy L. Miller available from Prentice-Hall, and your co-ordinator.

Total school site development will greatly assist in the establishment of attitudes such as Responsibility, Conservation, and Reverence for Life.

CONTENTS

SECTION A

ACTIVITY #1

INVESTIGATION OF A STORE-FRONT WINDOW -

Observe a variety of articles in a store window

- an awareness of how articles are similar and how they are different
- to create an interest in how articles are manufactured
- from where do they come?
- how are they used?
- are they necessity or luxury?

ACTIVITY -

Find a store window that displays articles that are made of rubber and some that are made of glass.
Make a list of these articles
What unique properties have each?
Are they made from living or non-living materials?
What properties have they in common?
What uses might be made of these articles?
On your way back to the school you may be able to add to your list.
In how many ways can you organize all these articles?
How do you think glass is made?
How do you think rubber is made?

ACTIVITY #2

SOUNDS TO RECOGNIZE -

Are we fully aware of the sounds around us in our daily environment?
Can we recognize them?
Can they be classified?

METHOD:

- select and map a route
- walk this route allowing the tape recorder to run, list all sounds as you hear them, and as they are being recorded.
- review the tape and list
- play the tape to the rest of your class
- have them record the source of all sounds heard

FOLLOW-UP

- arrange the sounds - natural, man-made; -high, low; -loud, soft;
  - pleasant, unpleasant
- did everyone hear the same sounds?

ACTIVITY #3

THE ENVIRONMENTAL TOUCH -

- to help the child observe the environment around him more perceptively through the sense of touch
- to develop a foundation vocabulary of tactile experiences
- to encourage the child to use his sense of touch will aid him in making his environment stimulating

METHOD:

Location: In and around the block; collect materials.
Collect materials of various textures.
Feel these materials, describe each.
Make a list of smooth objects.
Order the listing from smoothest to least smooth.
Compare and organize your material in as many ways as you can.

Game - Partners -

- One team member is blinfolded. He is led by a buddy, without verbal comment, along a trail and is asked to describe various natural items from touch only.

ACTIVITY #4

TEMPERATURE:

This is an extremely broad topic. Possible related topics include:

1. How do we read the thermometer?
2. How do we make a simple thermometer?
3. How does heat affect gases? liquids? solids?

3(a) During winter, inflate balloon in warm classroom. Take it outside. What happens? Why?

3(b) Inflate balloon outside (where it is cold). Take it inside to warm air, What happens? Why?

4. Freezing and melting.
5. Pressure and boiling.
6. Daily weather.
7. Germination and Growth
8. Fahrenheit and Centigrade

COMPARING GROUND TEMPERATURES:

To-day the weather man tells us the local temperature is _____°F. The temperature at each corner of the school is ____°F.
Select a land-line from lowest to highest points near the school.
Place similar thermometers on the ground at regular intervals and in like positions along this line. Leave for fifteen minutes. Record the temperature.
Compare the temperatures. Account for the difference.

ACTIVITY #5

SEEING OBJECTS -

- Practising critical observation.
- Are we selective in our sight?
- Is a deaf person likely to see more than we?

WE ARE:
- noting colours, shapes, sizes
- grouping families of things
- forming patterns
- seeing living and non-living things
- seeing movable and immovable objects
- seeing things wet and dry
- seeing texture
- seeing things we like and dislike

METHOD:
- Each member selects a site with a similar scope of vision.
- Draw a circle and place yourself at the centre. Locate the Cardinal Points and orient your line of vision accordingly.
- Arrange around the circumference all items viewed. Distance can be taken into account and recorded.ie. closer, further.

FOLLOW-UP: Classify in any of an infinite number of ways.

ACTIVITY #6

LISTENING FOR SOUNDS -

- Learning to become aware
- Are we selective in our listening?
- Are we conscious of all sound stimuli?
- Is a blind person more aware of sounds?
- Practising critical listening.

METHOD:

- select a site.
- sit or lie perfectly still and record all sounds for a specified period of time.
- NOTE: a recording should be made simultaneously for future clarification.

FOLLOW-UP

- list the sounds
- compare each person's list
- were all listeners facing the same direction?
- would this make any difference?
- classify the sounds.

SECTION B

SCAVENGER HUNTS

These activities may often be used as a supplement.
Emphasis is NOT on collecting, but rather on finding, and identifying.
Information gathered is always useful in arranging further field studies.
These activities relate well to map making.

A. FIND AND IDENTIFY (these are just examples of course)

1. a cone
2. a fungus
3. 4 different evergreen needles
4. a piece of granite
5. a mushroom
6. 2 new leaf buds
7. 2 live animals
8. a cattail
9. 3 kinds of moss
10. 2 kinds of lichen
11. a fern
12. 2 dead leaves

B. Small children enjoy an alphabet scavenger hunt, too.
"find something that begins with a, b, c, etc."

C. Small children also enjoy a rhyming scavenger hunt.
Find something that rhymes with: 1. beef, 2. read, 3. power,
4. moan, 5 etc.

SECTION C

TRAIL-TYPE ACTIVITIES

This trail is designed for use by students of all ages; because of the safety problems which exist on this trail, it is necessary that each student is accompanied by a teacher or guide.

OBJECTIVES:

1. To increase an individual's visual awareness by depriving him of his sight for a short period of time.

2. To increase an individual's knowledge through the use of his non-visual senses.

3. To develop an individual's kinesthetic awareness.

Special instructions intended for use only by the teacher or guide will be enclosed in parentheses.

Start: - While moving down to the water, use your eyes as well as your other SENSES to observe your surroundings.

Station #1 - In looking at the stones in the bottom of the stream, how do they differ from the stones on the trail on which you are standing?
Feel the water, guess the temperature.
What has happened to the trees along the shoreline?
How has man affected the naturalness of the area?

Station #2 - (Using a hankerchief or similar cloth, blindfold the student)
You are now facing east. Can you sense any point of reference that assures you that you are facing east?
From what direction is the breeze blowing?
In what direction is the community? How do you know?

Station #3 - Place your foot on this rock. Can you estimate its size?
Describe the area you are walking through.

Station #4 - What do you notice that is different from the area you just walked through?
In what direction are you now facing?

Station #5 - (Lead pupil down to touch decaying log.)
What is happening here? Describe what you feel.

Station #6 - How does this area differ from the tall grass area? What do you sense underfoot? What do you smell? Hear? Feel?

Station #7 - Place your hands on the tree and describe it. What would you say is its circumference?

Station #8 - What is unusual about this tree? How does it compare to the tree next to it for sturdiness? Describe its sound when you knock on it. What conclusion can you reach about this tree?
Reach up and you will feel a hole. How high is this hole? What or who made it?

Station #9 - Describe what you feel? What affect does this have on the tree?

Station #10- (Lead pupil to touch tree on ground)
What do you feel? What caused this? Can you describe the pattern?

Station #11- Feel the evergreens on your left and right. Note the differences. Can you describe the differences in feel, smell? Can you identify these two trees?

Station #12- (Lead pupil to touch upturned root.)
What has happened here?

Station #13- What did you just walk through? How did it get there? What do you smell?

Station #14- (Remove blindfolds)
How far did you walk? How long were you gone?

FOLLOW-UP:

It is left to the discretion of the teacher as to specifically how the learnings are reinforced. It is suggested that the teacher:

a. Discuss observations with the pupil at each station

OR

b. Take the trail with the pupil once more, but without the blindfold.

STOP, LOOK, and LISTEN TRAIL

Walk slowly and quietly,
You may see some of the
wild creatures who live in
these woods and fields.
Remember, you are a guest in their home.

INTRODUCTION: A nature trail of woodland and field has been developed so that you may have the opportunity to become acquainted with some of the visual and basic ecological fundamentals.

Station 1: Fallen Oak - This fallen oak was pushed down by gale force winds on June 17th, 1970. This tree was weakened by disease and other infestations. You may note that it could not survive one of nature's mighty forces and was eliminated. This opened the canopy allowing more light and makes room for younger more vigorous trees to grow.

Station 2: Dead Black Oak - This once majestic oak was thriving two years ago. Now, it is dead from a disease known as oak wilt. Once the tree is infected, the disease spreads from tree to tree by root grafts.

Station 3: Entering the oak area, feel and compare the weather in the open and then in the woods. These oaks are reaching maturity. You can readily observe what takes place when an area is mowed as compared to an area left growing. At the line where mowing ends you can see grass and on the other side we see an understory of small trees, vines and shrubs are abundant. If mowing is stopped, plants of the forest floor will move into the lawn area.

Station 4: Deer Pens - Many people are attracted and enjoy watching the white-tailed deer. However, the land reveals great abuse indicating tramping of visitors around the pen and the deer within the pen have worn away the ground cover, exposing the soil to be victim to water erosion. In the pens you can see the value of solar energy because grass is growing in an open area and is not growing under a canopy of oaks.

Station 5: Fungus Growth - Growing on this log is turkey tail fungus. It is a plant which does not have flowers, stems, leaves or roots. This fungus is getting its nourishment by "digesting" the log.

etc., etc., etc.,

SECTION D

SUGGESTED SCHOOL SITE OR NEARBY OUTDOOR ACTIVITIES

A. ANIMALS

Tracking - point out shape, size and patterns.
Homes - how are they constructed, where are they?
Make a model of different type animal homes.
Do any animals live in the schoolyard?
Which ones, where?
Make a plaster cast of tracks.
Look at animal pelts under lens.
Make animal pictures from paper, boxes, junk materials, vegetables, paper bags.
Find designs in animal sounds (squirrel's noise, dog's bark)
Write a story. (You are the animal telling the story)
Create a dance imitating an animal.
Imitate animal sounds.
Write a poem, compose a song.
Show pelts belonging to children.
Visit a pet with a litter of young.
Visit the farm. Have you thought of using the School-Farm program.

Concepts

Animals are living things - grow and change; need food and water; produce young; can move about.
We enjoy watching animals.
Animals in the home are called pets (Domestic animals only)
Pets need T.L.C. (Tender Loving Care) Learn to accept the responsibility of the pet's care.

1. Pets need water, food.
2. Have baby teeth; lose them as humans do.
3. Mother animal will care for her baby.

We can learn many things about wild animals.

1. Have different ways of protecting themselves (claws, teeth, horns)
2. Most animals care for their young.

How do animals help us:

1. Food
2. Pleasure
3. Provide clothing

What are the characteristics of mammals?
(Bat, chipmunk, skunk, muskrat, fox, mink, etc.)

How are animals of field and forest alike?

1. Need food
2. Grow and change
3. Produce young
4. Depend on themselves for existence.

How are animals of field and forest different?
Classify: Mammals, birds, reptiles, amphibians, insects.

Problems

How do animals live?
What animals do we find in our homes?
What animals are found at the zoo?
What animals live in or near the water?
What are the needs for pets? Wild animals?
Why do we keep some animals at the zoo?
How are animals beneficial or harmful?
What are their characteristics?
How do animals protect themselves?
How can you protect animals of woods and field?
Do seasons affect them?

Long range study

Visit different type homes.
Attract an animal to the school yard.
Watch nocturnal animals.
Visit beaver and muskrat homes.
Make lists of animals, date seen, etc.
Make a survey of the animals around you.
Write to the State Department of Wildlife for suggestions.
Collect skulls and skeletons and mount and identify.

Did you know?

Why does the raccoon live in a decayed tree home? (Oxidation of the decaying wood makes his home warm).
How many stomachs do cows have? (Four).
Does the raccoon always wash his food? (no).
Why does he like moist food? (He doesn't have saliva in his mouth as we do).
Skunks were used as food by Indians.
That the raccoon is an interior decorator!!

B ART AND CRAFTS

1. Finding "lines" in the environment:
   a. circle - sun, moon, berry, woodpecker's hole.
   b. zig-zag - tree rings, edges of leaves, building and trees on the horizon.
   c. wavy - path of a brook, ripple of water, soil.
   d. straight - tree trunk, vein in a leaf, a pine needle, a blade of grass.
   e. finding other shapes in the environment.

2. Finding design in movement:
   a. draw lines to show how different birds fly.
   b. draw lines to show how branches wave in the wind.
   c. draw lines to show how clouds move in the sky.

3. Finding design in sound:
   a. draw a sound the way it might be put down on paper using dots. light lines, dark lines, zig-zags, spirals, straight and wavy lines. (Wind in grass and trees, squirrel's, dog's bark.)

4. Finding design in colour:
   a. using rocks, sticks, leaves, etc. rub on sandpaper to see the colour.

5. Find design in texture:
   a. draw and describe the following: bark of trees, stumps, blade of grass, sidewalk, feather.

6. Constructing collages from natural materials such as cones, pebbles, twigs, leaves, etc.

7. Stone polishing and Grinding.

8. Whittling
   - safety is a key component, always, in this activity because a knife must be very sharp in order to whittle.
   - maintain sufficient distance between each participant so that they cannot easily touch one another.
   - sit cross-legged, with elbows on knees for stability.
   - discuss the history and significance of the sharp edge.
   - illustrate how to select a proper knife size for your hand.
   - show how to open a pocket knife - away from you.
   - emphasize that a pocket or jack knife is useless unless you can open it easily and unless it is very sharp.
   - demonstrate shaving away from you, drawing motion, use of thumb and fingers, use of padded tissue between thumb and index finger, etc.
   - stress blade control - ie. stopping the blade in mid-stroke.
   - what to make? just shavings first - smooth & even, a spear head, letter opener, fish or bird shape.
   - push knife gently, never jerk.
   - participants must keep their eyes on their work.

9. What to make?
   - polished roots & driftwood
   - willow whistles
   - centre pieces
   - signs for trails
   - navajo loom
   - terrarium and vivarium
   - picture frames

C BIRDS

Activities

Feeding Stations
Suet Feeders
Nests - try to make one
Sketching of bird's nests
List kinds of food, seeds, etc.
Observe feeding
Records of songs
Keep and take daily notes.

Create bird sounds to relate to call or song (what cheer) (Fee bee) (chick a dee dee) etc.

National Audubon Society conducts bird count December 25 and January 2 Do your own counting.

Start bird calendar -

Bird	Date	Where Seen	Seen By

Write stories, poems
Give dramatic skits (written by students)
Create a dance imitating bird movements while feeding, courtship. etc.
Compose a song about birds or one particular bird
Sketch and look under lens at feather construction
Make a chart of bird's beaks, feet
Carve birds from wood, soap
Make bird silhouettes - flying or sitting

Problems

How are the birds in your community alike?
How are birds different?
What are the characteristics of birds?
Why do birds migrate? Who do some stay?
When do they leave?
How do they live during the winter months?
Are they beneficial to your community?
How would you attract birds to your area?
Do birds need your protection?
How would you establish a bird sanctuary?
What can you and your class do to save our feathered friends from destruction?

Concepts to be developed

A. All birds have feathers

1. wings
2. 2 legs
3. lay eggs
4. move about
5. provide homes
6. fly
7. different type nests
8. move differently
9. different colouring
10. eat different foods
11. different body structure

B. Comparing sizes of different birds

1. Small or large
2. How long
3. Large or small wing span
4. Large or small
5. Large or small bill

C. Observe colours, marking

1. Did it flash colours when flying? Where? (rump, tail, wing, underwing)
2. Did it fly straight, swiftly, dart about, up and down, wave-like, flap, sail, soar?
3. What type bill? Tail?
4. Colours of feet, tail, nape, crown, etc, at closer range.

D. Song

1. Did it sing while flying? Did it sit when singing? All birds are not alike.

Long range study

What is the food of the bird, how is it obtained?
Describe nest, where placed, how supported, number of eggs.
How does it care for young?
How is the bird beneficial to us? Name of the bird.
Grow some weed seed cover in the spring.

D. INSECTS

Activities

Make a clue chart to identify insects.
Observe an ant hill indoors.
Study gall insects
Observe a spider indoors
Tell a story.
Compose music imitating sounds.
Make a cricket cage.
Find cocoons.
Do an insect dance.
Dramatize life of an insect.
Make a chart of helpful and harmful insects.
Draw a large picture of parts of insects.

Problems

What is an insect? (Animals with 6 legs)
How do moths and butterflies change?
Are insects common in your neighborhood?
What are the characteristics of an insect?
Do they live in any temperature?
Do insects migrate?
Insects need plenty of water and certain foods.

Concepts

Moths and butterflies cycle - lay eggs, hatch, emerge from cocoon.
Recognize common insects.
Insects can be found any place.
Almost everything is eaten by some kind of insect.
Some insects make interesting homes.
Some are helpful.
Some are harmful.
Insects have six legs and three body parts.
Inspect how temperature, light affect insects.

Long range study

Find out which insects were used by famous people in other countries. (China - crickets - Napoleon used a bee as his crest)
Which is the oldest and largest known insect? (Dragonfly - largest; silverfish - oldest).
Are insects found everywhere?
Stake out a 12 inch range when weather is moderate - look for insects and count them.
Find out if insects have coloured legs.
Make butterfly nets.
Mounting boards.

Did you Know?

An insect can smell?
Insects are social?
Caterpillars are harmful - butterflies are not?
Molts because his suit becomes too small?

E. POND

1. Netting and studying pond plants and animals.
2. Finding the average depth of the pond.
3. Making a simple map of the pond.
4. Finding the temperature of the water in different places and at different levels.
5. Using a microscope and hand lens to discover microorganisms.
6. Finding where the plant and animal life is most abundant in and around the pond.
7. Finding evidence of water pollution.
8. Discovering if shade changes the water environment.
9. Determining the acidity and alkalinity of the water and soil around the shore.
10. Marking off the watershed of the pond.
11. Figuring the volume of the pond.
12. Figuring the surface area of the pond.
13. Finding the turbidity of the pond.

F. PLANTS

1. Finding effects of people, animals, sunlight, shade, wind, water etc. on plant growth
2. Finding locations where plants grow (cracks in sidewalks, school buildings, tree stumps, etc.).
3. Tasting wild onion.
4. Finding effects of plants on erosion and erosion on plants.
5. Studying small, measured plots of ground for strengthening observational skills.
6. Rubbing plant pigments on sandpaper.
7. Keeping records of the heights of small plants with strips of coloured paper by gluing the strips to a piece of cardboard to make a growth graph.
8. Studying the roots of grass or other plants by carefully washing away the soil.
9. Tossing a wire hanger ring to study plants in a lawn.
10. Comparing how seeds travel from place to place.

Activities

Identify plants.
List flowering and non-flowering plants around the schoolyard.
Find rare local plants.
Grow plants.
Dig up plants and observe roots.
Make a display of seeds and pods.
Make a terrarium.
Make wax paper mounts.
Collect leaves, flowers, stems, roots.
Write original stories and compose song.
Write a poem.
Paint a landscape or make a flower design on a collage.
Read E. Dickinson's poetry.

Problems

How do plants grow?
Where do plants come from?
What do plants need to live and grow?
What are the parts of a plant?
How are plants reproduced?
How are seeds planted and transported?
How do they help us?
Are some harmful? How and Why?
Are plants protected by law?
Do some plants live all winter?
Does nature sometimes make mistakes?
What are the non-flowering plants?
Are flowers good to eat?
Do plants need insects?
Do we depend on plants for life?
Are some plants social or do they like to be alone?
How do tubers, bulbs and corms differ?

Concepts

Plants are living things - they grow and change, have several parts, reproduce themselves, are planted in different ways and grow in different places.
We find many different plants in our neighborhood; most plants are green; a tree is a big plant; plants are good to eat; they beautify our lives.
Most plants grow seeds.
Plants have different roots and stems.
Plants grow in many places.
There are many different kinds and their needs are different; all need air; all do not need the same kind of soil/all do not need the same amount of water.
Plants change with seasons.
What are the parts of the plant? stem root
leaves seed
flower fruit
Plants have different periods of growth.
Plants produce.
Seeds are food.
Does a vine support itself?

Did you know?

That the bittersweet fruit is poison?
That the Jack-in-the-pulpit was called Indian turnip?
That the trunk of the tree is a stem?
That cinnamon grows?
That sumac is the Indian drugstore?
Leaflet three, let it be? (Poison Ivy)

G. (A) Rocks and Minerals

1. Making soil by rubbing two rocks together.
2. Arranging rocks according to colour, texture, hardness, luster, fabric and other characteristics.
   a. Scratching rock on sandpaper on unglazed porcelain tile for colour streak.
   b. Examining a rock with a hand lens to see the size of the particles. (Texture)
   c. Rubbing two rocks together to see which one makes a scratch in the other. (Hardness)
   d. Observing if the surface of the rock or mineral reflects light or appears shiny. (Luster)
3. Finding rocks that break differently by comparing edges.
4. Finding rocks that have been worn smooth by water or cracked by the weather. (Comparing a freshly broken surface with a weathered one.)
5. Comparing man-made rock (bricks) to naturally made rock.
6. Comparing the weights of the different kinds of rocks of the same size.
7. Finding different kinds of fossils in clay.
8. Making impressions of fossils in clay.
9. Finding where plants are growing on and slowly breaking down rocks.
10. Making a survey of the different kinds of rocks on the school grounds.
11. Finding rocks that show signs of rusting.
12. Finding ways that rocks are useful to man.

(B) Earth Science

Activities

Make a collection of rocks, mount the specimens.
Identify the rocks in your collection.
Look for fossils in the rocks.
Make a fossil collection.
Make a series of dioramas to show local geologic history.
Collect soil samples, plant seeds in each..
Look at a soil profile.
Obtain a topographic map of the area.
Make a contour map of the area.
Look up the latitude and longitude of your school.
Make your own fossils.
Watch for areas of erosion in your schoolyard, try to remedy these.
Make a piece of clay pottery.

Problems

How were the rocks formed?
Compare the three types: igneous, metamorphic and sedimentary.
What minerals are contained in these rocks?
Which are native rocks?
Which are foreign rocks?
How did the foreign rocks get here?
What was the local climate when fossils were being formed?
Find out if a glacier covered the area.
How is soil formed?
How do plants affect the earth?
What is the effect of different kinds of soil on plants?
What effect does a river have on the surrounding land?
What mineral resources are found in your area?

Concepts

There aremany kinds of rocks.
Rocks are made of many materials.
The earth has undergone change.
The earth is still changing.
Plants change the soil. Soil affects plants.

Long range study

Notice how man is changing the land contours in your school yard (Grading, leveling, etc.)
Consider how many ways man uses rocks.
Make a map of your county or township showing the areas where mineral resources are found.
Study how the farmer conserves his top soil. (Contour plowing, strip farming).

Did you know?

The delicate plant roots can help to break a rock?
That Rockford was once a tropical area?
That we live on only a few inches of top soil?

"I consider basic to the development of a mature religion and understanding gained early and thus never lost of the interdependence of all living things. This understanding accepts all life as linked not only to everything else that lives but to the elements of the physical world. It is the understanding that led to St. Francis of Assissi's "Hymn of Creation" in which he refers to 'our brother, the sun' and 'our sister, water' and'our mother, earth." St. Francis was so at home with the universe he knew, that all parts of it seemed related to him, as, of course, they are now understood to be related to all of us, since, we are made of that related, very active matter, sometimes called "the stuff of the universe."
Giving children experiences to learn from, rather than information alone, teaches them to discover, test, ask about, evaluate, and not accept blindly what they are told. The things we really know and therefore live by we learn this way.

Katherine Wensberg
An Introduction to Ecology for 5 to 8 yr

H. SHADOWS

1. Estimating length of shadow in relation to object casting it.
2. Marking the position of the shadow on the ground with chalk or sticks.
   (Note the change in length and position after a few minutes, and hours). (What causes the shadow to move?)
3. Comparing the shadows cast by the flag pole, posts, trees, persons, buildings, etc.
4. Comparing shapes of shadows to the object casting the shadow.
5. Observing how shadows fall according to the position of the sun.

I. SIDEWALKS

1. Examining what they are made from and how they are made.
2. Finding plants growing in cracks.
3. Finding wearing away by forces of weather and people.
4. Finding soil washed onto them and determining where it came from.
5. Studying where the sidewalks have been placed and where they are needed.
6. Finding where tree roots have pushed up the sidewalk.

J. SOIL

1. Comparing size of soil particles. (Shake up soil in a jar of water and let it settle.)
2. Comparing colour of soil in different places.
3. Smelling soil to find out if it has an odor.
4. Comparing colour and moisture of soil from the surface to two feet deep (use of a soil auger).
5. Measuring soil compaction in different places (use a soil compaction gauge.)
6. Finding out how fast water soaks into the ground in different places. (Bottomless tin can sunk in ground)
7. Comparing erosion at different places on the school ground. (Noting evidences of erosion,ie., deltas, gullies, exposed roots, etc.)
8. Examining soil with a hand lens. Separating the parts of soil into piles of the same material. (Pebbles, roots, leaves, sand, etc.)
9. Listening to different soils when rubbed between the fingers and held to the ear.
10. Measuring the temperature of the soil in different spots.
11. Squeezing samples of different kinds of soil together to see if they form a ball.
12. Collecting some muddy water from some puddles or drainage ditches. Allow the suspended soil to settle to the bottom. Compare the amounts of soil in different places.
13. Pouring some water into a jar of soil. Noticing the air bubbles that rise to the top.
14. Measuring root exposure of the depth of gullies with strips of paper. Paste them to a piece of cardboard to record the measurements of soil erosion in different places.
15. Comparing plant growth in different kinds of soil.

16. (a) If wooded area is available, let children discover with their feet the difference in the "feel" of that soil and bare soil.
How does the bare soil feel?
How does the forest soil feel? (I keep going on until I get the word "spongy".)
Is it good to have spongy soil?
Why? (I keep asking questions until children have figured out these things.)

1. Water is absorbed by soil (instead of running off quickly to nearest stream.)
2. Roots of trees (and other plants) need the water.
3. Some of the water is stored up in the ground so we can have wells and springs.
4. Water does not wash away soil if it soaks into ground.
5. Spongy soil lets in air which is needed by plant roots and other organisms in soil.
6. Spongy soil allows plant roots to grow more easily.

(b) Find a bank - or a cut in soil - where children can see topsoil and mineral soil. Have them examine both carefully so that they can come up with these observations:

1. Mineral soil is <u>just</u> ground-up rock.
2. Topsoil has organic matter (rotting plant and animal matter (matter that has once been living matter)) mixed with mineral soil.
3. The organic matter makes the soil spongy.
4. Organic matter puts minerals (plant food - fertilizer) in the soil.
5. Organic matter makes the topsoil a different colour.

K. <u>STUMPS AND POSTS</u>

1. Figuring the method used in cutting and possible reasons for cutting.
2. Rubbing with pencil or crayon on paper to get an impression (tracing) of the growth rings.
3. Finding decay and insect evidence.
4. Finding clues that show what forces are acting on the stump.
5. Comparing wood that has been painted or treated with other preservatives to untreated wood.
6. Figuring out why posts have been put into the ground in certain locations.

L. <u>TREES AND SHRUBS</u>

1. (a) Deciduous trees lose their leaves in winter.
   (b) The American Beech may keep many of its dead leaves all winter. Why?
2. (a) Evergreen trees have green leaves all the time.
   (b) Evergreens replace their leaves periodically.
   (c) The Larch or Tamarac is our only deciduous evergreen.
3. Most evergreens bear their seeds in cones.

4. Most deciduous trees' seeds are enclosed in a fruit.
5. Observe winter buds terminal and lateral on a deciduous tree from beginning to end of school year. Note that buds are on the tree before it loses its leaves in fall. Observe what happens to terminal bud in spring - to lateral bud.
6. Sketching tree shapes (silhouettes)
7. Estimating height in relation to pupils.
8. Studying bark patterns, textures, colours.
9. Finding root systems (exposed by erosion).
10. Comparing deciduous and coniferous tree characteristics.
11. Comparing fruits, seeds, buds, leaf scars, leaves.
12. Measuring distance around (circumference) and distance through the centre (diameter) with a string tape measure marked off with knots one inch apart.
13. Comparing trees and shrubs.
14. Testing bark thickness.
15. Counting annual rings.
16. Estimating the age of (white pine, balsam fir) evergreens by counting the whorls of branches.

Leaves

1. Some plants have simple leaves - one blade.
2. Some plants have compound leaves - more than one blade.
3. Some compound leaves are palmately shaped (like the palm of the hand)Horse-chestnut, Buckeye, Virginia Creeper.
4. Some compound leaves are pinnately shaped (like a feather) hickory, walnut, sumac.
5. Blades of a compound leaf are called leaflets.
6. Some leaves and leaflets have smooth (entire) edges.
7. Some have saw-toothed (serrated) edges.
8. Some have lobed edges.

Activities

Collect pine cones and needles.
Save pennies for a tree to plant in the schoolyard or park.
Make silhouettes of shapes of trees.
Draw buds, seeds, bark.
Paint trees, colour the flowers.
Compare leaf; size, shape, edges, veins.
Create a dance imitating motion of leaves.
Make sound designs of tree leaves rustling, whispering, etc.
Feel leaves, stems, bark.
Count tree rings.
Study bark patterns.
Compare deciduous and coniferous trees.
Find designs in buds, sticks.
Make a candle holder
Gather roots to make crazy animals.

Problems

How does nature destroy trees?
Are trees necessary to our economical welfare?
What are the parts of a tree?
Determine growth patterns.
What foods do trees need?
How are trees reproduced?
How are seeds different?

Concepts

All trees are not alike - compare leaves, barks, root system, veins.
All trees need food and water and air.
All leaves are "manufacturing plants."
All trees have roots.
All leaves are not alike: different edges, size, kind, veins, (simple and compound), leaves have a job to do.
How many different trees grow in your schoolyard? are they beneficial to you and your neighbours? Do they furnish food?

Long range study

Find root systems (exposed by erosion).
Do "detective work" on a stump. (What kind of tree is it? Who might live in it?)
Sniff hike - smells of leaves, area.
Tap maple trees.
Label trees on playground.
Use plants and trees to make cooking utensils, fish hooks, etc.

Did you Know?

Trees are like "Ghost fountains" - they give off water continually but you can't see it. (Transpiration)
Leaves put together food. Photosynthesis - photo (light) and synthesis (putting together).
Trees have flowers.

M. WATER

Activities

Draw pond, river, lake,
Write a story,
Compose music imitating sounds of water.
Make a chart of farm practices used to conserve water.
Find out how much water your community uses for industry.
Find out how we soften our water.
Taste water.
Find out what kind of minerals we have in our water.
Create a water, rain, storm dance.
Draw sound patterns of wind, rain, sunshine, storms.
Talk about conserving water.
Make a display of water running down a slope not planted and one showing how it soaks into the ground when planted.
Make a chart showing how wind, rain, and sand can wear down an area.

Problems

Where do we find water?
Experiment with water to show how it changes. (Springs, ponds, lakes)
How does water appear and disappear?
Why is water important?
What happens when we pollute rivers, lakes and streams?
Which animals live in the water?
Did water play a part in making your city grow?
Do we have enough water?

Concepts

Fish live in water
- are animals
- can swim
- have scales
- eyes are always open.

Snails live in or near water.
Other animals live in or near the water.
Every living thing needs water.
Water transports seeds, boats, people, animals etc.
We must use our water supply wisely.
Where does _____ get its water supply?
Much life is found in the mud under ponds.
Much of the earth is covered by water - lakes, oceans, ponds, rivers, streams.
Water changes from liquid (rain); solid (ice); gas (clouds).
Water disappears from sight; evaporation, underground rivers, streams, sinks into the soil.
All living things must have water.
Life began in water.
Study our need for sunshine in the winter.
Learn about the calendar.

Long Range Study

Make dip nets
Make water life lists.
Visit a fish hatchery.
Mark chart of life in forest pond, marsh, bog, lake, river, mountain stream.
Maintain an aquarium.

Did you know?

We have as much water as we've always had.
We use more water because of our modern machines and larger population.
Water is always present in the air.
Clams are "legless travelers."
A clam has a foot.
Sponges are rooted animals.

N. WEATHER

1. Comparing cloud formations.
2. Finding wind speed with wind measurer (card and thread) and flag movement.
3. Finding wind direction with balloons and bird feather vane.
4. Comparing effects of objects (such as buildings or vegetation) on wind.
5. Exploring little climate (differences in temperature in different places on the school ground).
6. Seeing the effect of rain or soil erosion (set up splash boards and water soil with watering can).
7. Tracing rain that falls on the school building. (Where does it go?) (Roof, gutter, drain culvert, etc.)
8. Examining weathering on bricks, wood, and paint on school buildings.
9. Illustrating air pollution by holding clean cloth in smoke.
10. Observing where a puddle has dried up.
11. Finding where ice or snow is melting.

Activities

Make snow angels.
Snow sculpture.
Breathe on glass outside - find crystals.
Observe what happens to snow when different pieces of coloured paper are left for several hours in the snow.
Observe designs in freshly frozen ice sheets.
Observe what the wind does to the ice freezing and snow layers.
Observe snow flakes through hand lens.
Identify clouds. Make cloud pictures out of cotton or construction paper.
Tell time by the sun.
Write stories about winter.
Make a chart of the changes in winter.
Find wind speed - learn about the Beaufort Scale.

Concepts

All days are not the same. Record and read weather reports.
Measure precipitation.
Build- weather station. Identify clouds.
How does weather affect our life?
How does weather affect plants, trees, animals?
Observe changes in winter.
What sends water in the air?

Problems

How do we manage to continue life in the wintertime?
How about birds, animals, plants?
Do insects exist during the winter?
Are plants and trees dead?
What are some seasonal changes?

Long range study

Chart the seasons.
Observe rainbow - make colour chart.
Study the stars.
Does the wind play a beneficial role in life as far as food supply is concerned?
Can I feel, taste, hear and smell wind?
What kind of weather do we have?

Did you know?

Heat is the spoon that mixes the atmosphere to make weather.
The Indians called December "Moon of the long night."
Snowflakes are like minerals because they are formed by crystals.
Each snowflake is different.

O. MISCELLANEOUS

1. Finding litter (refuse) on the school grounds and having the children collect and display the litter to the school.
2. Using a 10x hand lens to open up a new world to the students.
3. Writing round-robin stories of observations. (Recorded by leader or teacher).
4. Helping to beautify the school grounds by correcting erosion problems. Planting trees, grass, flowers, etc.
5. Planning, planting and harvesting a garden.
6. Making simple maps of the school grounds.
7. Calculating the heights of trees, buildings, flagpoles, etc.
8. Examining the mill stones and noting construction and evidence of wearing and weathering.
9. Finding ways that trees are useful to man.
10. Learning to determine direction with a compass.
11. Using "Clue Chart."

P. INTERDEPENDENCE IN NATURE

Do animals help plants? How?
Do plants help animals? How?
Do animals help soil? How?
Does soil help animals? How?
Does soil help plants? How?
Do plants help soil How?
Do these things help you? How?
Take children on a field trip (preferably to a forest to discover as many different answers as possible to the above questions. Try to find these things.

1. Dead tree still standing.
2. Dead fallen tree, partially decomposed.
3. Rotting stump.
4. Animal homes - nests, dens.
5. Mole runs.
6. Earthworms.
7. Seeding plants.
8. Browsed plants etc., etc., etc.,
9. Insect galls.

SECTION E

MORE OUTDOOR ACTIVITIES

1. Trace an earth worm burrow by digging in soil. What do worms do for the soil?
2. Grow plants and show how they depend on water, sunlight, and soil.
3. Observe a patch of grass or soil for five minutes. How many animals can you see?
4. Observe the changes in seasons and discuss the changes in plants and animals as the season changes. What are the major colours for each season?
5. Explore with your class to locate evidence of fruits and seeds and other materials that animals are eating.
6. Provide winter feeding stations for animals and birds at home and at school.
7. Compare the amount of plant found above the ground to the amount found below. What reasons can you suggest for this?
8. Cut the bottom out of a coffee can. Select different locations on the schoolground; measure the amount of time required for a pint of water to be absorbed into the ground. Why does the time for different locations vary?
9. Observe the behaviour of animals such as the ant or beetle. Note their methods of locomotion, reaction to heat, light, moisture and touch.
10. Explore to find examples of weathering. Try to locate example of man-made and natural weathered rock.
11. Cover a tree stump with a piece of paper and rub with a soft pencil. This will make a pattern of annual rings. Use the rings to locate the year of the child's birth, school entrance, etc.
12. Melt some snow and observe the water. Compare the residue in new snow with that of aged snow. What are the sources of residue?
13. Make a compost pile of leaves in the fall. Observe the changes throughout the year. What happens to its size? Its colour? What disappears? What appears?
14. Dig up a well developed dandelion plant growing in a dry location. Show the class its taproot. Why does it have this shape? Why isn't it the same colour as the part of the plant above the ground?
15. Walk with your class to high and low areas around the school. Collect a soil sample in each area. Have the class distinguish differences in particle size, taste, colour, and amount of humus in the samples.
16. Collect four earthworms. Drop two in a grassy area and two in a barren area. Watch to see which worms burrow out of sight first. How many reasons can you find for this? What purpose do worms serve for plants?
17. Locate an old unused bird nest after the nesting season. Place the nest in a pie plate of water. Record how many seeds grow. Can you identify them? Do birds eat them?
18. Hike to observe evergreen trees in the fall or winter. How many differences can be found between the different evergreens? How many likenesses?
19. Make leaf pictures by holding a book up to a leaf and covering the book and leaf with a piece of paper. Rub the paper with a soft lead pencil until the outline and veination are discernible.

20. Take the class out on a bird walk. Learn to distinguish between birds by their size, shape, song, and colours. Let the pupils make up names according to the bird's distinguishing features.
21. Determine if mosses or lichens grow more abundantly on the north side of trees and rocks.
22. Find out where the water used in your community is obtained. Is the supply sufficient? Is there a danger of shortage now or in the future?
23. (a) Stake out a white cloth sheet and observe for air pollution evidences. What types of things do you observe on the sheet? What are the sources of these contaminants?
    (b) Put an inch of water in a pail and allow it to remain undisturbed. Do you observe the same things in the water as were on the sheet?
24. Determine the amount of water in a cubic foot of snow, is this figure true for all snow? Experiment.
25. Take your class on a gall hunt. They will have trouble finding at first, but, with practise, will locate several kinds. As they become competent at finding galls, have them devise a classification system (found below the waist, on a tree, etc.)
26. Observe a cross section of snow and compare to the formation of certain types of rocks.
27. Hike with your class to observe proof of the existence of wildlife. Such things as chewed nuts, feathers, nests, bones, holes, tracks and pellets can all be used by the observer to learn about forests inhabitants.
28. Take a field trip to observe kinds, sizes, and types of Christmas trees. What reasons are suggested for differences in prices? How old are some trees. When were they cut?
29. Impress students with the amount of life found in soil. Collect soil to a depth of four inches over a one square foot area. Have students examine closely a handful at a time. Have students classify materials found as being plant, animal or soil.

30. Examine cracks in the pavement near or on the school yard. What caused them? Is there any changes in size dependent upon the season? Why? What plants and animals are living in them?
31. Take the class to visit a small stream after a rain. What colour is the water? Collect a sample and allow to settle. What is the cause of the water's colour? Why do fish feed at this time? Do you see any evidence of this?
32. Take the class on an excursion through a park or forested area. Note trees disfigured by lettering or tree carving. Find trees that have been damaged by insects. Evidences of this are defoliation, feeding caterpillars, galls, accumulation of pitch on bark, sawdust, dead terminal leaves, etc.
33. Start a story by exploring to find samples of trees killed by animals. Display samples to show how a particular animal is responsible for the death of a tree.
34. Place a test tube filled with water over the leaf on an underwater plant on a sunny day. Wait a few hours and then test the gas collected. To test for oxygen insert a glowing wooden splint which should burst into flame at the presence of oxygen. Repeat the experiment and collect the gas overnight. Is it the same gas? A greater or lesser quantity?

35. Examine a rotting log with the class. Did the tree die naturally? How long has it been dead? Where is the stump? What animals are found living in or on it? Do plants around the log differ from those in surrounding areas?
36. Compare kinds of trees in wet and dry areas. Are some found in both areas? Which are predominantly dry trees? Wet?

SECTION F

The following reference and library books are very useful.

1. From Holt, Rinehart and Winston Inc.
   I Wonder Why Readers - Laurence F. Lewery
   - Evelyn Moore
   Teachers' Guide - I Wonder Why Readers
   - Soft as a Bunny
   - Look and See
   - Sweet as a Rose
   - Sounds are High, Sounds are Low
   - What Can an Animal Do?
   - How does a Plant Grow?
   - Looking for Animals
   - Light and Colour
   - Dark as a Shadow
   - Sounds are for Listening
   - Quiet as a Butterfly
   - Animals 2 by 2
   - Teddy the Taster
   - Tommy's Turtle
   - The Tree by David's House
   - I Like Rubber/ I Like Glass
   - Peter and the Rocks
   - Clouds, Rain, Clouds Again
   - How Does the Wind Blow?
   - Up, up in a Balloon
   - What does an Animal Eat?
   - Our Very Own Tree
   - How Tall was Milton?
   - Larry's Racing Machine

   Mini-Climate. ,Examining Your Environment
   Snow and Ice
   Pollution
   Running Water
   Birds
   A Pocket Full of Crickets
   Children's World, Guidebook

2. From McGraw Hill - Ryerson
   Studies for Open Places - McKillian/Wilson/Woolley
   Studies for Woodlands - Bates
   Studying Birds - Wilson
   Studying Insects - Sadler
   Studying Mammals - Dawson/Currie
   Studying Plants - Sadler
   Studying Soil - MacKillican
   Styding Streams - Daynes

3. From Doubleday Publishers
   People and their Environment, Grades 1,2,3,-Teacher's Curriculum Guide to Conservation Education
   People and their Environment, Grades 4,5,6,-Teacher's Curriculum Guide to Conservation Education.

4. From Burns & MacEachern Ltd.,
   Science Activities for Elementary Children

5. Title	Publisher
Let's Get Turtles	Harper & Row
All Kinds of Babies	Harper & Row
Terry and the Caterpillars	" & "
Bobby Follows the Butterfly	MacMillan
Down Came the Leaves	Crowell
The Friendly Bear	Doubleday
I Like Red	"
Jeanne Marie at the Fair	Scribner
The Thank You Book	"
How to Fall	Walck
I Found a Leaf	Lerner
Rain Makes Applesauce	Holiday
Johny Maple Leaf	Lothrop
All Falling Down	Harper
The Meanest Squirrel I Ever Saw	Scribner

REFERENCE BOOKS - WINTER

All Ready for Winter	Hale - Cadmus
Animals - Winter	Crowell
The Winter Noisy Book	Harper
Katy and the Big Snow	Houghton
Spring Snow	Knopf
When Winter Comes	Reiley and Lee
One Mitten Lewis	Lothrop
The Big Snow	Hale - Cadnus
I Like Winter	Walck
The Snowy Day	Vicking
White Snow, Bright Snow	Lothrop
The Summer Snowman	Harper
April's Kittens	Harper
All Ready for Summer	Hale (Cadrus)
Look Out the Window	Harcourt
Spring is a New Beginning	"
The Golden Egg Book	Simon & Schuster
Home for a Bunny	" "
Pussy Willow	" "
The Enchanted Egg	Randy & McNally
Spring is Like the Morning	Putnam
The Restless Robin	Houghton
Tim Tadpole & the Great Bullfrog	Doubleday
The Big Rain	Scribner
Springtime for Jeanne-Marie	"
Jenny's Hat	Harper
Spring is Here	Walck
Johnny and the Birds	Rand McNally
The Pinkish, Purplish, Bluish Egg	Houghton
Bobby Follows the Butterfly	Knoft
My Bunny Feels Soft	"
Little Red Nose	Hale

Title	Publisher
Follow the Wind	Lothrop
Hi, Mr. Robin	"
Hide and Seek Fog	"
Rain Drop Splash	"
In My Garden	"
The Park Book	"
The Storm Book	Harper

GENERAL SCIENCE BOOKS

Who Lives at the Seashore	McGraw Hill
Who Lives in This House	" "
A Tree is a Plant	Crowell
Houses from the Sea	Scribner
Seeds by Wind and Water	Crowell
Plink Plink	Doubleday
Inch by Inch	Obolensky
On My Beach there are Many Pebbles	"
Wonderful Things	Abalard
A Tree is Nice	Harper & Row
Find Out by Touching	Crowell
The Listening Walk	A Golden Capital Answer Book
The Touching Book	" " " " "
What Could you See	McGraw Hill
Rockets & Satellites	McGraw Hill
What the Moon is Like	" "

Reference Books

Reaching Out	Methuen & Co
Exploration & Language	" "
Discovering the Physical World	" "
Senses and Sensitivity	" "

Excellent Sources of Most Outdoor Educational Books and Materials

The Nature Gift Shop — Catalogue upon request
Federation of Ontario Naturalists
1262 Don Mills Road
Don Mills, Ontario

Canadian Orienteering Service
446 McNicoll Ave.
Willowdale, Ontario

Canadian F.D.S. Audio Visual
185 Spadina Ave.
Toronto 2B, Ontario

Ministry of the Environment
Information Services
135 St. Clair Avenue West
Toronto 195, Ontario