Presented in these teacher's guides for grades five and six are lesson plans and ideas for integrating mathematics and environmental education. Each lesson originates with a fundamental concept pertaining to the environment and states, in addition, its discipline area, subject area, and problem orientation. Following this, behavioral objectives and suggested learning experiences are outlined. Behavioral objectives include cognitive and affective objectives and skills to be learned, while learning experiences list student-centered in-class activities and outside resource and community activities. Space is provided for teachers to note resource and reference materials—publications, audio-visual aids, and community resources. The guides are supplementary in nature and the lessons or episodes are designed to be placed in existing course content at appropriate times. This work was prepared under an ESEA Title III contract for Project I-C-E (Instruction-Curriculum-Environment). (BL)
A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Mathematics GRADE 5

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-8-9
1927 Main Street
Green Bay, Wisconsin 54301
(414) 432-4338
(after Dec. 1, 1972 - 468-7464)
INSTRUCTION - CURRICULUM - ENVIRONMENT

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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RY PROGRAM FOR ENVIRONMENTAL EDUCATION

EA Mathematics Grade 5

Robert Warpinski, Director
Robert Kellner, Asst. Director
George Howlett, EE Specialist
PREFACE

"Oikus" for house is the Greek origin of the term "ecology". Our house--whatever or wherever it may be. Like an umbrella expand or contract to fit many ranges--natural and man-made. We environments, our many "houses" if we omit rancor and cite long complexities. Our "oikus" uses the insights of all subjects, multidisciplinary program like ours necessarily results. Also, a long time, our program ranges K thru 12. The environment mind values. These values have their origin in the "oikus" of our minds. Let us become masters of our house by replacing the Greek with "Know thyself and thine house."

1. Written and designed by your fellow teachers, this guide is set to fit appropriately into existing, logical course content.
2. Each page or episode offers suggestions. Knowing your students to adapt or adopt. Limitless chances are here for your experience. Many episodes are self-contained, some open-minded, still others developed over a few days.
3. Try these episodes, but please pre-plan. Why? Simply, no guide and no curriculum will work unless viewed in the context of you.
4. React to this guide with scratch ideas and notes on the episodes.
5. After using an episode, fill out the attached evaluation forms, duplicate, or request more of these forms. Send them singly.

We sincerely want your reactions or suggestions--negative and evaluations are the key in telling us "what works" and in aiding the guides.

TERMS AND ABBREVIATIONS

ICE RMC is Project ICE Resource Materials Center serving all school districts in CESA 3, 8, and 9. Check the Project ICE Bibliographies resources. Our address and phone number is on this guide's cover or call us for any materials or help.

BAVI is Bureau of Audio Visual Instruction, 1327 University Ave, Madison, Wisconsin 53701 (Phone: 608-262-1644).

Cognitive means a measurable mental skill, ability, or process.

Affective refers to student attitudes, values, and feelings.
PREFACE

"House" for house is the Greek origin of the term "ecology". Environmental education of our house—whatever or wherever it may be. Like an umbrella, our house can contract to fit many ranges—natural and man-made. We can add quality to our "houses" if we omit rancor and cite long range gains, costs, and values. Cur "oikus" uses the insights of all subjects. Thus, a rational, positive, interdisciplinary program like ours necessarily results. Also, since attitudes grow over time, our program ranges K thru 12. The environment mirrors our attitudes or These values have their origin in the "oikus" of our collective and individual Let us become masters of our house by replacing the Greek adage of "Know thyself" now thyself and thine house.

Written and designed by your fellow teachers, this guide is supplementary in nature—it fits appropriately into existing, logical course content. Each page or episode offers suggestions. Knowing your students best, you decide what adapt or adopt. Limitless chances are here for your experimentation and usage. Some episodes are self-contained, some open-minded, still others can be changed or elaborated over a few days. These episodes, but please pre-plan. Why? Simply, no guide has all the answers, no curriculum will work unless viewed in the context of your students.

For using an episode, fill out the attached evaluation form in the back. Use, circulate, or request more of these forms. Send them singly or collectively to us. Sincerely want your reactions or suggestions—negative and positive. Your evaluations are the key in telling us "what works" and in aiding our revisions of guides.

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is Bureau of Audio Visual Instruction, 1327 University Avenue, P. O. Box 2093, Wisconsin 53701 (Phone: 608-262-1644). Active means a measurable mental skill, ability, or process based on factual data. Attitude refers to student attitudes, values, and feelings.
ACKNOWLEDGEMENTS: The following teachers and consultants participated in the development of the Supplementary Environmental Education Guides:

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Kenneth Kelihcr, Appleton
Everett Klinzing, New London
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Jim Krueger, Winneconne
Mae Rose LaPointe, St. John High
Rosemarie Lauer, Hortonville
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Jan Serrahn, Sevastopol
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Mary Smith, Green Bay
Carol Trimberger, Kewaunee
Mary Wadowski, How.-Suam.
I. Energy from the sun, the basic source of all energy, is converted through plant photosynthesis into a form all living things can use for life processes.

BEHAVIORAL OBJECTIVES
Cognitive: The student will read a chart showing daily growth of plants in centimeters.

Affective: The student will through verbal action support the proposition that energy from the sun is converted through photosynthesis into a form all living things can use for life processes.

Skills to be Learned
Reading of Graphs
Comparing

SUGGESTED LEARNING EXPERIENCES
I. Student-Centered in class activity (Worksheet graph on reverse side)
A. Ask children to look at worksheet graph. Explain that someone did an experiment with pea seedlings to find out how much they would grow each day at a certain temperature. Have them look at 55 degrees on the chart. At 55 degrees the seedling grew 1/2 centimeter each day. Explain that seedlings were also growing at other temperatures.
B. Have children graph the information.
C. Have children answer various questions using the graph information.
1. At what temperature did plants grow most?
2. At what temperature did plants grow least?
3. Which temperature was the most like a cool day? Like a hot day?
4. Which temperature was best for plants?
5. What happened when the temperature was too cold? Too hot?
(continued on reverse side)
from the sun, the basic all energy, is converted plant photosynthesis into a living things can use for processes.

<table>
<thead>
<tr>
<th>Discipline Area</th>
<th>Mathematics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td>Sun Energy</td>
</tr>
<tr>
<td>Problem Orientation</td>
<td>Graph Reading - Grade 5</td>
</tr>
<tr>
<td></td>
<td>Metric Reading</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I. Student-Centered in class activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Worksheet graph on reverse side)</td>
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<tr>
<td>B. Have children graph the information.</td>
</tr>
<tr>
<td>C. Have children answer various questions using the graph information.</td>
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</table>

1. At what temperature did plants grow most?  
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3. Which temperature was the most like a cool day? Like a hot day?  
4. Which temperature was best for plants?  
5. What happened when the temperature was too cold? Too hot?  
(continued on reverse side)
Continued and Additional Suggested Learning

6. When would you expect pea plants to grow in winter, summer or spring?
7. What crops have you noted being affected by temperatures?
8. How do the extreme temperatures for growth affect life?

<table>
<thead>
<tr>
<th>Growth of pea seedlings</th>
<th>Temperatures (Degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>in centimeters</td>
<td>55</td>
</tr>
<tr>
<td>1/2</td>
<td></td>
</tr>
<tr>
<td>3/4</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>6</td>
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<tr>
<td>3/2</td>
<td></td>
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<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2/2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11/2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
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<tr>
<td>1/2</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Growth of pea seedlings each day in centimeters
6. When would you expect pea plants to grow best - in the winter, summer or spring?
7. What crops have you noted being affected by various temperatures?
8. How do the extreme temperatures for growing affect your life?

<table>
<thead>
<tr>
<th>Growth of pea seedlings in centimeters</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>65</td>
</tr>
<tr>
<td>3/4</td>
<td>65</td>
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<tr>
<td>1</td>
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<tr>
<td>4</td>
<td>65</td>
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<tr>
<td>5</td>
<td>65</td>
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<tr>
<td>5 1/2</td>
<td>65</td>
</tr>
<tr>
<td>6</td>
<td>65</td>
</tr>
</tbody>
</table>
### Concept
1. Energy from the sun, the basic source of all energy, is converted through plant photosynthesis into a form all living things can use for life processes.

### Behavioral Objectives

**Cognitive:** The student will collect data and graph it to make predictions that extend beyond the observations made and graphed.

**Affective:** The student will defend putting a plant in the sun over putting a plant in an area devoid of sunlight.

**Skills to be Learned**
1. Making a line graph
2. Reading a meter stick
3. Learning terms lateral, terminal
4. Using metric system

### Suggested Learning Experiences

<table>
<thead>
<tr>
<th>I. Student-Centered in class activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Graphing growth of vines.</td>
</tr>
<tr>
<td>1. Plant two vines, one in sunlight, the other in a place devoid of sunlight. Remove lateral growth so terminal growth can be easily measured.</td>
</tr>
<tr>
<td>2. Attach each vine to a meterstick for measuring purposes.</td>
</tr>
<tr>
<td>3. Graph growth on line graph in centimeters, recording date of observations.</td>
</tr>
<tr>
<td>B. Vary conditions to see what effect variations have on pupils ability to predict growth. (Ex: Quit removing lateral growth)</td>
</tr>
<tr>
<td>C. Make predictions on future growth.</td>
</tr>
<tr>
<td>D. Find areas of various growth conditions to observe effect of sun on plants.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II. Outside Res Community Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days on which made: 8 7 6 5 4 3 2 1</td>
</tr>
</tbody>
</table>
From the sun, the basic energy, is converted into plant photosynthesis into a living things can use for processes.

**Discipline Area: Mathematics**

**Subject: Metric Measuring preferred**

**Problem Orientation: Sun's Energy**

**Grade 5**

**OBJECTIVES**

**SUGGESTED LEARNING EXPERIENCES**

I. Student-Centered in class activity

A. Graphing growth of vines.
   1. Plant two vines, one in sunlight, the other in a place devoid of sunlight.
   2. Attach each vine to a meterstick for measuring purposes.
   3. Graph growth on line graph in centimeters, recording date of observations.

B. Vary conditions to see what effect variations have on pupils ability to predict growth. (Ex: Quit removing lateral growth)

C. Make predictions on future growth.

D. Find areas of various growth conditions to observe effect of sun on plants.

II. Outside Resource and Community Activities

**Growth of Vine in Centimeters**

<table>
<thead>
<tr>
<th>Days on which observations are made</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tbody>
</table>

*The student data and make predictions beyond those made.*

*The student putting a sun over an area light.*

*Learned*

The graph meter stick terms lateral system.
<table>
<thead>
<tr>
<th>Resource and Reference Materials</th>
<th>Continued and Additional Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Publications:</strong></td>
<td></td>
</tr>
<tr>
<td>Darling, Lois and Louis</td>
<td></td>
</tr>
<tr>
<td>Place in the Sun: Ecology</td>
<td></td>
</tr>
<tr>
<td>and the Living World, Morrow</td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td></td>
</tr>
<tr>
<td><strong>Audio-Visual:</strong></td>
<td></td>
</tr>
<tr>
<td>5553 Photosynthesis A'63</td>
<td></td>
</tr>
<tr>
<td>22 minutes, ($8.75) BAVI</td>
<td></td>
</tr>
<tr>
<td>6743 Green Plants and Sunlight,</td>
<td></td>
</tr>
<tr>
<td>$4.00 BAVI (11 minutes)</td>
<td></td>
</tr>
<tr>
<td><strong>Community:</strong></td>
<td></td>
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<tr>
<td>Farm with particular vine</td>
<td></td>
</tr>
<tr>
<td>crops.</td>
<td></td>
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<tr>
<td>County Agent</td>
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<tr>
<td>Greenhouse</td>
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<tr>
<td>Gardens</td>
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<tr>
<td>Suggested and Reference Materials</td>
<td>Continued and Additional Suggested Learning Experiences</td>
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<td>----------------------------------</td>
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<td>Habis and Louis</td>
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<td>The Sun: Ecology</td>
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<td>Desert World, Morrow</td>
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<td></td>
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<tr>
<td>Synthesis, A·63</td>
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<tr>
<td>Plants and Sun</td>
<td></td>
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<td>BAVI (11 minutes)</td>
<td></td>
</tr>
<tr>
<td>Particular vine</td>
<td></td>
</tr>
<tr>
<td>Forest</td>
<td></td>
</tr>
</tbody>
</table>
BEHAVIORAL OBJECTIVES

Cognitive: The student will identify and describe a square foot of school lawn and study natural life there in.

Affective: The student will appreciate his surroundings and the forms of plant life.

Skills to be Learned
Measuring Recording Charting Gathering Data Drawing or sketching

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
   A. A field trip is planned to the grass covered vacant lot areas or in a nearby field after a discussion is held in the schoolroom.
      1. Aim of field trip.
      2. How to find what a square foot is and the practical way to keep within that area.
      3. What records will be kept?
      4. Will specimens be preserved? How?
      5. How will plants and insects be identified? What leaf patterns are there?
      6. Which children will form respective groups?

II. Outside Field Community
   A. Take child covered area
   B. Measure ground – using boundary.
   C. Have child of 1. grass and record on paper. Words 4. Function of life
   D. What is the kind of plant foot of plot of the plant size, shape patterns.
   E. Sketch or identify.
   F. Investigate which lives on the surface affect the soil?
   G. Compare different plant with sunny and different in the species and the species why (continued on)
Learning organisms interact...intricate unit called an

Discipline Area: Mathematics
Subject: Measuring - Comparing Numbers
Problem Orientation: Recognizing shapes
Ecosystem
Grade 5

SUGGESTED LEARNING EXPERIENCES

- A field trip is planned to the grass-covered vacant lot areas or in a nearby field after a discussion is held in the schoolroom.
- Aim of field trip:
  1. What the square foot is and the practical way to keep within that area.
  2. What records will be kept?
  3. Will specimens be preserved?
  4. How will plants and insects be identified? What leaf patterns are there?
  5. Which children will form respective groups?

I. Student-Centered in class activity

II. Outside Resource and Community Activities

A. Take children to grass-covered areas.
B. Measure off square foot of ground using string for boundary.
D. What is the most common kind of plant found in square foot of plot? (Sketch a leaf of the plant showing actual size, shape, vein, edge patterns.)
E. Sketch organisms and identify.
F. Investigate three ways in which the living organisms on the surface of the ground affect the soil and plants.
G. Compare plots located in different places, shaded areas with sunny etc. to note differences in growth and varieties of life. Record numbers of species which have been (continued on reverse side)
Resource and Reference Materials

Publications:

Observing Properties
Minnemast Coordinated
Mathematics - Sciences Series
Unit 8 1967 at I-C-E RMC 110
University of Minnesota
National Science Teachers
Association, How to Read the
Natural Landscape in Forests
and Fields by Mallard C.
Davis at I-C-E RMC
(Teacher References)

Audio-Visual:
7123 "Living Things Depend
on Each Other" (color)
11 minutes EEF 1967
5677 "Life in a Cubic Foot of
Soil" 11 minutes $4.00
Coronet 1958 BAVI
"Environmental Action - No
time to Waste" Simulation
game at I-C-E K 4

Community:
Agricultural Agent

II. continued
G. observed.
H. Note season of year and refer to same area
to compare changes.
I. Find total number of square feet observed.
Continued and Additional Suggested Learning Experiences

II. continued
G. observed.
H. Note season of year and refer to same area again to compare changes.
I. Find total number of square feet observed.
C. 3. Environmental factors are limiting on the numbers of organisms living within their influence, thus, each environment has a carrying capacity.

**BEHAVIORAL OBJECTIVES**

<table>
<thead>
<tr>
<th>Cognitive:</th>
<th>The learner will use rate pairs to estimate and graph the population change of fruit flies.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective:</td>
<td>The learner will test the factors that determine carrying capacity.</td>
</tr>
</tbody>
</table>

**Skills to be Learned**

- Graphing
- Making and interpreting data tables
- Rates

**SUGGESTED LEARNING EXPERIENCES**

<table>
<thead>
<tr>
<th>I. Student-Centered in class activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Prepare a container (Use a plastic gallon jar, put 1/4 inch holes in the lid, fill the holes with cotton so air can enter. Peel a banana so 1/2 of the pulp is exposed and put into the container)</td>
</tr>
<tr>
<td>1. To collect the flies, leave the lid off until the flies begin to come.</td>
</tr>
<tr>
<td>2. When sufficient amount have arrived, replace the cover, record the number of flies and the date.</td>
</tr>
<tr>
<td>3. After 10 days record the number of flies and the date. Put this information onto a data chart.</td>
</tr>
<tr>
<td>4. Set up a rate second gen./initial using this rate, calculate the estimated growth if it continues at this rate for two more weeks. Four more weeks. Put this estimated growth onto the graph.</td>
</tr>
<tr>
<td>5. Two weeks after your second generation count and record your population increase or decrease. Graph. How does it correlate with your estimate. Why is there a difference?</td>
</tr>
</tbody>
</table>

(continued on reverse side)
factors are limiting organism, thus, each has a carrying capacity.

<table>
<thead>
<tr>
<th>SUGGESTED LEARNING EXPERIENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Student-Centered in class  activity</strong></td>
</tr>
<tr>
<td><strong>A. Prepare a container (Use a plastic gallon jar, put 1/4 inch holes in the lid, fill the holes with cotton so air can enter. Peel a banana so 1/2 of the pulp is exposed and put into the container)</strong></td>
</tr>
<tr>
<td>1. To collect the flies, leave the lid off until the flies begin to come.</td>
</tr>
<tr>
<td>2. When a sufficient amount have arrived, replace the cover, record the number of flies and the date.</td>
</tr>
<tr>
<td>3. After 10 days record the number of flies and the date. Put this information onto a data chart.</td>
</tr>
<tr>
<td>4. Set up a rate second gen./intial using this rate, calculate the estimated growth if it continues at this rate for two more weeks. Four more weeks. Put this estimated growth onto the graph.</td>
</tr>
<tr>
<td>5. Two weeks after your second generation count and record your population increase or decrease. Graph. How does it correlate with your estimate. Why is there a difference?</td>
</tr>
<tr>
<td><em>(continued on reverse side)</em></td>
</tr>
</tbody>
</table>

**II. Outside Resource and Community Activities**

A. The county agent can speak on the increase of population of various insects.
Resource and Reference Materials

Publication:
Populations SCIS Text - at I-U-E
100 Co Bougle, Arthur

Audio-Visual:
"Flies and Mosquitoes Their Life Cycle and Control" BAVI

Community:
County Agent
Exterminator.

---

Continued and Additional Suggested Learning

I. continued

6. What about the food supply? Should you increase that? Does that change the Carrying capacity?

B. If students are interested you may introduce natural variations - size of environment (baby food, cottage cheese box, etc.) food supply? The use rates and estimate and graph growth.
Continued and Additional Suggested Learning Experiences

I. continued
B. If students are interested you may introduce other variations - size of environment (baby food jars) cottage cheese "box, etc.) food supply? The student can use rates and estimate and graph growth.

What about the food supply? Should you add more? Does that change the Carrying capacity?
4. An adequate supply of pure water is essential for life.

**Discipline Area**  Mathematics  
**Subject**  Large numbers -  
**Problem Orientation**  Water Conservation

**BEHAVIORAL OBJECTIVES**

<table>
<thead>
<tr>
<th>Cognitive:</th>
<th>Student will compute daily amounts of water used.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective:</td>
<td>From studying statistics and solving problems, the student sets a goal about one change in his home on conserving water.</td>
</tr>
</tbody>
</table>
| Skills to be Learned | Large Numbers  
Problem Solving  
Graphs  
Measuring |

**SUGGESTED LEARNING EXPERIENCES**

<table>
<thead>
<tr>
<th>I. Student-Centered in class activity.</th>
<th>II. Outside Home Community</th>
</tr>
</thead>
</table>
| A. In small groups work together on these problems:  
1. If the average American uses 60 gallons of water a day, how many gallons is this per week?  
2. If the community must produce 150 gallons per person per day, how much is this in your community per day? Per week? Month? Year?  
3. Measure how much is needed for a shower.  
4. The paper industry uses 90,000 gallons of water for 1 ton of paperboard.  
5. How many gallons are needed for one pound of paper?  
6. For 53,000,000 tons per year, how many gallons of water are used? |
| A. As a home saving water commitment from publication, p. 34  
B. List the places you use water in your daily way of life, and after two weeks, identify changes you can make to conserve water.  
C. Draw a poster encouraging water conservation.  
D. Collect municipal water use data.  
E. Write an article on water use statistics of homes and industries. |
I. Student-Centered in class activity

A. In small groups work together on these problems:
1. If the average American uses 60 gallons of water a day, how many gallons is this per week?
2. If the community must produce 150 gallons per person per day, how much is this in your community per day? Per week? Month? Year?
3. Measure how much is needed for a shower.
4. The paper industry uses 90,000 gallons of water for 1 ton of paperboard.
5. How many gallons are needed for one pound of paper?
6. For 53,000,000 tons per year, how many gallons of water are used?

II. Outside Resource and Community Activities

A. As a home experiment in saving water, try the experiment from publication Pollution, p. 34

B. List the various uses of water in your home select one way in which the members of your family can conserve water and after two weeks report to the class.

C. Draw a poster or cartoon on water conservation. (Post in school corridor.)

D. Collect magazines or newspaper articles which include statistics on use of water in homes and industry.
<table>
<thead>
<tr>
<th>Resource and Reference Materials</th>
<th>Continued and Additional Suggested Learning Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Publications:</strong></td>
<td></td>
</tr>
<tr>
<td>J.K. Couchman, D.F. Wentworth,</td>
<td></td>
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<tr>
<td>J.C. MacBean, A. Stecher,</td>
<td></td>
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<tr>
<td><em>Pollution</em>, Holt Rinehart &amp;</td>
<td></td>
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<tr>
<td>Winston, 1971 pp. 67-68</td>
<td></td>
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<tr>
<td>I-C-E RMC</td>
<td></td>
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<tr>
<td><strong>Audio-Visual:</strong></td>
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<tr>
<td>&quot;Water Is Mine&quot; (54 min.)</td>
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<tr>
<td>Carousel Films Inc.</td>
<td></td>
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<tr>
<td>Broadway</td>
<td></td>
</tr>
<tr>
<td>New York, New York 10035</td>
<td></td>
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<tr>
<td>&quot;Problems With Water Is People&quot;</td>
<td></td>
</tr>
<tr>
<td>(30 min.) color on request.</td>
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<tr>
<td>McGraw Hill Contemporary Films</td>
<td></td>
</tr>
<tr>
<td>330 W. 42nd Street</td>
<td></td>
</tr>
<tr>
<td>New York, New York 10018</td>
<td></td>
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<tr>
<td><strong>Community:</strong></td>
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<tr>
<td>Sources of water supply</td>
<td></td>
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<tr>
<td>1. City</td>
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<td>2. Village</td>
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<td>3. County</td>
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<td>rials</td>
<td>Continued and Additional Suggested Learning Experiences</td>
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</table>
5. An adequate supply of clean air is essential because most organisms depend on oxygen, through respiration, to release the energy in their food.

Cognitive: The students will compute and record averages and estimates about problems on air pollution.

Affective: The students will show his appreciation of an essential supply of clean air.

Skills to be Learned
- Taking averages
- Computing averages
- Estimation

Suggested Learning Experience

I. Student-Centered in class
   A. Use a stop watch and ask children to count the number of breaths taken in one minute. (This will be from 14-18). Compute the average number of breaths taken by the average class member in an hour, in a day.
   B. Compute Problem
      When the sulfur dioxide content of the air in New York City rises above .2 parts per million, 10 to 20 people die as a result. In the five years, 1965 to 1970, sulfur dioxide reached this level once every ten days.
      1. What was the minimum number of people who died in New York City during the five years, 1965-1970, as a result of air pollution by sulfur dioxide.
      2. What was the maximum number of people who died in New York City during the five years, 1965-1970 as a result of air pollution by sulfur dioxide.
   C. Obtain statistics from Air Pollution Control Section, Department (continued on reverse side)
of clean air is Discipline Area Mathematics
in their food. Subject Computation and Averaging

Problem Orientation Air Quality Grade 5

I. Student-Centered in class
A. Use a stop watch and ask children to count the number of breaths taken in one minute. (This will be from 14-18). Compute the average number of breaths taken by the average class member in an hour, in a day.
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   2. What was the maximum number of people who died in New York City during the five years, 1965-1970 as a result of air pollution by sulfur dioxide.
C. Obtain statistics from Air Pollution Control Section, Depart-

II. Outside Resource and Community Activities
A. Take the class to a moderately busy intersection in the neighborhood.
   1. Have one group of children count all cars that pass in a 10 minute period.
   2. Another group counts trucks, and buses.
   3. A third group counts any vehicle emitting visible pollution. (This will be done quietly using tallies on paper instead of voices).
B. On returning to classroom present an impromptu math lesson to determine the proportion of cars visibly polluting the air. Make a rough estimate of cars in community and again figure proportion.

(continued on reverse side)
Resource and Reference Materials

Publications:

- *Pollution: A Handbook for Teachers* by Dorothy Needham Scholastic Book Service $1.00
- *Air and Water Pollution* by Gerald Leinwand and Gerald Popkin Washington Square Press 630 5th Avenue, N.Y., N.Y. 10020
- *Air Pollution* by Addison Wesley I-C-E
- *Air Pollution: Their Facts* National Tuberculosis and Respiratory Disease Association
- *Air Pollution and You* by John Quigley No. 676 University extension offices in Wisconsin
- *1971 EQ Index* National Wildlife Federation at I-C-E RMC
- *Environmental Analysis* by Joseph Moran, Michael Morgan, James Wiersma, UWGB Little & Brown

Continued and Additional Suggested Readings

I. continued

C. ment of Natural Resources, Box 4, 53701, concerning amounts of carbon monoxide and other dangerous gases that are being put into the air by each automobile every year through 1980 how the projected number of automobiles driven by Americans in 1980 will be put into the air by each automobile each year from 1970 to 1970.

Audio-Visual:

- 0033 Air (10 Min) $2.00 BAVI
- Atmospheric Pollution Filmstrip
- Ward's Scientific
- 0678 Air Pollution color (11 Min) Men at Bay I-C-E RMC

Community:

- National Tuberculosis and Respiratory Disease Association.
Continued and Additional Suggested Learning Experiences

I. continued

C. ment of Natural Resources, Box 450, Madison, Wis. 53701, concerning amounts of carbon monoxide and other dangerous gases that are being put into the air by each automobile every day. Based upon the projected number of automobiles that will be driven by Americans in 1980 how much more carbon monoxide will be put into the air in comparison to 1970.

Audio-Visual:

0033 Air (10 Min) $2.00 BAVI
Atmospheric Pollution Filmstrip at I-C-E RMC
Ward's Scientific

0678 Air Pollution color (11 Min.) $4.00 BAVI
Men at Bay I-C-E RMC

Community:

National Tuberculosis and Respiratory Disease Association.
II. Outside Resources

A. With a soil auger, Soil Conservation will bore soil samples from hillside and from valley below and measure topsoil in inches. Samples may be taken in number so that a depth for each area.

B. Measure length of species of plant on both thin topsoil areas and flat.

C. After it is determined type and growth possible for and how these affect food resources.

D. Compare types of productivity using

E. Go to an experimental area and measure various kinds of corn or lack of fertilizers.

F. Invite a soil representative to and types in and discuss with class how systems are dependent on

BEHAVIORAL OBJECTIVES

Cognitive: The child will measure, compare and record the depth of topsoil and subsoil found in two locations in a valley, flat plain or hillside.

Affective: The child will appreciate that the productivity of a given region may be related to the depth of the soil of that region.

Skills to be Learned

Observation
Research
Comparing
Measuring
Concluding

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

II. Outside Resources

Community Activity

A. With a soil auger, Soil Conservation will bore soil samples from hillside and from valley below and measure topsoil in inches. Samples may be taken in number so that a depth for each area.

B. Measure length of species of plant on both thin topsoil areas and flat.

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E. Go to an experimental area and measure various kinds of corn or lack of fertilizers.

F. Invite a soil representative to and types in and discuss with class how systems are dependent on
Resources are not equally distributed over the earth or over time. These variations significantly affect the geography, economic productivity, and quality of life.

**SUGGESTED LEARNING EXPERIENCES**

**I. Student-Centered in class activity**

A. With a soil auger borrowed from the Soil Conservation Service, the class will bore soil samples from a local hillside and from a flat plain or valley below and measure the depth of the topsoil in inches. Record the depths. Samples may be taken in sufficient number so that a representative soil depth for each area will be determined.

B. Measure length of grass or some species of plant growing on thick and thin topsoil areas.

C. After it is completed the child will determine type and yield of plant growth possible for a geographic region and how these affect growth of plants and food resources available to man.

D. Compare types of soil with their productivity using maps.

E. Go to an experimental field in the area and measure the size of the various kinds of corn; of the fertilizers or lack of fertilizers.

F. Invite a soil conservation service representative to compare soil depths and types in county and state, and discuss with class how crops and cropping systems are dependent on depth and type.
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Publications:</strong></td>
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<tr>
<td>Ecology: The Farm, Banzi-ger</td>
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<tr>
<td>at I-C-E RMC 130 Mc 10</td>
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<tr>
<td><strong>Audio-Visual:</strong></td>
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<tr>
<td>Conserving Our Soil,</td>
<td></td>
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<tr>
<td>Today 11 min. 5079(film)</td>
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<tr>
<td>$2.25 Coronet 1960 BAVI</td>
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<tr>
<td>4733 Treasures of the Earth</td>
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<tr>
<td>$3.50</td>
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<tr>
<td>0819 Yours is the Land</td>
<td></td>
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<tr>
<td>20 min, $6.75 BAVI</td>
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<tr>
<td><strong>Community:</strong></td>
<td></td>
</tr>
<tr>
<td>County Agent</td>
<td></td>
</tr>
<tr>
<td>Local Farmer</td>
<td></td>
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<tr>
<td>Horticulturist</td>
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</table>
7. Factors such as facilitating trans-
Concept, economic conditions, population growth, and increased leisure time have a great influence on changes in land use and centers of population density.

<table>
<thead>
<tr>
<th>BEHAVIORAL OBJECTIVES</th>
<th>SUGGESTED LEARNING EXPERIENCES</th>
</tr>
</thead>
</table>
| Cognitive: The child will construct tables showing graphically how available facilities, space and resources will be necessarily shared with others if population growth continues at the present rate. | I. Student-Centered in class activity
A. With the principal's help, the child will determine from school records, the present ratio of students to each classroom, teacher, basketball, desk, or area of school space.
1. Construct graphic display showing this ratio. (ratios)
B. Using projected population growth information set up ratios of students to classroom teachers, basketball, etc. for ten years from now. If present number of teachers, rooms etc do not change.
C. Based on the above graphic displays (pictographs might be preferable) a discussion could be developed comparing not only students to rooms or basketballs but people in the nation to land use areas or facilities and resources under increased population numbers. |
| Affective: The child will suggest how the increased population growth will affect land use and centers of population density. | II. Outdoor Community Service Project
A. Involve children in small groups to give an input on specific community centers.
B. Using population and projected population growth data, discuss the need of facilities and their use of play areas, recreation centers, etc.
C. Discuss the planning and future needs of facilities and their usage. |
such as facilitating trans-

disciplinary, such as economic conditions, population growth, and increased leisure time.

In addition, the study of population density is of great influence on changes in the centers of population density.

**OBJECTIVES**

<table>
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<tr>
<th>SUGGESTED LEARNING EXPERIENCES</th>
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I. Student-Centered in class activity

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C. Based on the above graphic displays (pictographs might be preferable) a discussion could be developed comparing not only students to rooms or basketballs but people in the nation to land use areas or facilities and resources under increased population numbers.

II. Outside Resource and Community Activities

A. Invite mayor or local official in to speak to class and give information on park and public facility use at present time. Ask him to predict future needs.

B. Using predicted growth in population from above and ordered pairs skills, show increase in facilities and space (in graphic way) needed to maintain resources available per person.

C. Discuss
Resource and Reference Materials

Publications:

Our Precarious Habitat, Benarbe, Melvin New York W.W. Norton & Co. Inc. 1970

Audio-Visual:

"Population Trends - Ecological Crisis" at I-C-E RMC K 14

Community:

Mayor
Park Director
<table>
<thead>
<tr>
<th>Reference Materials</th>
<th>Continued and Additional Suggested Learning Experiences</th>
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</thead>
<tbody>
<tr>
<td>S: Oior Bomb, Ehrlich, Paul</td>
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<tr>
<td>Ballantine Books, 1968</td>
<td></td>
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<tr>
<td>B: Habitat, Benarđe,</td>
<td></td>
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<tr>
<td>York W.W. Norton &amp;</td>
<td></td>
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<tr>
<td>T: Trends - Ecological</td>
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<td>-C-E RMC K 14</td>
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</tbody>
</table>
8. Cultural, economic social, and political factors determine status of man's values and attitudes toward his environment.

**BEHAVIORAL OBJECTIVES**

| Cognitive: | Student will compute numbers and record rat population. He will compute total pounds of food destroyed by rats. |
| Affective: | Student will suggest that the population of rats will cause destruction and disease. Student will take part in rat extermination program. |

**SUGGESTED LEARNING EXPERIENCES**

I. Science-Centered in class activity
   A. Students and teacher will have discussion on rat problem in their area.
   B. Through library research, local newspapers, consulting home and farm owners and industry. Students will learn about the seriousness of rat destruction and how it affects the economy.
   C. Measure length of 9 inches. Double it to get idea of size of full grown rat (including tail).
   D. He raises a new family of six every 30 days.

   1. How many rats are born to one set of parents in a year if there are 12 families a year?
   2. A rat can devour 17 lbs. of garbage a year. How much would a family of six devour in 3 years?
   3. A rat carries bubonic plague via the rat flea. 25 million people died from this illness in Europe in 1343. Compare this to the size of New York City's population. (continued on reverse side.)

II. Outside the Community
   A. To note of:
      1. Visit farms
      2. Feed mile
      3. Storage used by stores and industry
      4. Dumps.
SUGGESTED LEARNING EXPERIENCES

**ILL**

I. Student-Centered in class activity
   A. Students and teacher will have discussion on rat problem in their area.
   B. Through library research, local newspapers, consulting home and farm owners and industry. Students will learn about the seriousness of rat destruction and how it affects the economy.
   C. Measure length of 9 inches. Double it to get idea of size of full grown rat (including tail).
   D. He raises a new family of six every 30 days.
      1. How many rats are born to one set of parents in a year if there are 12 families a year?
      2. A rat can devour 17 lbs. of garbage a year. How much would a family of six devour in 3 years?
      3. A rat carries bubonic plague via the rat flea. 25 million people died from this illness in Europe in 1343. Compare this to the size of New York City's population.

**II.** Outside Resource and Community Activities
   A. To note damage and prevention there of:
      1. Visit farms
      2. Feed mills
      3. Storage areas or warehouses used by stores, restaurants, and industry.
      4. Dumps.
Resource and Reference Materials

Publications:
McCue, George; Ecology: The City
Benziiger, Inc. New York at
I-C-E RMC # 130 Mc10

Audio-Visual:
1815 Rat Problem $3.00 1954
23 minutes - (Castle U.S. Army)
BAVI
3623 Control Rats 1956 BAVI

Community:
County Agent
Feed Mills
Warehouses
Farm
Restaurants

Continued and Additional Suggested Learning

I. continued
D.
3. population today.
4. From given facts estimate annual cost...
<table>
<thead>
<tr>
<th>Materials</th>
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<td>Continued and Additional Suggested Learning Experiences</td>
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<tr>
<td>I. continued</td>
</tr>
<tr>
<td>D.</td>
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<tr>
<td>3. population today.</td>
</tr>
<tr>
<td>4. From given facts estimate annual cost of rat damage.</td>
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</table>
Cultural, economic, social, and political factors determine status of man's values and attitudes toward his environment.

**Behavioral Objectives**

**Cognitive:** The student will write in ratio forms, the voting trend on pollution abatement laws.

**Affective:** The student is alert to laws which indicate positive attitude toward pollution.

**Skills to be Learned**
1. Collection of data
2. Setting up data tables
3. Ratios
4. Interpreting data

**Suggested Learning Experiences**

I. Student-Centered in class activity
   A. Write to Senator Proxmire or Nelson to find statistics of voting on environmental questions and pollution abatement laws.
   B. From these materials set up table to show the change of voting trend comparing your earliest reports with the later ones.
   C. Set up ratios of pro and con for each bill.
   D. Write a short statement to clarify the trend and explain the change.
   E. You may repeat the process with the SST.
   F. Use the simulation Game Recycling and Resources from I-C-E RM Sg6 Set 1.

II. Outside Retail Community
   A. Business owner who has pollution abatement in to speak to.
   B. Write a letter to further support pollution abatement laws.
   C. Try to find how local pollution fire burning usage.
SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
   A. Write to Senator Proxmire or Nelson to find statistics of voting on environmental questions and pollution abatement laws.
   B. From these materials set up table to show the change of voting trend comparing your earliest reports with the later ones.
   C. Set up ratios of pro and con for each bill.
   D. Write a short statement to clarify the trend and explain the change.
   E. You may repeat the process with the SST.
   F. Use the simulation Game Recycling and Resources from I-C-E RMC Set I.

II. Outside Resource and Community Activities
   A. Business or factory manager who has to deal with pollution abatement laws invited to speak to the class.
   B. Write a letter to encourage further support of pollution laws.
   C. Try to find out kinds of local pollution laws such as fire burning permits, muffler usage.
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<td>Man's Control of the Environment</td>
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<td>Congressional Quarterly # 100</td>
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<td>at I-C-E RMC</td>
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<td>Pollution Holt, Rinehart - Winston</td>
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<tr>
<td>at I-C-E RMC</td>
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<td>Congressional Record from the</td>
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<td>State Senator</td>
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<tr>
<td><strong>Audio-Visual:</strong></td>
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<tr>
<td>&quot;Living Earth&quot; DAVI</td>
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<td>&quot;Recycling and Resources&quot;</td>
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<tr>
<td>Kit SG6 from I-C-E RMC Set I</td>
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<tr>
<td><strong>Community:</strong></td>
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<td>Newspaper Reporter</td>
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<td>Mayor or Business man</td>
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<tr>
<td>Language Materials</td>
<td>Continued and Additional Suggested Learning Experiences</td>
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<td>--------------------</td>
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<tr>
<td>Environment</td>
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<tr>
<td>Daily # 100</td>
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<tr>
<td>Smart - Winston</td>
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<tr>
<td>from the</td>
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</tr>
</tbody>
</table>

"Sources" in C Set I
9. Man has the ability to manage, manipulate, and change his environment.

**Discipline Area**: Mathematics

**Subject**: Measurement, Problem Orientation

**Land Use**

<table>
<thead>
<tr>
<th>BEHAVIORAL OBJECTIVES</th>
<th>SUGGESTED LEARNING EXPERIENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cognitive:</strong> The student will draw to scale on paper 1/2 acre of land, landscape it and compute the cost of materials used.</td>
<td>I. Student-Centered in class activity</td>
</tr>
<tr>
<td><strong>Affective:</strong> The student will suggest ways to improve his outdoor environment.</td>
<td>A. Have a landscaper speak to the groups on trees, shrubs, and space involved in planning. Encourage questions.</td>
</tr>
<tr>
<td><strong>Skills to be learned</strong></td>
<td>II. Outsider in class activity</td>
</tr>
<tr>
<td>Square Area</td>
<td>A. Visiting the Land, etc.</td>
</tr>
<tr>
<td>Addition of money</td>
<td>B. Visiting the Land, etc.</td>
</tr>
<tr>
<td>Scale model drawing</td>
<td>C. Using the equipment above tell students they have about 1/2 acre of land, 104 X 209. They have a small creek or natural spring on their land. They are to plan cost of landscaping the 1/2 acre plot.</td>
</tr>
<tr>
<td></td>
<td>D. Put the plan onto the grid in scale-model.</td>
</tr>
<tr>
<td></td>
<td>E. When complete, if possible invite the landscaper to look at the maps, evaluating the appropriateness and placement of trees.</td>
</tr>
<tr>
<td></td>
<td>F. Discuss the plans with the class, taking into account the use of the area, beauty of the area.</td>
</tr>
<tr>
<td></td>
<td>G. Discuss actual parks and their aesthetic appeal.</td>
</tr>
<tr>
<td></td>
<td>H. Use the Simulation Game - Man and His Environment from I-C-E RMC.</td>
</tr>
</tbody>
</table>
SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
   A. Have a landscaper speak to the groups on trees, shrubs, and space involved in planning. Encourage questions.
   B. Give Students
      1. Grid with 1" squares
      2. Tree and shrub catalog
      3. Have them form groups
   C. Using the equipment above tell students they have about 1/2 acre of land, 104 X 209. They have a small creek or natural spring on their land. They are to plan cost of landscaping the 1/2 acre plot.
   D. Put the plan onto the grid in scale-model.
   E. When complete, if possible invite the landscaper to look at the maps, evaluating the appropriateness and placement of trees.
   F. Discuss the plans with the class, taking into account the use of the area, beauty of the area.
   G. Discuss actual parks and their aesthetic appeal.
   H. Use the Simulation Game - Man and His Environment from I-C-E RMC.

II. Outside Resource and Community Activities
   A. Visit the tree nursery.
   B. Visit a wayside or park.
Publications:
Dudley, Ruth H. *Our American Trees* New York Crowell 1956
Bulla, Clyde R. *A Tree is a Plant* Crowell, 1962
Buelcher, Jean E. & R.H. Naoilles, *A Tree is Born* New York Sterling, 1960
Udry, Janice M., *A Tree is Nice* Harper and Row, 1956

Audio-Visual:
3873 "Tree Portrait" BAVI
"Man and His Environment"
Simulation Games from I-C-E RWC

Community:
Landscaper
County Agent
Tree and shrub catalog
Stark Brothers
Louisiana
Missouri 63353
Continued and Additional Suggested Learning Experiences
Problem Orientation: Short-Long

Concept 1: Short-term economic gains may produce long-term environmental losses.

Discipline Area: Mathematics
Subject: Decimals - Problem Orientation

BEHAVIORAL OBJECTIVES

Cognitive: The child will solve problems that deal with economic factors involving pollution. Child observes building landmarks and noting observations of environmental deterioration.

Affective: The student will develop an appreciation for the above concept from working with problems dealing with the monetary aspect of environmental losses.

Skills to be Learned
- Problem solving
- Reasoning, Observing
- Computing, Analyzing

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
   A. We've used our waterways as dumping grounds for more than two centuries. The villains of the pollution of our waterways are Industry 65%, municipalities 20%, and Agriculture 15%.

   1. If only 32 states have fully approved water quality standards how many do not? What is the percentage ratio of those that do to those that don't?
   2. It will take a 5 year investment of $42 billion to clean up water. Over half is industry's responsibility. If industries share is 3.2, 2.0, 4.0, 6.6, 1.0, and 7.7 billion dollars for various abatement needs, what is the total of Industry's financial responsibility?
   3. What is the municipal financial responsibility?
   4. At present North Americans are removing fresh water from underground sources twice as fast as it can be replaced. It is estimated that Americans will need 700 billion gallons of (continued on reverse side)

II. Outside Community
   A. Take the nearest construction project and see who is responsible for the pollution. Ask the people about the environmental impact of the project.
   B. Go on a hike to an area not affected by pollution. Observe and note what you see and write a report about the area. The story of the facts that are learned is continued on the backside.
<table>
<thead>
<tr>
<th>SUGGESTED LEARNING EXPERIENCES</th>
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</thead>
<tbody>
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3. What is the municipal financial responsibility?

4. At present North Americans are removing fresh water from underground sources twice as fast as it can be replaced. It is estimated that Americans will need 700 billion gallons of (continued on reverse side)

| **II. Outside Resource and Community Activities** |
| A. Take a field trip to the nearest "large city". Observe the effects of various acids in the atmosphere that are damaging buildings, landmarks, and works of art. Can old landmarks and buildings be restored or must they be replaced? Some of these buildings are, in reality, irreplaceable.

B. Go on the school grounds or area not far from an industrial site that has plant life growing on it. Observe the upper side of the leaves for evidence of an accumulation of pollutants. The stomata are tiny openings on the underside of the leaves that afford the plant the ability to breathe.
<table>
<thead>
<tr>
<th>Resource and Reference Materials</th>
<th>Continued and Additional Suggested Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Publications:</strong></td>
<td>I. continued</td>
</tr>
<tr>
<td>The Only Earth We Have</td>
<td>4. underground water in 1980 (per year). In</td>
</tr>
<tr>
<td>Laurence Pringle, MacMillan Co.</td>
<td>billion gallons will be available, what is</td>
</tr>
<tr>
<td>866 Third Avenue, New York City</td>
<td>available water to that which will be need</td>
</tr>
<tr>
<td>10022 $4.50 hardcover, $1.60</td>
<td>for...</td>
</tr>
<tr>
<td>paperback</td>
<td></td>
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<tr>
<td>Schneider, Gerak., 1968 Conservation Teaching in the City</td>
<td></td>
</tr>
<tr>
<td>New York State Conservation</td>
<td></td>
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<tr>
<td>Dept. (Resource Center)</td>
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<tr>
<td><strong>Audio-Visual:</strong></td>
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<tr>
<td>no. 250 Men at Bay. I-C-E RMC</td>
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<tr>
<td>BAVI 0678 - &quot;Air Pollution&quot;</td>
<td></td>
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<tr>
<td>11 minutes $4.00 BAVI Journal 1968</td>
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<tr>
<td><strong>Community:</strong></td>
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<tr>
<td>City Planner</td>
<td></td>
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<td>Historical Society</td>
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</tbody>
</table>
I. continued

4. underground water in 1980 (per year). If only 650 billion gallons will be available, what is the ratio of available water to that which will be needed?
Individual acts, duplicated or compounded, produce significant environmental alterations over time.

**BEHAVIORAL OBJECTIVES**

**Cognitive:** The student will compute the amount of waste-paper, bottles, or cans, etc., which could be found in a given area.

**Affective:** Students will criticize actions of their own and their families and respond to the beauty of a litter-free landscape.

**Skills to be learned:** Planning, Observation, Collecting, Organizing, Computing, Criticizing

**Discipline Area:** Mathematics

**Subject:** Numeration (Multiplication, Division)

**Problem Orientation:** Waste Disposal

**SUGGESTED LEARNING EXPERIENCES**

**I. Student-Centered in class activity**

A. The class will select an area of roadside which they feel needs to be cleaned up and make preparations for an "environmental cleaning hike."

1. Bring bags in which to place various types of litter.
2. Volunteer to be on a group which picks up one type of litter (paper, cans, etc.)

B. The class will determine what length of roadside they will clean up.

1. Determine how it will be measured.

C. Compute the miles of roadside in their township, county or state.
<table>
<thead>
<tr>
<th>SUGGESTED LEARNING EXPERIENCES</th>
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| B. The class will determine what length of roadside they will clean up.
  1. Determine how it will be measured.
| C. Compute the miles of roadside in their township, county or state. |
| **II. Outside Resource and Community Activities** |
| A. Tour a measured or known length of roadside collecting various classes of waste or litter (paper, cans, etc.) which can be weighed.
  1. Record the amount of each class of waste
  2. At this rate per mile, by multiplication, compute amount found in township, county or state.
  3. Write to County Road Commissioner for mileage covered by County Cleanup Crews. |
Continued and Additional Suggested Learning Activities:

I. (continued)
   D. Based on the amount of litter picked up during the community clean-up project, compute the cost of cleaning in parks, streets, and parks.

   5. As a class project, organize and carry out a community clean-up and spruce up event.

Publications:

National Wildlife Federation EQ Index, I-C-E
Bronson, William, How To Kill A Golden State

Audio-visual:

Film (color), Land Betrayed (Riggins), 10 minutes, $3.75
<table>
<thead>
<tr>
<th>Continued and Additional Suggested Learning Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. (continued)</strong></td>
</tr>
<tr>
<td>D. Based on the amount of litter picked up in outside activities, compute by multiplication the tons of litter in townships, county or state.</td>
</tr>
<tr>
<td><strong>II. (continued)</strong></td>
</tr>
<tr>
<td>4. Children living in village or city could find cost of cleaning in parks, streets, etc.</td>
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<tr>
<td>5. As a class project, organize and carry out a community &quot;clean up and spruce up&quot; campaign.</td>
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</table>
**Cognitive:** The learner will compute amounts and costs of board feet used and wasted.

**Affective:** The student will appreciate the monetary value of the tree for building purposes at the present and in the future.

**Skills to be Learned**
- Multiplying
- Observing
- Listing

---

**BEHAVIORAL OBJECTIVES**

**Cognitive:**
- The learner will compute amounts and costs of board feet used and wasted.

**Affective:**
- The student will appreciate the monetary value of the tree for building purposes at the present and in the future.

---

**SUGGESTED LEARNING EXPERIENCES**

**I. Student-Centered in class activity**
- A. Given the fact that an average family dwelling unit requires about 13,000 board feet of lumber.
  1. Find the board-foot requirement if 10 new homes are built.
  2. Find board feet destroyed if 20 homes are demolished to clear a path for a highway.
- B. Find the cost of the board feet destroyed in number 2 above.
- C. List the effects of waste of board feet of lumber on lumber availability for future generations.

**II. Outside Resource Community Activity**
- A. Invite in a demolition team to discuss the quantities of tearing down homes in the proposed building project.
- B. Visit a lumber yard and study different kinds of lumber.
- C. Visit a sawmill and learn about waste caused in boards.
- D. Talk to local person and learn how he contributes.

---

**Concept:**
- Private ownership must be regarded as a stewardship and should not encroach upon or violate the individual right of others.

**Discipline Area:** Mathematics

**Subject:** Computation

**Problem Orientation:** Conservation
Ownership must be re-stewardship and should not upon or violate the right of others.

<table>
<thead>
<tr>
<th>ACTIVITIES</th>
<th>SUGGESTED LEARNING EXPERIENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Student-Centered in class activity</td>
<td>II. Outside Resource and Community Activities</td>
</tr>
<tr>
<td>A. Given the fact that an average family dwelling unit requires about 13,000 board feet of lumber.</td>
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</tr>
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<td>1. Find the board foot requirement if 10 new homes are built.</td>
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</tr>
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<td>C. Visit a sawmill and note the waste caused in manufacturing boards.</td>
</tr>
<tr>
<td>B. Find the cost of the board feet destroyed in number 2 above.</td>
<td>D. Talk to local carpenter and learn how he conserves materials.</td>
</tr>
<tr>
<td>C. List the effects of waste of board feet of lumber on lumber availability for future generations.</td>
<td></td>
</tr>
</tbody>
</table>

Discipline Area: Mathematics
Subject: Computation
Problem Orientation: Conservation
Grade: 5
### Resource and Reference Materials

**Publications:**

- Trail Guide Berlin
- Outdoor Education Center
- I-C-E RMC Vertical file

**Audio-Visual:**

- 6448 Lumberman (Color)  
  15 min. $5.50 BAVI, 1965

- Let's Build a House, Churchill Films, 6671 Sunset Boulevard, Los Angeles

### Community:

- Sawmill
- Lumber Yard
- House Construction
- Road Building Sites
Continued and Additional Suggested Learning Experiences
Private ownership must be reared as a stewardship and should not encroach upon or violate the individual right of others.

**Behavioral Objectives**

| Cognitive | The child will compute the amount of wastepaper, bottles, or cans, etc. which could be found in a given area. |
| Affective: Students will criticize actions of their own and their families and respond to the beauty of a litter-free landscape. |

**Skills to be Learned**

- Planning
- Observation
- Collecting
- Organizing
- Computing
- Criticizing

**Problem Orientation**

- **I. Student-Centered in class activity**
- A. The class will select an area of roadside which they feel needs to be cleaned up and make preparations for an environmental cleanup hike.
  1. Bring bags in which to place various types of litter.
  2. Based on the amount of litter picked up, multiply the tons of litter in their township, county or state.
  3. Determine how it will be measured.
- B. The class will determine what length of roadside they will clean.
- C. Compute the miles of roadside in their township, county or state.
- D. Based on the amount of litter picked up and the tons of litter, compute or multiply the tons of litter in township, county, or state. Write to County Road Commissioner for mileage covered by County crews. Use town-County-State office maps to get own mileage or State highway miles have figures on state highway miles.
**Objectives**

Discipline Area: Mathematics  
Subject: Numeration (Multiplication)  
Problem Orientation: Waste Disposal  
Grade: 5

<table>
<thead>
<tr>
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<tr>
<td>3. Based on the amount of litter picked up in outside activity compute or multiply the tons of litter in township, county, or state.</td>
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<tr>
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- Ownership must be reve-  
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<tr>
<th>Resource and Reference Materials</th>
<th>Continued and Additional Suggested Learning Experience</th>
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</tr>
<tr>
<td>National Wildlife Federation</td>
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<tr>
<td>EQ Index # VF at I-C-E RMC</td>
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<tr>
<td>God's Own Junkyard, Borgstrom</td>
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<tr>
<td>George</td>
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<td>How to Kill a Golden State</td>
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<tr>
<td>Bronson, Wm.</td>
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<tr>
<td><strong>Audio-Visual:</strong></td>
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<tr>
<td>6878 Land Betrayed (color)</td>
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<td>$3.75 10 minutes (Riggins)</td>
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<td>1967 BAVI</td>
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<tr>
<td><strong>Community:</strong></td>
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<td>Town Chairman</td>
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<tr>
<td>Road Commissioner</td>
<td></td>
</tr>
<tr>
<td>Experiences</td>
<td>Continued and Additional Suggested Learning Experiences</td>
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</tbody>
</table>
Please fill in:
Subject: __________________
Grade: _________________
Concept No. Used: ______

In commenting on each episode used in your critiques and comments - negative
hand column, please rate (poor, good,
made specific comments or suggestions
vided to help us make this a more usable

<table>
<thead>
<tr>
<th>Poor</th>
<th>Good</th>
<th>Exc.</th>
</tr>
</thead>
</table>

I. Behavioral Objectives
A. Cognitive:

II. Affective:

III. Skills Developed

III. Suggested Learning Experiences
A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials
   (specific suggestions & comments)
I-C-E Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, please use this form. Feel free to adapt it and add more pages. Let us know all your critiques and comments - negative and positive. In the left-hand column, please rate (poor, good, excellent) each item. Also, make specific comments or suggestions if possible in the space provided to help us make this a more usable guide. Thank you.

I. Behavioral Objectives
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   B. Affective:

II. Skills Developed

III. Suggested Learning Experiences
   A. In Class:

   B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials
   (specific suggestions & comments)
A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Mathematics GRADE 6

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA 3-8-9
1927 Main Street
Green Bay, Wisconsin 54301
(414) 432-4338
(after Dec. 1, 1972 - 468-7464)
EARY PROGRAM FOR ENVIRONMENTAL EDUCATION

REA Mathematics GRADE 6

Robert Warpinski, Director
Robert Kellner, Asst. Director
George Howlett, EE Specialist
PREFACE

"Oikus" for house is the Greek origin of the term "ecology". It studies our house—whatever or wherever it may be. Like an expand or contract to fit many ranges—natural and man-made environments, our many "houses" if we omit rancor and cite complexities. Our "oikus" uses the insights of all subjects in a multidisciplinary program like ours necessarily results. A long time, our program ranges K thru 12. The environment values. These values have their origin in the "oikus" of our minds. Let us become masters of our house by replacing the with "Know thyself and thine house."

1. Written and designed by your fellow teachers, this guide to fit appropriately into existing, logical course content. 2. Each page or episode offers suggestions. Knowing your students to adapt or adopt. Limitless chances are here for your curriculum and no curriculum will work unless viewed in the context of these episodes. Many episodes are self contained, some open-ended, still developed over a few days. 3. Try these episodes, but please pre-plan. Why? Simply, not and no curriculum will work unless viewed in the context of these episodes. 4. React to this guide with scratch ideas and notes on the episode. 5. After using an episode, fill out the attached evaluation duplicate, or request more of these forms. Send them in. We sincerely want your reactions or suggestions—negative evaluations are the key in telling us "what works" and in the guides.

TERMS AND ABBREVIATIONS

ICE RMC is Project ICE Resource Materials Center serving all school districts in CESA 3, 8, and 9. Check the Project ICE resources. Cur address and phone number is on this guide's cover or call us for any materials or help.

BAVI is Bureau of Audio Visual Instruction, 1327 University Blvd., Madison, Wisconsin 53701 (Phone: 608-262-1644).

Cognitive means a measurable mental skill, ability, or process. Affective refers to student attitudes, values, and feelings.
PREFACE

for house is the Greek origin of the term "ecology". Environmental education
our house--whatever or wherever it may be. Like an umbrella, our house can
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e, our program ranges K thru 12. The environment mirrors our attitudes or
these values have their origin in the "oikus" of our collective and individual
us become masters of our house by replacing the Greek adage of "Know thyself"
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ABBREVIATIONS

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r address and phone number is on this guide's cover. Feel free to write
s for any materials or help.

Bureau of Audio Visual Instruction, 1327 University Avenue, P. C. Box 2093,
consin 53701 (Phone: 608-262-1644).
ve means a measurable mental skill, ability, or process based on factual data.
ve refers to student attitudes, values, and feelings.
ACKNOWLEDGEMENTS: The following teachers and consultants participated in the development of the Supplementary Environmental Education Curriculum Guides:

CESA #3
D. C. Aderheld, Bonduel
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Bonnie Beamer, Coleman
Merlyn Blonde, Shawano
R. A. Dirks, Gillett
Dennis Dobrzenski, White Lake
LeRoy Gerl, Oconto
Karen Grunwald, St. James (L)
William Harper, Lena
Sister Claudette, St. Charles
Ervin Kunesh, Marinette
Kathleen LeBreck, Oconto
P. E. Lewicki, Gillett
Dorothy O'Brien, Wausauke
Terry Otto, St. John (L)
Arthur Paulson, Cconto Falls
Marie Prochaska, Lena
Christine Proctor, Wausauke
Arthur Schelk, Suring
Peter Skroch, Cconto Falls
David Soltesz, Crivitz
Bill Stillion, Shawano
Cathy Warnack, White Lake

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Mary Chriss, Hortonville
Cliff Christensen, Winneconne
Kenneth Couillard, Hortonville
Raymond Emerich, Hortonville
Mike Ercegovac, Winneconne
Dona Geeding, Menasha
Donald Hale, Winneconne
James Huss, Freedom
Sister Lois Jonet, Holy Angels
Kenneth Kappell, St. Aloysius
Kenneth Keliher, Appleton
Everett Klinzing, New London
Fred Krueger, Oshkosh
Jim Krueger, Winneconne
Mae Rose LaPointe, St. John Hig
Rosemarie Lauer, Hortonville
Robert Lee, Neenah
Harold Lindhorst, St. Martin (L)
Dennis Lord, Little Wolf
Robert Meyer, Neenah
Arnold Neuzil, Shiocton
James Nuthals, Lourdes
Connie Peterson, St. Martin (L)
Rosemary Rafath, Clintonville
Mark Reddel, St. Martin (L)
Gladys Roland, Little Wolf
Kathryn Rowe, Appleton
Mary Margar, Sauerkraut, Menasha
Edwin Schaefler, Kaukauna
Lee Smoll, Little Chute
Doris Stehr, Mt. Calvary (L)
Ginger Stufetraa, Oshkosh
Richard Switzer, Little Chute
Tim Van Susteren, Holy Name
Lila Wertsch, St. Margaret Mary
Warren Wolf, Kimberly
Gery Farrell, Menasha

CESA #9
Dr. Charles Peterson,
St. Norbert College
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Robert Becker, Fox Valley (L)
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Cliff Christensen, Winneconne
Kenneth Couillard, Hortonville
Raymond Emerich, Hortonville
Mike Ercegovac, Winneconne
Donna Geeding, Menasha
James Huss, Freedom
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Lila Wertsch, St. Margaret Mary
Warren Wolf, Kimberly
Gery Farrell, Menasha

CESA #9

Peter Biole, West DePere
Lee Ciesen, Lux.-Casco
Kathryn Colburn, Algoma
Merle Colburn, Algoma
Sara Curtis, Green Bay
Duane DeLorme, Green Bay
Roberta Dix, St. Joseph Acad.
Janet Elinger, Ashwaubenon
Phyllis Ellefson, Wash. Isle.
Keith Fawcett, West DePere
Jack Giachino, Seymour
Mike Gleffe, St. Matthews
Herbert Hardt, Gibraltar
Gary Heil, Denmark
Nannette Hoppe, How.-Suam.
Joseph Hucek, Pulaski
Catherine Huppert, DePere
DeAnna Johnson, Denmark
Kris Karpinen, West DePere
Mel Kasen, Gibraltar
Jack Koivisto, Green Bay
Sister Mary Alice, Cathedral
Ellen Lotz, West DePere
Judilyn McGowan, Green Bay
Priscilla Mereness, Wrightstown
C. L. Paquet, Denmark
William Roberts, Sturgeon Bay
Roger Roznowski, Southern Door
Jan Serrahn, Sevastopol
Calvin Siegrist, How.-Suam.
Mary Smith, Green Bay
Carol Trimberger, Kewaunee
Mary Wadzinski, How.-Suam.
Energy from the sun, the basic source of all energy, is converted through plant photosynthesis into a form all living things can use for life processes.

**BEHAVIORAL OBJECTIVES**

<table>
<thead>
<tr>
<th>Cognitive: The student, through the use of observation and conclusion, will compute the fractional parts of his community that can sustain adequate plant growth.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective: The student will recognize certain growth of vegetation in accordance to direct rays of the sun compared to diverted rays of the sun.</td>
</tr>
</tbody>
</table>

**Skills to be Learned**
- Graphing
- Charting
- Concluding
- Observing
- Recording

**SUGGESTED LEARNING EXPERIENCES**

<table>
<thead>
<tr>
<th>I. Student-Centered in class activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Teacher states: Compare the sun's energy in certain areas of the school yard (according to plant growth).</td>
</tr>
<tr>
<td>1. Then have the students divide the yard into certain sections.</td>
</tr>
<tr>
<td>a. Where sun rays hit directly.</td>
</tr>
<tr>
<td>b. Where sun rays are diverted, etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II. Outside Community activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. On a field trip, take different sections of the yard.</td>
</tr>
<tr>
<td>B. Bring home soil samples.</td>
</tr>
</tbody>
</table>

2. Then, through the use of observation, have student compute the fractional parts of each section of the yard that can sustain plant growth.
Discipline Area: Math
Subject: Fractions
Problem Orientation: Energy
Grade: 6

<table>
<thead>
<tr>
<th>SUGGESTED LEARNING EXPERIENCES</th>
</tr>
</thead>
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<tr>
<td><strong>I. Student-Centered in class activity</strong></td>
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<tr>
<td>A. Teacher states: Compare the sun's energy in certain areas of the school yard (according to plant growth).</td>
</tr>
</tbody>
</table>

1. Then have the students divide the yard into certain sections.  
   a. Where sun rays hit directly.  
   b. Where sun rays are diverted, etc.  

2. Then, through the use of observation, have students compute the fractional parts of each section of the yard that can sustain plant growth.  

B. Bring in an ecologist, florist, or landscaper and have him explain the different vegetation found in these areas and why they are found there.
### Resource and Reference Materials

**Publications:**

Any local articles on city pollution
1. Newspaper
2. Magazine

**Audio-Visual:**

Sound Filmstrip: The Deciduous Forest, Warren Schloat Films, Inc., West Nyack, N.Y.

Film: #6743 Green Plants and Sunlight, color, 11 min., $4, (Intermediate level), 1966 B.A.V.I.

**Community:**

Get local authorities (i.e., City Planner or Park Commissioner) to lead a field trip through the city.
**Continued and Additional Suggested Learning Experiences**

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1. **[Underscored line]**
2. **[Underscored line]**
3. **[Underscored line]**

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**Note:**
- The document contains a table with the title "Continued and Additional Suggested Learning Experiences.
- The table is followed by several underscored lines, which may indicate notes or highlights.

---

**ERI**
All living organisms interact among themselves and their environment, forming an intricate unit called an ecosystem.

**BEHAVIORAL OBJECTIVES**

**Cognitive:** The student will explain data presented in graphs and construct graphs to summarize data.

**Affective:** The student will become conscious of the various types of plants that are supported by these soils.

**Skills to be learned:**
- Observation
- Measuring
- Classification
- Recording
- Concluding

**SUGGESTED LEARNING EXPERIENCE**

1. **Student-Centered in class activity**

   A. Measuring, recording, graphing plant growth at specific intervals.

   1. Using an area map, discuss the possible sites for collecting soil (to obtain variety)

   2. Actual work of preparing containers planting seeds or plants -- daily tasks to be carried out as plants begin to grow.

   3. Measure and record the growth of a plant over regular intervals of time (use metric measure if possible).

   4. Graph the recorded results of the plant growth with either bar, line, or picto-graphs.

   5. Suggest integration with science unit
<table>
<thead>
<tr>
<th>SUGGESTED LEARNING EXPERIENCES</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>5. Suggest integration with science unit</td>
</tr>
<tr>
<td><strong>II. Outside Resource and Community Activities</strong></td>
</tr>
<tr>
<td>A. <strong>Library</strong></td>
</tr>
<tr>
<td>1. Locate information about the major soil groups in your area.</td>
</tr>
<tr>
<td>B. <strong>Immediate area - Nature hik</strong></td>
</tr>
<tr>
<td>1. Observe abundance and variety of vegetation in different soils.</td>
</tr>
<tr>
<td>C. <strong>Field trip to a farm</strong></td>
</tr>
<tr>
<td>1. Interview the farmer</td>
</tr>
<tr>
<td>a. What kind of soil</td>
</tr>
<tr>
<td>b. What type of plants</td>
</tr>
<tr>
<td>D. <strong>Field trip to a Florist</strong></td>
</tr>
<tr>
<td>1. Observe plants grown under controlled conditions</td>
</tr>
<tr>
<td>2. Why do certain plants grow in certain soils?</td>
</tr>
</tbody>
</table>
### Resource and Reference Materials

<table>
<thead>
<tr>
<th>Publications:</th>
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<table>
<thead>
<tr>
<th>Audio-Visual:</th>
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</thead>
<tbody>
<tr>
<td>#55035 Seed Sprouting, time lapse film, 2 min., Walt Disney Education Materials Co., 800 Sonora Ave., Glendale, Calif. 91201</td>
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</table>

<table>
<thead>
<tr>
<th>Community:</th>
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<tbody>
<tr>
<td>Farm</td>
</tr>
<tr>
<td>Florist</td>
</tr>
<tr>
<td>DNR</td>
</tr>
<tr>
<td>Library</td>
</tr>
<tr>
<td>School Forest or Outdoor Center</td>
</tr>
</tbody>
</table>
Environmental factors are limiting on the numbers of organisms living within their influence, thus, each environment has a carrying capacity.

**BEHAVIORAL OBJECTIVES**

**Cognitive:** The student will differentiate between the sets given in the classroom activity.

**Affective:** The student will appreciate, through observation of life in an aquarium, that each environment has its own carrying capacity.

**Skills to be learned:**

- Observation
- Comparison
- Recording
- Naming
- Classifying

**SUGGESTED LEARNING ACTIVITY**

1. **Student-Centered Activity**
   - A. Guppy food set

   - 1. Set up 10 gallon aquarium systems equipped with average filtration and heating systems

   - 2. Daily supply maximum amount of fish food for guppies to survive, compared to each system's capacity to support life. (Set I)

   - 3. Put 10 male and 10 female guppies in each tank. (Set II)

   - 4. When second generation of fish is produced, watch for signs of the balance compared to the capacity of the environment to sustain life.

   - 5. Use O₂ instead of air for oxygenation.
Factors are limiting on the organisms living within their environment. Each environment has a capacity.

**OBJECTIVES**

- Student will differentiate in the sets given.
- Student will study the sets given.
- Student will conduct a high observation study to determine what each organism can carry on its own carrying capacity.

**SUGGESTED LEARNING EXPERIENCES**

I. Student-Centered in class activity

A. Guppy food set study

1. Set up 10 gallon aquarium system equipped with average filtration and airation systems.

2. Daily supply of maximum amount of fish food for twenty guppies to survive (Set I)

3. Put 10 male guppies and 10 females in tank. (Set II)

4. When second generation of fish appear, watch for disturbance of the balance of food compared to carrying capacity of the fish to survive. (Set III)

5. Use O₂ instead of food.

II. Outside Resource and Community Activities

A. Take a field trip to nearest natural body of water and note various life forms in the woods and lakes.

B. Use local library or school library to look up deer, birds, etc. populations according to the carrying capacity of the land.

C. Have a conservationist come in and talk on some of the above mentioned subjects and topics.
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>Publications:</strong></td>
<td></td>
</tr>
<tr>
<td>Little, Charles E., <em>Challenge of the Land</em>, N.Y.: Oxford University 1949</td>
<td></td>
</tr>
<tr>
<td>Stewardship - The Land - The Land Owner - The Metropolis, N.Y. Open Space Institute, Inc. 1968</td>
<td></td>
</tr>
<tr>
<td><strong>Audio - Visual:</strong></td>
<td></td>
</tr>
<tr>
<td>Interdependence of Living Things, I-C-E RMC, Filmstrip Set #13</td>
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</tr>
<tr>
<td><strong>Community:</strong></td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td></td>
</tr>
<tr>
<td>Lake</td>
<td></td>
</tr>
<tr>
<td>DNR Office</td>
<td></td>
</tr>
</tbody>
</table>
Continued and Additional Suggested Learning Experiences

- Challenge of Ford University
- Land - The Land, N.Y. Open Inc. 1968
- Living Things, Trip Set #13
An adequate supply of pure water is essential to life.

**Behavioral Objectives**

**Cognitive:** Observe and record the amount of water used and wasted within the school and community.

**Affecrive:** The student will offer suggestions of ways in which water can be conserved.

**Skills to be learned:**
- Knowledge of liquid measures (standard and metric)
- Conservation of smaller to larger units over time and rate
- Problem solving

**Suggested Learning Experiences**

I. Student-Centered in class activity

A. Measurement of water waste at school water fountain continuously run.

1. How much water is wasted from a leaky faucet?

2. Number of students in class versus amounts of water used on an average (60 gallons) per person per day. Number of people in the community

B. Procedures:

1. Use containers expressing standard and metric units of measurement (cups, pints, quarts and gallons)

2. Compute amounts collected per hour in relation to number of hours in school day, week, year, etc.
**Discipline Area** Mathematics  
**Subject** Recording-Problem Solving-Measurement  
**Problem Orientation** Water  
**Grade** 6  

### SUGGESTED LEARNING EXPERIENCES

<table>
<thead>
<tr>
<th><strong>I. Student-Centered in class activity</strong></th>
<th><strong>II. Outside Resource and Community Activities</strong></th>
</tr>
</thead>
</table>
| A. Measurement water wasted as school water contains continuously run.  
1. How much water is wasted from a leaky faucet?  
2. Number of students in class versus amounts of water used on an average (60 gallons) per person per day. Number of people in the community. |
| B. Procedures:  
1. Use containers expressing standard and metric units of measurement (cups, pints, quarts and gallons).  
2. Compute amounts collected per hour in relation to number of hours in school day, week, year, etc.  

| **A. Waste treatment plant** |  
|-------------------------------|---|
| 1. How many gallons of water a day are used?  
2. What is added to the water?  
3. Controls concerning water usage. |

<table>
<thead>
<tr>
<th><strong>B. A Home</strong></th>
</tr>
</thead>
</table>
| 1. Tabulations (same as above)  
   a. Kitchen  
   b. Bathroom |
<table>
<thead>
<tr>
<th>Resource and Reference Materials</th>
<th>Continued and Additional Suggeste...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Publications:</strong></td>
<td></td>
</tr>
<tr>
<td>Leinwand, Gerald and Popkin, Gerald</td>
<td>Air and Water Pollution,</td>
</tr>
<tr>
<td></td>
<td>Washington Square Press</td>
</tr>
<tr>
<td></td>
<td>630 Fifth Ave., N.Y. City 10020</td>
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<tr>
<td><strong>Audio-Visual:</strong></td>
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<tr>
<td>Kit #5, Degradation - Degradation,</td>
<td>(set of 16 filmstrips) Eye Gate</td>
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<td></td>
<td>house, Inc. 1970, I-C-E RMC</td>
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<tr>
<td>Water Famine, 54 minutes, Carousal</td>
<td>Films, Inc., 1501 Broadway, New</td>
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<td></td>
<td>York, N.Y. 10035</td>
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<td>Problem with Water is People, 30</td>
<td>minutes, request color, McGraw - Hill</td>
</tr>
<tr>
<td></td>
<td>Contemporary Films, 330 W. 42nd Street,</td>
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<tr>
<td></td>
<td>New York, N.Y. 10018</td>
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<tr>
<td><strong>Community:</strong></td>
<td></td>
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<tr>
<td>Community Water Department</td>
<td></td>
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<tr>
<td>Sewage Plant</td>
<td></td>
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</tbody>
</table>
### Continued and Additional Suggested Learning Experiences

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Popkin, Gerald</td>
<td>Degradation, Brutes, Carousel</td>
<td>McGraw - Hill</td>
</tr>
<tr>
<td></td>
<td>Broadway, New York</td>
<td>330 W. 42nd Street, N. Y.</td>
</tr>
<tr>
<td></td>
<td>City 10020</td>
<td>Press</td>
</tr>
<tr>
<td></td>
<td>RMC</td>
<td>330 W. 42nd Street, N. Y.</td>
</tr>
<tr>
<td></td>
<td>Department</td>
<td>330 W. 42nd Street, N. Y.</td>
</tr>
</tbody>
</table>
An adequate supply of clean air is essential because most organisms depend on oxygen, through respiration, to release the energy in their food.

**Skills to be learned:**
- Practice in metric systems
- Computation of area and volume of prisms

**Behavioral Objectives**

1. **Cognitive:** The student will determine and record the amount of air needed for his survival.

2. **Affective:** The student will be alerted to the need for and supply of clean air.

**Suggested Learning Activity**

**I. Student-Centered in Class:**

**A. Measuring and recording volume of air and volume of your classroom (prism):**

- Determine the average amount of air per breath, per child, through the use of plastic bags and immersion (volume) in the classroom (prism). This can be tested in one of the following ways:

  a. Place water in a beaker (half full), immerse the bag into the water and check the displacement (metric system).

B. Additional activities:

- **Release the energy in their food.**
Supply of clean air is essential for life. Because most organisms depend on oxygen for survival, they obtain energy in their food through respiration, to unlock the chemical energy stored in the nutrient molecules.

**General Objectives**

- **Student will:** Record the amount of air needed for his survival.
- **Student will:** Understand the need for and the role of air.

**Competencies Acquired:**

- Basic systems
- Area and volume

---

### Suggested Learning Experiences

**I. Student-Centered in class activity**

- **A. Measuring and recording volume of air**
  1. Determine surface area and volume of your classroom (prism) (length x width x height)
  2. Determine the average amount of air per breath, per child, through the use of plastic bags and immersion (volume). This can be tested in one of the following ways:
     a. Place water in a beaker (half full). Emerge the bag into the water and check the displacement (metric system).

**II. Outside Resource and Community Activities**

- **A. Calculate the cubic feet (meters) of area in the students’ home.**
- **B. Research the average amount of air used by the average adult.**
- **C. Investigate the effects of vigorous physical activity on the amount of air used.**

(continued on reverse side)
Resource and Reference Materials

<table>
<thead>
<tr>
<th>Publications:</th>
<th>Continued and Additional Suggested Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aylesworth, Thomas G.</td>
<td></td>
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<tr>
<td>This Vital Air</td>
<td></td>
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<tr>
<td>This Vital Water: Man</td>
<td></td>
</tr>
<tr>
<td>Environmental Crisis,</td>
<td></td>
</tr>
<tr>
<td>Ran McNally, 1968, $4.95</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Audio-Visual:</td>
<td></td>
</tr>
<tr>
<td>Air Pollution, Part A</td>
<td></td>
</tr>
<tr>
<td>Pergamon Publishing Co.,</td>
<td></td>
</tr>
<tr>
<td>Maxwell House, Fairview</td>
<td></td>
</tr>
<tr>
<td>Part, Elmsford, N.Y., 10523</td>
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<tr>
<td></td>
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</tr>
<tr>
<td>With Each Breath</td>
<td></td>
</tr>
<tr>
<td>99 minutes, color</td>
<td></td>
</tr>
<tr>
<td>Health Educational Services</td>
<td></td>
</tr>
<tr>
<td>Box 7263, Albany, N.Y., 12224</td>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td>Air Pollution; Take a Deep</td>
<td></td>
</tr>
<tr>
<td>Deadly Breath, 3 parts total 54 minutes, color, free.</td>
<td></td>
</tr>
<tr>
<td>National Medical Audio-Visual Center</td>
<td></td>
</tr>
<tr>
<td>Chamblee, Georgia 3005</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Community:</td>
<td></td>
</tr>
<tr>
<td>City Health Department</td>
<td></td>
</tr>
</tbody>
</table>

I. (continued)

b. Fill a beaker and place a bag over the beaker. As the bag is immersed, take the beaker and go into the pan (metric system).

3. Determine the average number of breaths available in the room.

4. Calculate the number of breaths in the room.

B. Enrichment:

1. Make allowances for the area occupied by tables and chairs and other equipment.

2. Make allowance for the amount of air used per breath.

3. Remember you are breathing "used" air.
I. (continued)

b. Fill a beaker and place a pan next to the beaker. As the bag is immersed, the water will leave the beaker and go into the pan. Measure the water in the pan (metric system).

3. Determine the average number of breaths per minute, available in the room.

4. Calculate the number of breaths of air available in the room.

B. Enrichment:

1. Make allowances for the area of the room occupied by tables and chairs and other fixtures.

2. Make allowance for the amount of oxygen not actually used per breath.

3. Remember you are breathing "used" air to begin with.
**Behavioral Objectives**

**Cognitive:** The student will differentiate soil formations and their ability to sustain life in a given geographic area.

**Affective:** The student will appreciate all life forms in contrast to the various geographic conditions of the earth.

**Skills to be Learned:**
- Research
- Concluding
- Hypothesizing
- Observation
- Time Ratio

**Suggested Learning Experiences**

**I. Student-Centered in class Activity**

1. Gather all the soil types you can get around the school grounds (black dirt, gravel, sand, red clay, silt, etc.)

2. Then plant various vegetation (beans or corn) in each soil sample and make certain hypotheses of what is going to happen to plant growth.

3. Then observe plant growth according to a certain time ratio and see how close original hypotheses were.

4. Chart, graph or otherwise record data for comparisons.

**II. Out of class Activity**

A. Differentiate between soil formation and its ability to sustain life.

1. Gather all the soil types you can get around the school grounds (black dirt, gravel, sand, red clay, silt, etc.)

B. Hypothesize about vegetation growth in different soil types, and plant samples accordingly.

C. Time ratio and chart, graph or otherwise record data for comparisons.
are not

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really affect the

ons and quality of life.

<table>
<thead>
<tr>
<th>VES</th>
<th>SUGGESTED LEARNING EXPERIENCES</th>
</tr>
</thead>
<tbody>
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</tr>
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<tr>
<td></td>
<td>4. Chart, graph or otherwise record data for comparisons.</td>
</tr>
<tr>
<td>II.</td>
<td>Outside Resource and Community Activities</td>
</tr>
<tr>
<td></td>
<td>A. Take a field trip around surrounding area and compare various vegetation to different soil formations. (See what grows along roadside or bank of river, etc.)</td>
</tr>
<tr>
<td></td>
<td>B. Have a soil conservationist come in and give a talk on soil types and what vegetation and animal life will be found in these certain areas.</td>
</tr>
<tr>
<td>Resource and Reference Materials</td>
<td>Continued and Additional Resources</td>
</tr>
<tr>
<td>----------------------------------</td>
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</tr>
<tr>
<td><strong>Publications:</strong></td>
<td></td>
</tr>
<tr>
<td>The Natural Resources of Wisconsin (or any other state)</td>
<td></td>
</tr>
<tr>
<td>The National Resources Committee of State Agencies</td>
<td>(Madison, Wisconsin 1956)</td>
</tr>
<tr>
<td><strong>Audio-Visual:</strong></td>
<td></td>
</tr>
<tr>
<td>Why plants Grow Where They Do color, 11 minutes, Coronet</td>
<td></td>
</tr>
<tr>
<td>Our Natural Resources, color 11 minutes, BAVI</td>
<td></td>
</tr>
<tr>
<td><strong>Community:</strong></td>
<td></td>
</tr>
<tr>
<td>Get a local Conservationist to talk with students</td>
<td></td>
</tr>
<tr>
<td>Reference Materials</td>
<td>Continued and Additional Suggested Learning Experiences</td>
</tr>
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<tr>
<td>Resources of</td>
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<tr>
<td>any other state)</td>
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<tr>
<td>Resources Committee</td>
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<td>agencies.</td>
<td></td>
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<tr>
<td>Wisconsin 1956)</td>
<td></td>
</tr>
</tbody>
</table>

- Grow Where They Do
- Conservationist students
- Resources, color
- BAVI
Cognitive: The student will compare (using the percent of change type of problem) use of time, land, population density today with use of same during student's grandparents' time.

Affective: The student will see the importance and seek the opportunity of being able to use and influence others in use of time, land, resources.

Skills to be learned:
- Interviewing
- Collecting Information
- Comparing

### BEHAVIORAL OBJECTIVES
- Discipline Area: Mathematics
- Subject: Percent
- Problem Orientation: Changes in Land Use and Centers of Population Density

### SUGGESTED LEARNING EXPERIENCES

<table>
<thead>
<tr>
<th>I. Student-Centered in class activity</th>
<th>II. Outside classroom experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Using data and information collected in outside resource activity at right, student will compare (by percent of change) such changes as:</td>
<td>B. Use information given by DNR representative to find percent of change in amount of land use for public recreation.</td>
</tr>
<tr>
<td>1. Length of working day (hours)</td>
<td></td>
</tr>
<tr>
<td>2. Length of vacations (days or weeks)</td>
<td></td>
</tr>
<tr>
<td>4. Size of community in areas (blocks)</td>
<td></td>
</tr>
<tr>
<td>6. Size of community by population (numbers)</td>
<td></td>
</tr>
</tbody>
</table>
such as facilitating trans-

economic conditions, popula-
and increased leisure
create influence on changes in centers of population density.

OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Using data and information collected in outside resource activity at right, student will compare (by percent of change) such changes as:

1. Length of working day (hours)
2. Length of vacations (days or weeks)
3. Amount of money earned per day (dollars)
4. Size of community in areas (blocks)
5. Size of community by population (numbers)

B. Use information given by DNR representative to find percent of change in amount of land use for public recreation.

II. Outside Resource and Community Activities

A. Each student will interview his parent and grandparent or elderly neighbor to collect data and information to use in showing percent of change in regard to items to be used in class activity at left. Specific interview questions might be:

1. How many hours per day did you work?
2. How many days/weeks vacation did you get?
3. How much were you paid per day?

B. Invite DNR, local tourist trade owner, local soil agent, forester, etc., to talk to class and give information as to amount of public land (continued on reverse)
<table>
<thead>
<tr>
<th>Resource and Reference Materials</th>
<th>Continued and Additional Suggested Learning Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Publications:</strong></td>
<td>II. (continued)</td>
</tr>
<tr>
<td>Berrarde, Melvin A. <em>Our Precarious Habitat</em>, W. W. Norton and Co., Inc., N.Y., 1970</td>
<td>available for recreational use and 1, 2, 5, 10 years ago.</td>
</tr>
<tr>
<td><strong>Audio-Visual:</strong></td>
<td></td>
</tr>
<tr>
<td><em>The Squeeze</em>, Mass Media Ministries, 2116 North Charles Street, Baltimore, Maryland 21218</td>
<td></td>
</tr>
<tr>
<td>#4278 <em>Cities are Different and Alike</em>, color, 11 minutes, $4.75, BAVI</td>
<td></td>
</tr>
<tr>
<td>#0884 <em>Cities  How They Grow</em>, 2nd Edition, 11 minutes, $2.00, BAVI</td>
<td></td>
</tr>
<tr>
<td><strong>Community:</strong></td>
<td></td>
</tr>
<tr>
<td>DNR Representative</td>
<td></td>
</tr>
<tr>
<td>Tourist - Resort owner or business man</td>
<td></td>
</tr>
<tr>
<td>Soil Agent (County)</td>
<td></td>
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<tr>
<td>Forest Ranger</td>
<td></td>
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<tr>
<td>Curator of city or county park</td>
<td></td>
</tr>
<tr>
<td>Reference Materials</td>
<td>Continued and Additional Suggested Learning Experiences</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>A. &quot;Our varied, W. W. Norton</td>
<td>II. (continued)</td>
</tr>
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<td>Media Ministries, BAVI</td>
<td>and 1,2,5,10 years ago.</td>
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<tr>
<td>Live owner or bus-</td>
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<tr>
<td>or county park</td>
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<tr>
<td>Discipline Area</td>
<td>Mathematics</td>
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<td>-----------------</td>
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</tr>
<tr>
<td>Subject</td>
<td>Percent</td>
</tr>
</tbody>
</table>

**Problem Orientation:** Influence for change in land use and centers of population density.

**BEHAVIORAL OBJECTIVES**

**Cognitive:** The student will use simple percentage to find and express change in land use and changes in centers of population density.

**Affective:** The student will become aware of changes in land use and population density in his own area or community. He will recognize the need for proper planning and laws regulating change.

**Skills to be Learned:**
- Observation
- Investigation
- Research
- Comparing
- Reporting
- Reflection
- Making judgements
- Establishing Conclusions

**SUGGESTED LEARNING EXPERIENCE**

**I. Student-Centered in class Activity**

A. Using local voter registration figures, student will show % of increase or decrease in voter population.

B. Using school enrollment figures compute and show % of increase or decrease in school population from one year or period to another.

C. Using USDA figures in land use change (acres or square miles) use percent in expressing land use change (i.e., "urban sprawl" vs - corn fields.)

D. Use data given in class by guest speakers to find percent of change.

**II. Outside Community Activity**

A. Investigating figures on change over a period by student and show changes in their community.

B. Investigating or comparing changes in other community and show the changes in their community.

C. Investigating in Improvements made in land use, showing change in percent of change.

D. Investigating to find percent of change.

E. Investigating in community.
**SUGGESTED LEARNING EXPERIENCES**

<table>
<thead>
<tr>
<th>I. Student-Centered in class Activity</th>
<th>II. Out of Resource and Community Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Using local voter registration figures, student will show % of increase or decrease in voter population.</td>
<td>A. Invite Principle or Superintendent of schools to give a talk to class on school enrollment changes and problems that have resulted.</td>
</tr>
<tr>
<td>B. Using school enrollment figures compute and show % of increase or decrease in school population from one year or period to another.</td>
<td>B. Invite Chief of Police or Sheriff to talk to class on changes in methods or problems involving law enforcement resulting from population change.</td>
</tr>
<tr>
<td>C. Using USDA figures in land use change (acres or square miles) use percent in expressing land use change (i.e., &quot;urban sprawl&quot; - vs - corn fields.)</td>
<td>C. Invite County Agent to talk to class on change in local county land use and problems resulting from these changes.</td>
</tr>
<tr>
<td>D. Use data given in class by guest speakers to find percent of change.</td>
<td>D. Invite Farmer to speak to class.</td>
</tr>
<tr>
<td>E. Invite and Industrialist to speak to class.</td>
<td></td>
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</tbody>
</table>
### Resource and Reference Materials

<table>
<thead>
<tr>
<th>Publications</th>
<th>Continued and Additional Learning Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Different Kind of Country</td>
<td></td>
</tr>
<tr>
<td>2nd Ed., Wiley, 1968</td>
<td></td>
</tr>
<tr>
<td>Statistical Abstracts from school libraries.</td>
<td></td>
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<tr>
<td>U.S. Government Printing Office reprints</td>
<td></td>
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<tr>
<td><strong>Audio-Visual:</strong></td>
<td></td>
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<tr>
<td>People, Our Most Valuable Resource</td>
<td></td>
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<tr>
<td>McGraw-Hill Co.</td>
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<tr>
<td>The City and the Future, Sterling Educational Films</td>
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<tr>
<td>All Kinds of People, 13 minutes, $5, color #3999 BAVI</td>
<td></td>
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<tr>
<td><strong>Community:</strong></td>
<td></td>
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<tr>
<td>Farmer</td>
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<tr>
<td>Industrialist</td>
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<tr>
<td>Police Department</td>
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<tr>
<td>Principal or Superintendent of Schools</td>
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<thead>
<tr>
<th>Experience Materials</th>
<th>Continued and Additional Learning Experiences</th>
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<tr>
<td>Of Country</td>
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<td>1968</td>
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<tr>
<td>Acts from</td>
<td></td>
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<td></td>
<td>Videos, 13 minutes, MVI</td>
</tr>
<tr>
<td>Instructor</td>
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</tbody>
</table>
### BEHAVIORAL OBJECTIVES

**Cognitive:** The student will estimate long-range effect of litter on current data, portraying it in graph form.

**Affective:** The student will suggest ways of improving the litter problem in his community.

**Skills to be learned:**
- Graphing
- Estimation (over a long range period based on knowledge of present information)

### SUGGESTED LEARNING EXPERIENCES

**I. Student-Centered in class activity**
- **A. Litter in the Classroom**
  1. Dispense with janitorial services in the classroom for a period of time (at least 1 week). Note the day to day accumulation of scrap paper, pencil shavings, paper towels, etc.
  2. List and graph different types of refuse accumulated from day to day.
  3. Estimate yearly accumulation.

**B. Discussion:**
1. Do students feel that the money spent to (continued on reverse side)
<table>
<thead>
<tr>
<th>OBJECTIVES</th>
<th>SUGGESTED LEARNING EXPERIENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Student-Centered in class activity</td>
<td>II. Outside Resource and Community Activities</td>
</tr>
<tr>
<td>A. Litter in the Classroom</td>
<td>A. Investigation of littering in the community.</td>
</tr>
<tr>
<td>1. Dispense with janitorial services in the classroom for a period of time (at least 1 week). Note the day to day accumulation of scrap paper, pencil shavings, paper towels, etc.</td>
<td>1. Have children stand for about 30 minutes of a busy hour near a store, restaurant, or garage and tally the litter dropped or thrown by passers-by. List according to types of litter and make a graph depicting the results.</td>
</tr>
<tr>
<td>2. List and graph different types of refuse accumulated from day to day.</td>
<td>2. In class activity to follow exercise No. 1: Our community has a ($50) fine for littering. How much money would have been collected &quot;yesterday&quot; in just our neighborhood if that law were (continued on reverse side)</td>
</tr>
<tr>
<td>3. Estimate yearly accumulation.</td>
<td>(continued on reverse side)</td>
</tr>
<tr>
<td>B. Discussion:</td>
<td></td>
</tr>
</tbody>
</table>
Resource and Reference Materials

Publications:

Pringle, Laurence, The Only Earth We Have, Mac Millan Company, 866 Third Avenue, New York City, N.Y. 10022, $4.50

Man's Control of the Environment, Congressional Quarterly 1970

Audio-Visual:

House of Man - Our Changing Environment, 17 minute, color, Encyclopedia Britannica Educational Corp., 425 N. Michigan Ave., Chicago, Ill., 60611

Our Vanishing Land, McGraw - Hill Contemporary Films, 330 W. 42nd Street, New York, N.Y. 10018

Community:

Community or County Department which collects litter or refuse.

I. (continued)

1. salary the custodial crews or custodial to clean up "behind"

II. (continued)

2. enforced. Have state individual totals final class totals appreciation of littering. Have of taxpayers for to businessmen, etc.
Continued and Additional Suggested Learning Experiences

I. (continued)

1. salary the custodian is well spent?

2. What would happen if there were no highway crews or custodians, or sanitation workers to clean up "behind us"?

II. (continued)

2. enforced. Have students figure their individual totals; help them compile a final class total. Lead children to an appreciation of the economic effects of littering. Have them consider the cost of taxpayers for streetcleaning, the cost to businessmen, etc.
A Man has the ability to manage, manipulate, and change his environment.

Subject: Cognitive

Cognitive Objective: The student will identify the effects of varying concentrations of salt on vegetation.

Skills to be learned:

1. Observing
2. Recording
3. Measuring (in inches and liquid)

Cognitive: The student will identify and list the effects of varying concentrations of salt on native vegetation.

Subject: Affective

Affective Objective: The student will relate, appreciate, and recognize the inherent danger of the practice.

Skills to be learned:

1. Student-Centered Class Activity:
   a. Salt effect on vegetation
   b. Salt effect on native vegetation

SUGGESTED ACTIVITIES:

1. Student-Centered Activity:
   a. Salt effect on vegetation
   b. Salt effect on native vegetation

2. Maintaining equal amounts of water and heat in the terrariums:
   a. Maintain equal area and water for about 30 minutes.

(continued on reverse)
<table>
<thead>
<tr>
<th>OBJECTIVES</th>
<th>SUGGESTED LEARNING EXPERIENCES</th>
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</thead>
<tbody>
<tr>
<td>I. Student-Centered in class activity</td>
<td>II. Outside Resource and Community Activities</td>
</tr>
<tr>
<td>A. Salt effects on vegetation.</td>
<td>A. Take a field trip and observe the amount and type of vegetation along a road that is salted throughout the winter and one that received no salt treatment.</td>
</tr>
<tr>
<td>1. The students will construct 4 terrariums (window boxes) and fill them with native vegetation.</td>
<td>B. Find out how much salt the county uses on roads during the month of February. Calculate the cost.</td>
</tr>
<tr>
<td>2. Maintain the terrariums with equal amounts of water and sunlight for about ten days.</td>
<td>C. Research the effect of excess amounts of salt on small game.</td>
</tr>
</tbody>
</table>

(Continued on reverse side)
Resource and Reference Materials
Continued and Additional Suggested Literature

Publications:
Anderson, Edgar, Plants, Man and Life, University of California Berkeley, 1967

Dasmann, Raymond F., A Different Kind of Country, Mac Millan, 1968

Audio-Visual:
Ecology and Man Series - Set #3 FS ST11 I-C-E RMC

Community:
County Department of Highways

I. (continued)

3. Introduce a strong solution into box #1, a weaker solution into boxes #3 and #4.

4. Maintain a salting procedure for ten days and carefully observe progress.

5. Salt solution must be carefully prepared and carefully measured.

6. Conduct an experiment showing the effects of salt on ice. Such an experiment could be used in science or social studies classes.
Continued and Additional Suggested Learning Experiences

I. (continued)

3. Introduce a strong solution of salt water into box #1, a weaker solution into box #2, and no salt into boxes #3 and #4.

4. Maintain a salting procedure for an additional ten days and carefully observe and record the progress of all four boxes.

5. Salt solution must be carefully measured to insure constant dosage.

6. Conduct an experiment showing the physiological effects of salt on ice. Suggest integration with science or social studies classes.
10. Short-term economic gains may produce long-term environmental losses.

**BEHAVIORAL OBJECTIVES**

**Cognitive:** The student will determine by decimal fractions the dollar value of environmental clean-up.

**Affective:** The student will question and evaluate short-term gains to environmental losses.

**Skills to be Learned:**
- Gathering Data
- Reporting
- Comparing

**SUGGESTED LEARNING EXPERIENCES**

I. Student-Centered in class activity

A. Related class and community activities.

1. In a class discussion, set dollar values on the cost of discarding of cars, bottles, can, garbage, etc. (Estimate using decimal fractions)

2. Are there economic gains which bring about environmental losses with respect to trash on the city and country lands?

3. Is it worth the cost of removing cans and cars at public expense to have desirable environmental conditions?

4. Reports of computations made in the various activities
<table>
<thead>
<tr>
<th>OBJECTIVES</th>
<th>SUGGESTED LEARNING EXPERIENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student will evaluate the value of environmental gains.</td>
<td>I. Student-Centered in class activity</td>
</tr>
<tr>
<td>The student will evaluate short-term economic gains.</td>
<td>A. Related class and community activities.</td>
</tr>
<tr>
<td>The student will evaluate long-term environmental gains.</td>
<td>1. In a class discussion, set dollar values on the cost of discarding of cars, bottles, can, garbage, etc. (Estimate using decimal fractions).</td>
</tr>
<tr>
<td>The student will evaluate the cost of environmental losses.</td>
<td>2. Are there economic gains which bring about environmental losses with respect to trash on the city and country lands?</td>
</tr>
<tr>
<td>The student will evaluate the cost of removing cans and cars.</td>
<td>3. Is it worth the cost of removing cans and cars at public expense to have desirable environmental conditions?</td>
</tr>
<tr>
<td>The student will evaluate the cost of the environment cleaned up.</td>
<td>4. Reports of computations made in the various activities</td>
</tr>
</tbody>
</table>

II. Outside Resource and Community Activities

A. Class visit to the County Highway Department to check on the cost of picking up cans and bottles in the ditches.

B. Class visit to sanitary department or sanitary land fill site and talk with officials to get cost of disposing of cans or bottles.

C. Class visit to County Police Department to find the cost of towing away abandoned cars to junkyards and finding the net loss in terms of dollars in getting the environment cleaned up.

D. After field trips compare the actual costs to the class estimations.
<table>
<thead>
<tr>
<th>Resource and Reference Materials</th>
<th>Continued and Additional Suggested</th>
</tr>
</thead>
</table>

**Publications:**

- *Stewardship: The Land - The Land Owner: The Metropolis, New York Open Space Institute, Inc., 1968*
- *Inherit the Earth: Man On An Aging Planet, Dodd, 1966*

**Audio-Visual:**

- #6366 - What's Happening to Our Landscape ?, 20 minutes, color, $2, BAVI
- #6878 - Land Betrayed, 10 minutes, color, $3.75, BAVI

**Community:**

- County Highway Department
- Sanitation Department
- County Police Department
<table>
<thead>
<tr>
<th>Science Materials</th>
<th>Continued and Additional Suggested Learning Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Land</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- New York, Inc., 1968</td>
</tr>
<tr>
<td>Man On An Aging</td>
<td></td>
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<tr>
<td></td>
<td>- Showing to Our Students, color</td>
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<tr>
<td></td>
<td>- 10 minutes,</td>
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</tbody>
</table>
BEHAVIORAL OBJECTIVES

Cognitive: The student will explain data presented in graphs and construct graphs to summarize data.

Affective: The student will pick up litter on the school facilities and place it in a proper container.

Skills to be Learned:
- Estimating
- Graphing
- Problem Solving
- Drawing Conclusions

I. Student-Centered in class activity

After outside activity:

A. Write the estimates on the chalkboard and have children make bar or line graphs or pictographs to show the incidence of certain types of litter on the playground.

1. How much of it was biodegradable?
2. Can they imagine the amounts of litter on all of the playgrounds in the community? in the state? in the country? in the world?
3. Can some of the types of litter be called pollutants? What kinds?

B. Have children collect the litter in their yards or on their block, estimate the incidence of certain (continued on reverse side)
The student will present the data by constructing graphs.

Learned:
- Estimations
- Graphs

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in-class activity

After outside activity:
A. Write the estimates on the chalkboard and have children make bar or line graphs or pictographs to show the incidence of certain types of litter on the playground.
1. How much of it was biodegradable?
2. Can they imagine the amounts of litter on all of the playgrounds in the community? in the state? in the country? in the world?
3. Can some of the types of litter be called pollutants? What kinds?
B. Have children collect the litter in their yards or on their block, estimate the incidence of certain (continued on reverse side)

II. Outside Resource and Community Activities

A. Take a "litter walk" around the school playground. Give each group a large bag and designate areas to be covered.
Give one child a separate bag and a large magnet to "sweep" the area and probe into sidewalk or asphalt cracks for metals.
B. Still outdoors have the children empty the bags and sort the contents. Estimate the number of pieces of paper, bottles, string, etc., and record the estimates.
C. Re-collect the litter and dispose of it.
<table>
<thead>
<tr>
<th>Resource and Reference Materials</th>
<th>Continued and Additional Suggested Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Publications:</strong></td>
<td>I. (continued)</td>
</tr>
<tr>
<td>Benarde, Melvin A., <em>Our Precious</em></td>
<td>types and prepare graphs to compare with done for the school grounds.</td>
</tr>
<tr>
<td>Habitat, W. W. Norton and Co.,</td>
<td></td>
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<tr>
<td>55 Fifth Ave., N.Y., N.Y. 10003</td>
<td></td>
</tr>
<tr>
<td>$2.95 paperback</td>
<td></td>
</tr>
<tr>
<td>$6.95 hardcover</td>
<td></td>
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<tr>
<td><strong>Audio-Visual:</strong></td>
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<tr>
<td>Film Strip: Beer Can By The Highway</td>
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<tr>
<td>(sound tape) Warren Schloat Prod-</td>
<td></td>
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<tr>
<td>uctions, Inc., West Nyack, N.Y. 10994</td>
<td></td>
</tr>
<tr>
<td><strong>Community:</strong></td>
<td></td>
</tr>
<tr>
<td>City or County Street and Highway</td>
<td></td>
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<tr>
<td>Department</td>
<td></td>
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</tbody>
</table>
I. (continued)

...types and prepare graphs to compare with those done for the school grounds.
**Concept:** Private ownership must be regarded as a stewardship and should not encroach upon or violate the individual right of others.

**Behavioral Objectives**

<table>
<thead>
<tr>
<th>Cognitive: The student will predict the consequences of uncontrolled development of &quot;open spaces&quot; and snowmobile trails.</th>
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</thead>
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<td>Affective: The student will suggest ways of controlling the development of land used for snowmobiling.</td>
</tr>
</tbody>
</table>

**Skills to be Learned:**

- Large Number Multiplication
- Interviewing
- Drawing Conclusions

**Suggested Learning Experience**

**I. Student-Centered in class activity**

A. See attached sheet and formulate problems for class to work. Examples:

1. What is the minimum number of snowmobiles registered June-1971?

2. What is the maximum number of snowmobiles registered June-1971?

B. The average amount spent for snowmobiles in 1970 was $1,000.

1. What was the total amount of money spent for the minimal number of snowmobiles registered?

2. What was the total amount spent on the maximum number of snowmobiles registered? (continued on reverse side)
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1. What was the total amount of money spent for the minimal number of snowmobiles registered?

2. What was the total amount spent on the maximum number of snowmobiles registered?

II. Outside Resource and Community Activities

A. Have the students write to International Snowmobile Industry Association News Release, 5100 Edina Industrial Blvd., Minneapolis, Minn. 55435, c/o Public Relations Department for the number of snowmobiles registered in the U.S. and the total amount of land available for trails and open spaces.

B. Calculate the number of snowmobiles in their community.

C. Have students go out in pairs and make a neighborhood survey. Example questions:

1. What is good about snowmobiling?

2. Do you think snowmobiles are or could be a
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**Publications:**

A Program for Snowmobiling in Wisconsin, DNR, Bureau of Commercial Recreation, Box 405, Madison, Wisconsin 53701


**Audio-Visual:**

**Community:**

DNR Representative
Local Farmers
Snowmobile Club
County Land Office (Registrar of Deeds)

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**I. (Continued)**

C. By 1980, $156,377,370 will be needed to develop land for snowmobiles in Wisconsin. We estimate that 421,000 acres for open space and 700 miles of trails available for snowmobiling will be needed by 1980. 10,000 acres of open space must be added costing $38,000,000.

1. What is the average amount per trails?
2. What is the average amount per open space?

**II. (continued)**

- What is the problem?
  1. If they are not now, how about kind?
  4. What kind of restrictions should snowmobiles? If any, why?

**E.** Correlate with Social Studies to advantages of recreation.
C. By 1980, $156,377,370 will be needed to buy and develop land for snowmobiles in Wisconsin. This would make 421,000 acres for open spaces plus many miles of trails available for snowmobiling. In order to meet the required needs by 1980, 10,000 more miles of trails must be added costing $38,000,000 and 127,000 acres of open space must be added costing $120,000,000.

1. What is the average amount per mile for additional trails?
2. What is the average amount per acre for additional open space?

II. (continued)

3. If they are not now, how about the future? What kind?
4. What kind of restrictions should be placed on snowmobiles? If any, why?

D. Report Findings in class.

E. Correlate with Social Studies to discuss the advantages of recreation.
PROJECT I-C-E Episode Evaluation Form (Reproduce or duplicate)

Please fill in:
Subject: 
Grade: 
Concept No. Used: 

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<th>Poor</th>
<th>Good</th>
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I. Behavioral Objectives
A. Cognitive:

E. Affective:

II. Skills Developed

III. Suggested Learning Experiences
A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials
(specific suggestions & comments)

In commenting on each episode used in your form, feel free to adapt it and add more of your critiques and comments - negative and positive. In the appropriate hand-column, please rate (poor, good, excellent) each episode. Make specific comments or suggestions if you feel they would be helpful to us in making this form more usable.

Se
I-C-E Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, please use this form. Feel free to adapt it and add more pages. Let us know all your critiques and comments - negative and positive. In the left-hand column, please rate (poor, good, excellent) each item. Also, make specific comments or suggestions if possible in the space provided to help us make this a more usable guide. Thank you.

1. Behavioral Objectives
   A. Cognitive:

   B. Affective:

   C. Skills Developed

2. Suggested Learning Experiences
   A. In Class:

   B. Outside & Community Activities:

   (specific suggestions & comments)
Cognitive: The student will identify and list the effects of varying concentrations of salt on native vegetation.

Affective: The student will realize and appreciate the ability that man has to change and manipulate his environment and recognize the inherent danger of that practice.

Skills to be learned:
- Observing
- Recording
- Measuring (dimension and liquid)

SUGGESTED LEARNING EXPERIENCE

I. Student-Centered in class activity

II. Conceptual learning experience

A. Salt effects on vegetation.

1. The students will construct 4 terrariums (window boxes) and fill them with native vegetation.
2. Maintain the terrariums with equal amounts of water and sunlight for about ten days
   a. It will be necessary to measure equal amounts of water, soil, exposure to the sun, and estimate the type of vegetation in each box.

(continued on reverse side)
Grade 6
Measurement

II. Outside Resource and Community Activities

A. Take a field trip and observe the amount and type of vegetation along a road that is salted throughout the winter and one that received no salt treatment.

B. Find out how much salt the county uses on roads during the month of February. Calculate the cost.

C. Research the effect of excess amounts of salt on small game.
Resource and Reference Materials

Continued and Additional Suggested Learn...

Publications:
Anderson, Edgar, Plants, Man and Life, University of California Berkeley, 1967

Dasmann, Raymond F., A Different Kind of Country, Mac Millan, 1968

Audio-Visual:
Ecology and Man Series - Set #3
FS ST11 I-C-E RMC

Community:
County Department of Highways

I. (continued)

3. Introduce a strong solution of box #1, a weaker solution into boxes #3 and #4.

4. Maintain a salting procedure for ten days and carefully observe progress of all four boxes.

5. Salt solution must be carefully insured constant dosage.

6. Conduct an experiment showing effects of salt on ice. Suggest science or social studies class.
Reference Materials

Continued and Additional Suggested Learning Experiences

**I. (continued)**

3. Introduce a strong solution of salt water into box #1, a weaker solution into box #2, and no salt into boxes #3 and #4.

4. Maintain a salting procedure for an additional ten days and carefully observe and record the progress of all four boxes.

5. Salt solution must be carefully measured to insure constant dosage.

6. Conduct an experiment showing the physiological effects of salt on ice. Suggest integration with science or social studies classes.
10. **Short-term economic gains may produce long-term environmental losses.**

**Behavioral Objectives**

**Cognitive:** The student will determine by decimal fractions the dollar value of environmental clean-up.

**Affective:** The student will question and evaluate short-term gains to environmental losses.

**Skills to be Learned:**
- Gathering Data
- Reporting
- Comparing

**Suggested Learning Experience**

I. Student-Centered in class activity

II. Concept

A. Related class and community activities.

1. In a class discussion, set dollar values on the cost of discarding of cars, bottles, cans, garbage, etc. (Estimate using decimal fractions)

B. Are there economic gains which bring about environmental losses with respect to trash on the city and country lands?

C. 3. Is it worth the cost of removing cans and cars at public expense to have desirable environmental conditions?

D. Reports of computations made in the various activities
Discipline Area: Mathematics
Subject: Decimal Fractions
Problem Orientation: Short-Long term

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Related class and community activities.
   1. In a class discussion, set dollar values on the cost of discarding of cars, bottles, can, garbage, etc. (Estimate using decimal fractions).
   2. Are there economic gains which bring about environmental losses with respect to trash on the city and country lands?
   3. Is it worth the cost of removing cans and cars at public expense to have desirable environmental conditions?
   4. Reports of computations made in the various activities

II. Outside Resource and Community Activities

A. Class visit to the County Highway Department to check on the cost of picking up cans and bottles in the ditches.
B. Class visit to sanitary department or sanitary land fill site and talk with officials to get cost of disposing of cans or bottles.
C. Class visit to County Police Department to find the cost of towing away abandoned cars to junk yards and finding the net loss in terms of dollars in getting the environment cleaned up.
D. After field trips compare the actual costs to the class estimations.
Resource and Reference Materials

Continued and Additional Suggested

Publications:

Stewardship - The Land - The Land Owner - The Metropolis, New York Open Space Institute, Inc., 1968

Inherit the Earth: Man On An Aging Planet, Dodd, 1966

Audio-Visual:

#6366 - What's Happening to Our Landscape ?, 20 minutes, color $2, BAVI

#6878 - Land Betrayed, 10 minutes, color, $3.75, BAVI

Community:

County Highway Department
Sanitation Department
County Police Department
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<td>Times, New York</td>
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<td>Man On An Aging</td>
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- Screening to Our
  - 10 minutes, color
- Tested, 10 minutes,

- Department
  - Department
BEHAVIORAL OBJECTIVES

Cognitive: The student will explain data presented in graphs and construct graphs to summarize data.

Affective: The student will pick up litter on the school facilities and place it in a proper container.

Skills to be Learned:
- Estimating
- Graphing
- Problem Solving
- Drawing Conclusions

II. Individual acts, duplicated or compounded, produce significant environmental alterations over time.

I. Student-Centered in class activity

After outside activity:
A. Write the estimates on the chalkboard and have children make bar or line graphs or pictographs to show the incidence of certain types of litter on the playground.

1. How much of it was biodegradable?
2. Can they imagine the amounts of litter on all of the playgrounds in the community? in the state? in the country? in the world?
3. Can some of the types of litter be called pollutants? What kinds?

B. Have children collect the litter in their yards or on their block, estimate the incidence of certain litters.
SUGGESTED LEARNING EXPERIENCES

I. Student-Centered activity

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A. Write the estimates on the chalkboard and have children make bar or line graphs or pictographs to show the incidence of certain types of litter on the playground.

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B. Have children collect the litter in their yards or on their block, estimate the incidence of certain (continued on reverse side)

II. Outside Resource and Community Activities

A. Take a "litter walk" around the school playground. Give each group a large bag and designate areas to be covered. Give one child a separate bag and a large magnet to "sweep" the area and probe into sidewalk or asphalt cracks for metals.

B. Still outdoors have the children empty the bags and sort the contents. Estimate the number of pieces of paper, bottles, string, etc., and record the estimates.

C. Re-collect the litter and dispose of it.
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<td>Benarde, Melvin A., <em>Our Precious</em></td>
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<tr>
<td>Habitat, W. W. Norton and Co.,</td>
<td>types and prepare graphs to</td>
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<td>55 Fifth Ave., N.Y., N.Y. 10003</td>
<td>done for the school grounds.</td>
</tr>
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<td>$2.95 paperback</td>
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<td>$6.95 hardcover</td>
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**Audio-Visual:**

Film Strip: *Beer Can By The Highway* (sound tape) Warren Schloat Productions, Inc., West Nyaak, N.Y. 10994

**Community:**

City or County Street and Highway Department
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Private ownership must be regarded as a stewardship and should not encroach upon or violate the individual right of others.

**BEHAVIORAL OBJECTIVES**

**Cognitive:** The student will predict the consequences of uncontrolled development of "open spaces" and snowmobile trails.

**Affective:** The student will suggest ways of controlling the development of land used for snowmobiling.

**Skills to be Learned:**

- Large Number Multiplication
- Interviewing
- Drawing Conclusions

**SUGGESTED LEARNING EXPERIENCES**

**I. Student-Centered in class activity**

A. See attached sheet and formulate problems for class to work. Examples:

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II. (continued)

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| Please fill in: | In commenting on each episode, feel free to adapt it to your critiques and comments. In this hand column, please rate (po, good, exc) and make specific comments or suggestions to help us make this a

| Subject: | 
| Grade: | 
| Concept No. Used: |

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   A. Cognitive:

   |

   |

 II. Skills Developed

   |

 III. Suggested Learning Experiences
   A. In Class:

   |

     |

 B. Outside & Community Activities.

   |

 IV. Suggested Resource & Reference Materials
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Objectives:

- [ ]

Developed:

- [ ]

Learning Experiences:

- [ ]

Ide & Community Activities:

- [ ]

Resource & Reference Materials (suggest suggestions & comments)

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Project I-C-E

Serving Schools in CESA 3-5-9

1927 Main Street

Green Bay, WI 54301