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Outside four walls: Implementing environmental education out-of-doors on school campuses

Diane Marie Bruns

OUTSIDE FOUR WALLS:

IMPLEMENTING ENVIRONMENTAL EDUCATION

OUT-OF-DOORS ON SCHOOL CAMPUSES

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

in

Education: Environmental Option

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ABSTRACT

This project discusses the history, necessity, and efficacy of environmental education. It presents outdoor classrooms as an integrating teaching tool, offers a collection of multi-disciplinary environmental activities, and includes a resource list for teachers.

Lessons focus on using the out-of-doors as a strategic part of the educational experience, while addressing crucial content-area skills and service learning. Curriculum areas included are science; social studies; language arts, including reading, writing, oral language, and poetry; mathematics; geography; fine arts; and physical education.

ACKNOWLEDGEMENTS

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Finally, I would like to thank the National Geographic Society. The Society's photo essays, articles and programs have opened my eyes and touched my soul with an incredible view of Earth. My desire to educate others about the extraordinary wonders and challenges facing our fragile planet have been cultivated by the efforts of this organization.

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INTRODUCTION

Since the dawn of humanity, our lives have been intricately connected to the world around us. The cyclical changing of seasons, the phases of the moon, even "El Nino" weather events, have profound effects on what people do and how we act. Indeed, humanity is a part of nature.

According to E. O. Wilson, author of The Diversity of Life, the more closely we identify with the rest of life, the more quickly we will be able to discover the sources of human sensibility. Unfortunately, our species has begun to lose touch with the environment in which we live. "Only in recent decades has the delusion arisen that people can flourish apart from the living world" (Wilson, 1992, p. 348-349). We must regain this connection if we are to successfully negotiate the future demands of our rapidly changing planet. Environmental education is one strategy for bridging this gap and preparing our students for the challenges they will surely meet.

American schools are now the subject of intense criticism. We are experiencing a new climate of openness to revolutionary ideas. People are looking for solutions to complex problems: illiteracy, low test scores, high dropout rates, racial and economic issues, educating language minority students, school choice, and more. Clearly, the educational system is in a period of crisis. It is prudent to take advantage of this. The use of environmental education may lead to innovative reform, creating new paradigms for educational pedagogy. Outdoor classrooms, while not a new idea, is one that is being utilized in new ways.

To some environmental education is simply learning out-of-doors those facts, themes, and concepts that can best be learned outside the traditional classroom (Marsh, 1968). Outdoor classrooms introduce students to a novel study environment and living laboratory. It engages students in the learning process so that they are active participants who can apply their knowledge to other areas of learning.

Children are seekers of meaning, and are naturally curious about the world. They learn best in the context of meaningful learning experiences which embrace their natural sense of wonder. "Youngsters have the true explorer's interest in faraway places, as well as in their immediate surroundings, and are eager to know about the things they encounter" (Shuttlesworth, 1977, p. 6). Outdoor classrooms provide these experiences, help develop cognitive and critical thinking skills, and improve student motivation and achievement. This can have a profound effect on students' attitudes towards education, citizenship, and environmental responsibility. In addition to building interpersonal skills, students begin to take pride in their campus.

Environmental education helps students realize that the future well being of the planet depends on an understanding that all systems, including human systems, are connected. As Chief Seattle stated in an admonition to all at a tribal assembly in 1854:

> This we know. The Earth does not belong to man: man belongs to the Earth...All things are connected like the blood which unites one family.
>
> (Caduto & Bruchac, 1988, pp. 4-5)

Thus, I believe that the only way to enable students to feel that they are a part of this global family is to have them participate in quality outdoor experiences.

Environmental education can be implemented across all geographic and socioeconomic settings. It is driven by the philosophy that all teaching should be student-centered and based on the constructivist approach, guided by teachers using proven educational practices.

The current skills-based instruction concentrates on reading and mathematics, to the exclusion of how these subjects can inform and stimulate children's everyday understanding of the world. This frequently leads to a dull and repetitious curriculum. I believe that outdoor classrooms are an effective vehicle for providing a meaningful, motivating educational experience for students of all ages.

REVIEW OF THE LITERATURE

Recent advances in technology has resulted in vast gains in our knowledge base, growing at an unprecedented exponential rate. To combat this, the educational pedagogy has turned to less varied but more in-depth instruction. The focus is shifting from trying to teach a little of everything to facilitating an atmosphere wherein the students learn how to access information using print media and technological resources. However, we must not mistake this for knowledge and wisdom, for as we are increasing in some types of knowledge, other knowledge is being lost (Orr, 1994, p. 9).

The Rationale for Environmental Education

Orr wrote that teachers and administrators struggle with a fragmented, isolated curriculum which divides instruction into disciplines. This approach tends to induce passivity, and leaves most students without any broad, integrated sense of unity. Traditional instruction also reduces opportunities for personal interaction between student and teacher, and limits cooperative learning, personalized instruction, and social support. It typically focuses on unconnected teacher recitation, objective drill, and learning of facts.

> Students graduate without knowing how to think in whole systems, how to find connections, how to ask big questions, and how to separate the trivial from the important. Now more than ever, however, we need people who think broadly and who understand systems, connections, patterns, and root causes. (Orr, 1994, p. 23)

California's Department of Education (CDE) is now emphasizing the need for increased focus on a thinking, meaning-centered curriculum. Quantitatively, the CDE has called for a shift from a skills-based pedagogy in which the teacher serves as a dispenser of knowledge to a hands-on, student-centered, experiential one. Qualitatively, the CDE has called for a greater depth of understanding in a wider range of knowledge areas than ever before attempted (It's Elementary, 1992a, pp. 2-3). Specifically, the Department of Education recommends that the instructional programs require students to do more work in school that relates to the world beyond school (Second to None, 1992b, p. 7).

Environmental education typically provides hands-on, experiential learning which requires students to interpret their experiences and understanding, putting it into a context which includes emotional, spiritual, social, and intellectual elements. The CDE's restructuring document, Second to None, recommended the following:

> Students' work should focus on projects which students construct, using experiences that relate to the world outside school and primary source materials they select because of the appropriateness and personal connection to their lives. Learning activities include complex concepts that require students to apply skills across subject-matter boundaries and to confront personal and group values to their learning (1992b, pp. 23-24).

The National Science Education Standards developed by the National Research Council, an agency of the National Academy of Sciences, recommended application of scientific process which is based on constructivist methodology (in Fisher, 1998, p. 97). Environmental education lends itself to constructivist teaching, which helps develop learners' attitudes, interests, and perspectives based on previous experience. This

conflicts with objectivism, which is based on a theory that students learn because teachers teach.

Proponents of constructivism believe that learning occurs through the students' continual creation of rules and hypothesis to explain what is observed. The need to create new rules is a result of old paradigms colliding with new information, generating cognitive disequilibrium. The revision that occurs results in a newly constructed reality for students. In the process, learners actively seek meaningful connections between themselves, other group members, and the content of the course (Brooks, 1990, p. 68).

Defining Environmental Education

A continuing dilemma for those concerned with environmental education lies in the matter of definition. John Disinger quoted a 1971 report of The Educational Products Information Exchange that "the term environmental education is in itself most loosely defined...the following terms were used synonymously: Environmental Education, Environmental-Ecological Education, Ecological Education, Conservation Education, Camping Education, Outdoor Education, and Environmental Science Education" (in Disinger, 1983, p. 12).

Early efforts in the field concentrated on nature study, conservation and ecology. Educational pioneers Jean Jacques Rousseau and Johann Pestalozzi believed that nature was the source of knowledge. To "know" meant to understand nature, its patterns, and its laws. John Locke stressed empirical learning through which people learn about their

environment by carefully observing natural phenomena (Ornstein & Levine, 1997, p. 111). Environmental education has also been closely identified with John Dewey, incorporating his "learning by doing" philosophy (Disinger, 1983, p. 12).

As early as 1891, Wilbur Jackman's Nature Study for the Common Schools launched a movement which took students outdoors. The Dust Bowl tragedy of the 1930s gave rise to conservation education, whose main objective was to reawaken American interest in environmental problems and the importance of conserving various natural resources (in Disinger, 1983, p. 12). These conservation programs focused primarily on agricultural management practices and were largely governed by economic self-interest.

During the past 70 years the United States has moved from a rural society to a predominantly urban one, both in thought and in character (Stapp, 1969, p. 30). In 1949 Aldo Leopold described the responsibility we all have towards maintaining a healthy environment in a collection of essays called The Sand County Almanac (1966). Called the father of the "land ethic," Leopold's feelings were that the existence of an ecological conscience reflected a conviction that each individual is responsible for the health of the land. This assured the land's capacity for renewal.

According to Leopold, conservation is the action we take to understand and preserve this capacity. Leopold believed that people could only be ethical in relation to that which we can see, feel, understand, love, or otherwise have faith in. He believed that our education system was headed away from, rather than towards, an intense consciousness of land.

Before his death, Leopold stated:

> Conservation is a state of harmony between men and land. Despite nearly a century of propaganda, conservation still proceeds at a snail's pace... The usual answer to this dilemma is more 'conservation education.' No one will debate this, but is it certain that only the volume of education needs stepping up? Is something lacking in the content as well? (1966, p. 243)

In the 1960s, a flurry of academic definitions for environmental education began to develop. In 1969, William Stapp (p. 20) defined it this way, "Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution." The Environmental Education Act of 1970 defined it as "The educational process dealing with man's relationship with his natural and manmade surroundings, and includes the relation of population, conservation, transportation, technology, and urban and regional planning to the total human environment" (Disinger, 1983, p. 15).

The problem with defining environmental education was not limited to the United States. In 1975 the international community convened for a ten-day workshop in Belgrade, Yugoslavia, and defined the goals of environmental education as:

> To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and prevention of new ones. (UNESCO, 1976, pp. 1-2)

Although as a field, environmental education has made great strides to become an integral part of the educational process, it still has a long way to go (Simmons, 1989,

p.17). According to Simmons, educators have tended to teach environmental education as an enrichment program, mostly in natural science and social studies courses (1989, p.15). Realizing the need to incorporate ecological awareness and environmental education into the modern American curriculum, the National Environmental Education Act of 1990 reemphasized the need to increase public understanding of the natural environment and to develop environmental education and training (Klein & Merritt, 1994, p. 15).

Clearly, environmental education means different things to different people. Therefore, for the purposes of this review, it is my belief that over the years environmental education has evolved to become an integrated, interdisciplinary method of instruction which is thematically linked to ecological principles of conservation and stewardship.

Environmental Education as a Conceptual Context

Vice President Al Gore proposed making the health of our environment the main focus for humanity. In Earth in the Balance, he called for a movement oriented towards a global constituency for the long haul, oriented to the health of the planet. However, we need leadership at all educational levels committed to making ecological literacy central to national goals and standards (in Orr, 1994, p. 122-126).

A few of the important tenets of environmental education closely parallel the ideology of Abraham Maslow. These include the recognition of emotional and aesthetic needs such as the need to develop awareness, to appreciate beauty, to explore the world, and to seek and find meaning. Maslow concisely described the importance of satisfying basic human needs. He stated that personal growth, called "self actualization," cannot occur until these needs are recognized and met. His ideas place value on internal, qualitative processes of personal experiences (Commission on Teacher Credentialing, 1985, p. vi).

Environmental education supports and encourages the infusion of these factors into lessons and educational experiences because they lead to learning and enhance growth of the individual. Dr. Frederick J. Deneke, assistant director of the USDA Forest Service stated:

> People who live in healthy ecosystems are healthier. People who view themselves as a part of that ecosystem, and are actively involved in its protection, care and restoration, develop a sense of empowerment and ownership over their lives. This translates into socially, culturally and economically stronger communities, neighborhoods, cities, and society as a whole.
>
> (in Adams, Brickell, Clark, et al., 1995, p. III)

According to John Disinger (1983, p. 5), environmental education nurtures alternative ways of thinking. It provides a synthesis which colors and affects the humanities, languages, social sciences, history, economics, and religion as dramatically as it does the natural sciences.

The Outdoor Classroom

David Orr believes there is a very real danger that formal schooling will damage the "sense of wonder" with which we are born; reducing knowledge to rote memorization, boring curriculum, and too many rules.

> Indoor classes create the illusion that learning only occurs inside four walls, isolated from what students call "the real world." By what is included or excluded, students are taught that they are part or apart from the natural world."(1994, p. 12)

Outdoor classrooms enable teachers to utilize direct instruction and include a variety of multisensory experiences. It involves an environment that can provide relaxation, exercise, and novel stimuli. Students observe firsthand the patterns of nature, thus deepening their cognitive learning and critical thinking skills. Outdoor lessons provide a means for students to understand and remember experiences in three-dimensional space, as embedded in their natural, spatial memory (Knapp, 1992, p. 6).

There is overwhelming evidence that children benefit from outdoor experiences in many ways. At the lower grades, even walking tours around the school grounds can be very rewarding, providing students with the opportunity to observe and discuss their surroundings (Iozzi, 1989, p. 9). As they participate in hands-on, collaborative activities typical of outdoor activities, students learn to communicate with their peers, function democratically, and work together toward mutual goals. Students develop a strong sense of belonging, fellowship, caring, and community (Lieberman & Hoody, 1998, p. 65).

Outdoor classrooms bring together the integrating factors of direct experience, whole process, authenticity, intellectual challenge and cooperative learning. Learning through direct experience is the quintessential factor that integrates curriculum elements, and experiential learning is present to a high degree in outdoor classrooms. This type of instruction places value on students having early, first hand experience with every aspect of their learning (Horwood, 1994, p. 19).

An outdoor classroom on campus can creatively blend five essential ingredients: textbooks, technology, hands-on activities, outdoor experiences, and interdisciplinary applications. Students gain first hand knowledge, and children of all ability levels are able to participate, either in whole class or small group pull-out (Stoner & Overby, 1989, p. 147).

Outdoor classrooms enhance teaching and learning through hands-on experience. No teacher is creative enough, patient enough, or financially able to duplicate or recreate indoors the real, on-going fascinations that have always existed in the outside world (Marsh, 1968, p. 3). In the out-of-doors, students work with natural resources and learn how their decisions and behaviors affect other living things. They discover how people are affected by the way they use soil, water, air, and other living creatures.

School campuses, as part of our educational ecosystem, should reflect the pride and commitment we have towards our children's learning environment. According to Orr (1994, p. 68), this can be accomplished by changing the attitudes of landscape management and district groundskeepers in which trees on campus are regarded merely as decorative. Campuses should have natural areas preserved to harbor biological

diversity. A school yard that is alive with trees and flowers, that attracts birds and butterflies, and organically changes with the cycle of the seasons, will convey a sense of wonder that no book or photograph can equal (Meyer, 1995, p. 2).

All schools can have an outdoor classroom. It might take the form of a formal garden, on-campus wilderness area, or even a small corner of the playground. Some might have a creek or small pond, or there may be no open water source at all. Teaching outdoors can broaden instruction, reinforcing and enhancing many of the concepts taught indoors. It also helps to develop an understanding and appreciation of the natural environment (Indiana Soil and Water Conservation Committee, n.d., p. 2).

Using Outdoor Classrooms to Teach Interdisciplinary Units

The job of incorporating environmental education into the K-12 curricula poses significant challenges, but also untapped potential for interdisciplinary configurations. Most instructional methods have a variety of limitations. Classroom management skills are crucial, as teachers become facilitators between students and resources (Ramsey, Hungerford, & Volk, 1992, p. 35-39). Outdoor classrooms provide an additional challenge in the high level of student excitement when being outdoors.

The success of any interdisciplinary unit depends on the choice of motivating themes. These must be relevant and meaningful for students. While it is important to be sure that activities from several disciplines are included, students might brainstorm ideas and discuss them prior to the teacher's choice of themes (Williams & Reynolds, 1993,

p. 15). Experienced teachers can often "guide" students in the brainstorming activities, leading them in a desired direction of study. As their learning transcends traditional disciplinary boundaries, helping them make connections between a variety of subjects, students become more eager, resulting in increased attention to schoolwork. This increased engagement often resulted in fewer behavior problems, and greater pride in and ownership of projects. (Lieberman & Hoody, 1998, p. 25-27).

In Closing the Achievement Gap, Lieberman and Hoody point out that as students work in their outdoor classrooms, building and maintaining nature trails, planting flowers and shrubs, participating in experiments, measuring precipitation and wind chill factors, and the like, they become more enthusiastic about applying their language arts skills. Even reluctant writers and special education students tend to get bolder...often taking greater risks and pushing themselves well beyond previously mastered skills (1998, p. 35). They also state that in the area of math knowledge and skills, students demonstrate better understanding of mathematical concepts, improved mastery and retention of math skills, greater enthusiasm, and greater understanding of abstract mathematical ideas when presented in the concrete learning situations that hands-on outdoor classrooms can provide (1998, p. 39).

At a higher level, activities typical of those done in outdoor classrooms promote the use of the Socratic method of teaching. This involves getting the learner into a questioning mode, and ties directly into cognitive development; as the sharing of knowledge can be related to prior discussions (Kaplan & Kaplan, 1981, pp. 184-195).

This is another example of the integrated use of speaking and listening skills in the outdoor classroom setting.

There are many different environmental education guides available for use in outdoor classrooms, which were designed to supplement existing curriculum. Among those are Project Learning Tree (American Forest Council, 1990), Project WILD (Western Regional Environmental Education Council, 1986), and Project WET (Higgins, Kesselheim, & Robinson, 1995). These all provide interdisciplinary activities and integrating ideas (Ramsey, Hungerford, & Volk, 1992, p. 45).

The availability of curricula with such strong national representation plays an essential role in getting environmental education into schools, however the vast majority of educators still perceive these as science oriented. A greater variety of materials need to be developed which will be perceived as language arts, social studies, mathematics, art, music, and health activities (Simmons, 1989, p. 17).

Efficacy of Environmental Education

The Greek principle of paideia conceptualizes the goal of education as "not mastery of subject matter, but of one's person." (Orr, 1994, p. 13). Many educators have long insisted on the value of problem solving, hands-on experiences in developing skills in investigation, evaluation, and decision-making skills. These help students become self-initiating and self-reliant learners prepared to participate in our ever-changing society.

Environmental education readily lends itself to the use of authentic assessment as a measure of student learning. A teacher can easily develop checklists for evaluation, such as portfolios, problem-solving tasks, student-created projects, writing journals, and oral presentations for documenting student growth and understanding. Despite this, according to Lieberman and Hoody (1998, p. 22), student assessment continues to be measured by objective instruments such as standardized tests results, such as the Stanford Achievement Test (SAT), and the Iowa Test of Basic Skills (ITBS).

Until recently, the effects of learning and instruction when the environment was used as an integrating context for learning were poorly represented in the literature. There are many possible explanations for this lack of research that reinforces the pedagogical strengths of environmental education, such as: lack of funding, difficulty incorporating authentic assessments into traditional school structures, and lack of relevant case studies of model environmental education programs (Hoody, 1995, p. 18).

A study by the State Education and Environmental Roundtable compiled data from 40 study schools, and published the results in Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning (Lieberman & Hoody, 1998). Fourteen of these study schools conducted comparative analysis of data for students in environmental-based classrooms with those from traditional classrooms. All fourteen schools found that quantitative measures, such as standardized test scores and grade point averages, indicated better student performance from the environmental-based instructional mode.

> Ninety two percent of academic achievement comparisons, using both comprehensive and subject specific standardized assessments, indicate that EIC (Environment as an Integrating Context for learning) students outperform traditional students in reading, writing, math, science, and social studies.
>
> (1998, p. 23)

Additionally, evidence from Lieberman and Hoody's study indicated that 98% of the teacher-respondents reported increased student engagement, enthusiasm, and interest in science (1998, p. 51); 99% of the respondents reported that students retained more knowledge and comprehension (p. 47); and 100% of those surveyed reported that students demonstrated better behavior, attendance, and attitudes than traditional students (p. 24). Results from all 40 study schools supported these observations.

DESIGN OF THE PROJECT

This project was the driving force in developing an outdoor classroom at Grandview Elementary School in Lake Arrowhead, California. It involved designing a nature trail, getting permission from administrators of Rim of the World School District to improve the proposed site, acquiring monies for the project from grants and fundraisers, generating staff support and buy-in, organizing volunteer work days, researching available teacher resources and materials, collecting and housing these resources and materials, organizing materials' check-out and classroom visit schedules, and writing lesson plans.

The activities included in this project (Appendix A) are intended to be used as a springboard for taking environmental education out of the classroom and into the natural world outdoors. Lessons represent a variety of topics: earth science, life science, geology, geography, conservation, weather, and more. Most can be taught in sessions of about one hour's duration, and all can be adapted to a variety of grade levels. A list of teacher resources (Appendix B) is also included for the reader's convenience.

IMPLICATIONS FOR EDUCATORS

With the dawn of a new millennia, environmental education is beginning to be seen as a tool to develop students' skills for the future. Presently, the standard curriculum teaches a great deal about individualism and rights, but little about citizenship and ethical responsibilities. While valuing our rapidly increasing technological gains and new scientific advances, we must not lose sight of the need for preserving our biotic community and recognizing our place in it. This may require enriching the discipline centric curriculum by strengthening more interdisciplinary modes of instruction, leaving the confinement of traditional classrooms in favor of holistic experiences in the "real world," and changing the way educational systems view the purposes of learning. Outdoor classrooms are the perfect vehicles for teachers to provide such instruction.

Outdoors, working with natural resources, students learn how their decisions and behaviors affect other living things and how people are affected by the way they use soil, water, air, and other living creatures. They learn that the future well being of the planet depends on an understanding that all systems, including human systems, are connected.

Environmental education's inclusion in the K-12 curriculum can serve as a synthesis for all disciplines in the curriculum: physical and social sciences, mathematics, arts, humanities, and others. Outdoor classrooms can successfully integrate concepts both within and across disciplines.

School calendars should include Arbor Day celebrations, Earth Day celebrations, and the like, which get children outdoors actively involved in the emotional feeling of the

out-of-doors. Through this process, attitudes toward and appreciation of the land will be developed (Johns, Liske, & Evans, 1986, pp. ix-x).

Across America, educators are facing a back-to-basics movement designed to focus curriculum on identified student learning outcomes as measured by standardized testing results, and reducing the time devoted to perceived frivolous and extraneous experiential programs and processes. A teacher interested in initiating or continuing an environmental education program may encounter "...deadfall blocking the trail in the form of administrative backlash, withdrawal of funding, required additional training, and little preparation time" (Hanna, 1992, pp. 77-78).

The implementation of environmental education programs involves training and developing the confidence of classroom teachers. These issues can be addressed by helping teachers recognize their real or perceived limits, and aggressively seeking staff development activities which give them opportunities to learn and lead environmental programs (Hanna, 1992, p. 78).

The development of an outdoor classroom at my school site, administrative support, and circumstances cannot be duplicated exactly on another campus. These details must be worked out on an individual basis. For that reason, this paper focuses on the rationale, definition, and conceptual context of environmental education, and discusses how outdoor classrooms provide a setting for the effective delivery of an integrated, interdisciplinary curriculum.

There is an ethnocentric, underlying assumption that Western society, including the educational system in the United States, represents the apex of human culture and

achievement. However, some share a different worldview. Ron Miller, editor of Holistic Review, stated the following:

> Our culture does not nourish that which is best or noblest in the human spirit. It does not cultivate vision, imagination, or aesthetic or spiritual sensitivity. Increasingly in the late 20th Century, the economic-technocratic-statist worldview has become a monstrous destroyer of what is loving and life-affirming in the human soul. (in Orr, 1994, p. 12)

Environmental education develops humane vision and sensitivity. This is essential for, as Stephen J. Gould reminds us, "We cannot win this battle to save our species and environments without forging an emotional bond between ourselves and nature as well-for we will not fight to save what we do not love" (in Orr, 1994, p. 43).

According to Hungerford and Volk, the ultimate goal of education is shaping human behavior. However, it is not enough that students become aware of the environment and its associated problems. We must encourage and develop a love for the physical world and provide experiences which demonstrate the individual's ability to affect change, or "locus of control." If people they cannot affect changes in society it is unlikely that they will attempt to resolve environmental issues (Hungerford & Volk, 1990, pp. 8-15).

Students given the opportunity to participate in outdoor learning activities sow more that just seeds. They cultivate a love for the Earth and see first-hand the changes they can effect in their local environment.

All humanity is accountable for the sustainability of our environment, yet it is the children of today who will inherit the awesome responsibility of maintaining a healthy

planet. They will be charged with correcting existing environmental problems, finding solutions to new obstacles, and confronting complex issues that have yet to surface.

As educators, its is our responsibility to prepare our students for the future. Environmental education provides students with the strategies and skills to meet the challenges of the new millennium. Outdoor classrooms are the ideal setting in which to provide these learning experiences for our students.

APPENDIX A

Interdisciplinary Lessons for the Outdoor Classroom

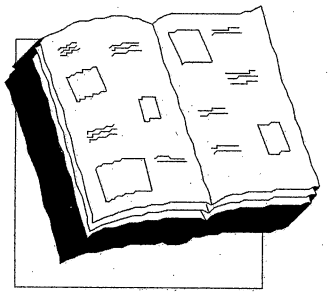
The following lessons have been chosen specifically for use in the outdoors, and are appropriate for students in elementary school. Although a grade level key is included, most can be adapted for any age.

It is important to be aware of local laws before collecting materials outdoors off your school site. Gathering specimens from state and national parks or forests may be illegal. Always be careful to gather only what you need. It is advisable to have students work in groups to reduce your class's impact on the environment.

Wildlife deserves respect. Never allow students to chase or harass animals. Many will bite, peck, or scratch to defend themselves. Some are even poisonous. Encourage pupils to observe animals quietly in their natural habitat.

When collecting plants, remember that many species are toxic. Learn to recognize poison ivy, poison sumac, and poison oak. Never allow students to taste plants unless you are absolutely certain of their safety. Even then, some students may have allergic reactions.

When on a nature walk, stay on marked trails to avoid trampling plants and to protect fragile soil. Students should always remain within view of an adult supervisor. Remember, the best of outings will be ruined should an injury occur to student or teacher. Be careful, and enjoy the great outdoors!



Nature Journal

Objectives: Students will be able to:
Collect and observe objects from the natural world
Organize specimens
Create a class scrapbook
Compare objects collected throughout the year
Observe how organisms change from season to season.

Materials:

- Magnifying glasses
- Specimen jars or boxes
- White or manila colored construction paper cut to desired page size
- Pencils, crayons, colored pencils, markers, etc. for drawing and labeling
- Glue for mounting specimens
- 3-ring binder, poster board or oak tag board for scrapbook cover and binding material (spiral binders, roving, ring clips, cording, etc.)

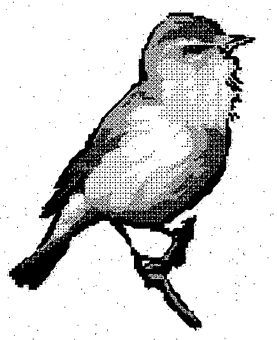
Grade Levels: K-6

Curriculum Links: Life Science, Environmental Science, Mathematics, Language Arts, Fine Arts, and Physical Education

Procedure: Teacher will divide students into cooperate groups, and instruct students to collect the desired number of samples. Student groups will walk around their school grounds to observe and collect specimens found in the natural world. They will collect one representative sample for each species. Plant specimens may be pressed and dried. Students draw the objects in their natural state, as found outdoors. These drawing are mounted in the journal alongside the specimens, dated, and described. Journals may be organized by classification, e.g., plants, soils, rocks, animals, etc.

Evaluation: Teacher observation, student projects, class discussion and journal entries.

Variation: This could take the form of a leaf, seed, or feather collection.



Bird Treats

Objectives: Students will:

Research appropriate foods to feed local and migrating birds
Research bird migration routes
Collect seeds, nuts, and fruits to create bird feeding stations
Construct bird treats
Reflect on the reasons people care for wild animals

Materials:

- String
- Yogurt or other small plastic containers
- Wooden spoons
- Scissors
- Needles
- Mixing bowls
- Microwave oven or small saucepan and access to a stovetop
- Birdseed and kitchen scraps such as: mixed nuts, bread crumbs, oats, rice, etc.
- Pinecones and 4-6" twigs

Grade Levels: All

Curriculum Links: Life Science, Environmental Science, Mathematics, and Language Arts

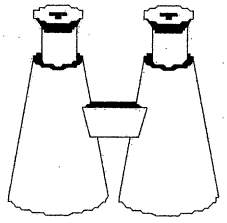
Procedure: Students will make bird treats by mixing feed together and using pinecones, hung from trees or patios, to serve as feeding stations. Adult supervision is necessary due to the hot lard used in this recipe. Prepare as follows:

1) Mix all kitchen scraps together in mixing bowl
2) Heat lard in microwave or saucepan and pour into mixture
3) Spoon measured mixture into small containers and pat down
4) Insert twig into mixture before it cools
5) After mixture has set, carefully ease it out of container by gently pulling the twig. Roll in more birdseed or oatmeal.

6) Tie string to twig and hang from tree branch or

Evaluation: After creating the treats, students will reflect orally or in writing journals, discussing the need for environmental stewardship and conservation.

Variation: Press warm mixture between the scales of pinecones. Roll in seeds. Tie string around the pointed end of pinecone, and hang on branch.



Bird Watching

Objectives: Students will be able to:
Use field guides to identify bird species
Use binoculars properly in a field setting
Produce field sketches
Recognize bird species by their vocalizations
Chart and/or graph bird sighting frequency

Materials:
- Binoculars
- Notebook or journal
- Pencils
- Crayons or colored pencils
- Field guides of North American bird species

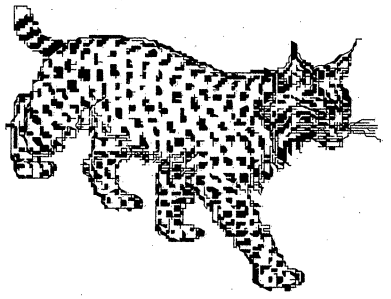
Grade Levels: All

Curriculum Links: Life Science, Fine Arts, Geography, Mathematics, and Reading

Procedure: Students go bird watching by taking a walking field trip either on their school grounds, in nearby open spaces or parks. Students will try to identify birds seen, and make field sketches of them, noting distinguishing features of different species.

Evaluation: Teacher observation, student work

Variation: Students will trace migration routes of bird species sighted.



Animal Tracks

Objectives: Students will learn that:

Different species have unique and distinguishing footprints
Animals that may not be visible during the daylight venture out at night
Larger animals generally leave larger tracks
Animal locomotion can be determined by their tracks, (e.g., animals leave different patterns when they are walking running or hopping)
Water mister or watering can with water
Kitchen leftovers
Field guide with local animals' prints pictured

Materials:

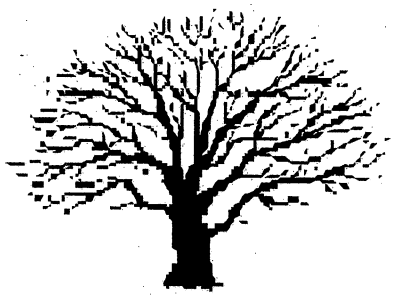
- Sandbox, large shallow tray, or flat area of land near shrubbery
- Fine sand
- Yardsticks or 2"x4"x8' lumber to smooth and level sand

Grade Levels: All

Curriculum Links: Life Science, Earth Science, Mathematics, and Fine Arts

Procedure: Students will take a walking field trip on campus or to a nearby open space to conduct this investigation. Using fine sand, students will pour sand onto the tray, into the sandbox, or directly on the ground. Level and smooth the sand with yardstick or 2"x 4"x 8' lumber. Make it slightly damp with a mister. Place a small amount of food (kitchen leftovers) in the middle of the sand and leave overnight. First thing in the morning, check the sand for tracks. Using the field guide, determine the species of the animals which visited the site. Repeat several nights in a row for statistical evidence and graphing data. Measure the size of tracks to determine if they were made by the same or different individual animals, and chart the variety of species represented.

Evaluation: Teacher observation, oral presentation of students' graphs



Bark Rubbings

Objective: Students will:
Become aware of the variety of textures present in nature.
Write about the different bark textures using descriptive adjectives
Create bark rubbings using several different species of trees for comparison
Discuss the locally common tree species

Materials:
- Plain paper
- Crayons
- Masking tape

Grade Levels: 1-4

Curriculum Links: Life Science, Environmental Science, Language Arts, Fine Arts, and Geography

Procedure: Students will take a walking tour of the school campus to observe the variety of tree species and observe the textures and patterns of tree bark. After making these comparisons, students will choose their "favorite" trees and make a tree rubbing. To do this, paper is attached to the tree trunk using masking tape. Crayons are then rubbed firmly over the paper, which transfers the bark pattern. After returning to the classroom, students will use discuss the area's local tree species, and write a paragraph about their chosen tree using descriptive adjectives.

Evaluation: Teacher observation and student projects

Variations: Teachers might consider using black paper and bright or neon colored crayons for a new twist on this traditional outdoor activity. The rubbings can also be combined with leaf rubbings for a beautiful effect.

Tall Trees

Objectives: Students will use mathematical skills to determine the height of a tree

Materials:

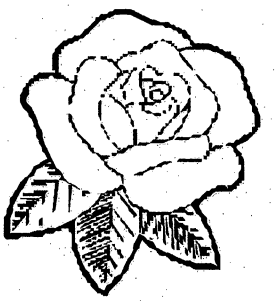
- Pencil
- Paper, nature journal, or notebook
- Ruler or yardstick

Grade Levels: 3 and up

Curriculum Links: Mathematics, Language Arts, and Fine Arts

Procedure: Students will work with a partner, measuring each other's height and writing these measurements down. They will then choose a tree and determine its height by having each other stand at the base of the tree. Holding the yardstick or ruler at arm's length, students will note their partner's height on it. Students will then line up the base of the tree with the end of the ruler, and multiply how many times their friend's height is to the tree's top. They will then multiply this figure by their friend's "real" height to determine the "real" height of the tree.

Evaluation: Teacher observation and student work



Flower Parts

Objectives: Students will:

Use scientific process
Dissect a flower
Learn how to use a microscope or magnifying glass
Illustrate magnified parts of a flower
Learn the parts of seed plants

Materials:

- Fresh flowers
- Microscope or magnifying glass
- Scissors
- Tweezers
- Paper and pencil
- Craft knife (for adult supervisor's use only)

Grade Levels: K-6

Curriculum Links: Life Science, Environmental Science, and Fine Arts

Procedure: Teacher prepares students for this activity by familiarizing them with the features of a flower and their parts in plant reproduction. It is advisable to use a variety of flowers, and compare the variation in appearance of the flowers' reproductive parts. Using fresh flowers, adult participants carefully slice the buds or flowers in half, vertically, to expose the inside. The stamens, pollen-coated anthers, seeds, ovaries, etc., can be observed with the microscope or magnifying glass and drawn.

Evaluation: Teacher observation, student projects, and informal oral discussion

Variation: This procedure can also be used with seed germination. Because of their large size, lima bean seeds are ideal. Germinate the seeds in a zipper bag with a damp paper towel. After the seeds germinate, they can be pulled apart to see the inner parts of the seed.

Rock Collecting

Objectives: Students will:

Become familiar with the origins of rocks, e.g., igneous, sedimentary, and metamorphic
Identify local rock types
Apply the scientific process
Compare the features of different rock types
Analyze rocks for specific properties, such as hardness

Materials:

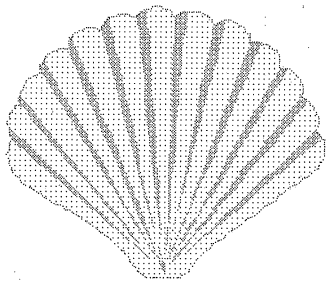
- Rocks collected from the school campus and surrounding area, or those brought by students from home
- Magnifying glasses
- Specimen containers (such as egg cartons, shoe boxes, etc.)
- Paper for labels
- Labeled rock specimen collection or book on rock types

Grade Levels: 2-6

Curriculum Links: Science, Geology, and Language Arts (labeling)

Procedure: Discuss the various type of rocks: igneous, sedimentary, and metamorphic. Students are then taken for a walking field trip to try and find as many different types of rock specimens as possible. Ask students to look for rocks with different colors, textures, and shapes. Have pupils try to identify their specimens and label them. Students keep the rocks in a divided box or egg carton.

Evaluation: Teacher observation, identification skills.



Create A Fossil

Objectives: Students will create a "fossil" as part of their study of sedimentary rocks and paleontology.

Materials:

- Small natural-type objects (shells, bones, plastic animals or insects, leaves, etc.)
- Vaseline/petroleum jelly
- Plaster of Paris
- 1/2 lb. margarine tubs

Grade Levels: All

Curriculum Links: Earth Science, Geology, Fine Arts, Language Arts, and Mathematics

Procedure: Students take a walking field trip to collect items to cast. Students could also bring seashells or plastic animal/insect toys from home. Coat object with petroleum jelly to prevent sticking. Mix plaster of Paris with water and pour into a margarine tub. Let plaster set a few minutes, then press object into it. Let dry at least two days, then carefully remove object. An impression, similar to a fossil, will be left similar to those made by ancient creatures. Students could write a story about their fossil and then read it aloud to the class. Students use measurement skills to mix their own plaster of Paris.

Evaluation: Students projects and teacher observation.

Create A Petroglyph

Objectives: Students will:

Become aware of the importance of written language
Be introduced to the art of ancient petroglyphs
Compare petroglyphs to modern graffiti
Create a petroglyph of their own

Materials:

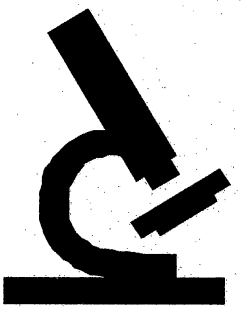
- Plaster of Paris
- Small margarine tubs
- Brown tempera paint
- Paintbrushes
- Large (16P) nails for scratching designs
- Pictures or drawings of authentic petroglyphs

Grade Levels: 2 and up

Curriculum Links: Earth Science, Geology, Social Studies, Anthropology, Fine Arts, Language Arts, and Mathematics

Procedure: Students will be introduced to Native Americans through textbooks or trade literature. They will then create their own petroglyph. Students mix small batches of plaster of Paris, and pour the mixture into margarine tubs. Try to finish the top surface roughly, so that it will resemble rock after painted. Let these dry for about two days. Carefully pop the disks out, and paint with brown tempera. After dry, students etch the surface to create petroglyph-like symbols.

Evaluation: Students create a story explaining their petroglyph, and share it with their classmates.



Soil Discoveries

Objectives: Students will explore the microscopic world of soil collected from various locations on campus.

Materials:

- Soil samples
- Microscopes
- Drawing paper and pencils
- Insect identification guide

Grade levels: 3 and up

Curriculum Links: Earth Science, Life Science, and Fine Arts

Procedure: Students will take a walking field trip to collect a variety of soil specimens. Using microscopes, students will discover the small life forms and pieces of decomposing plant matter which make up soil's composition. Students will sketch the small creatures found in the soil, and try to identify them, using an insect identification guide.

Evaluation: Teacher observation, student participation, student drawings and insect identification skills.

Pond Plankton

Objectives: Students will recognize the aquatic environment as dynamic habitat for a variety of life forms.

Materials:

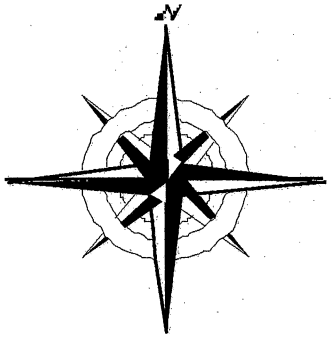
- Water collected from a still, preferably stagnant pond or similar sources
- Field biology handbook with pictures of fresh water plankton and/or insects which develop in water
- Microscopes
- Drawing paper and pencils

Grade levels: 3-6

Curriculum Links: Life Science, Social Studies, and Fine Arts

Procedure: Water is collected from stagnant sources and/or ponds. Students observe the variety of life forms present under the microscope and identify organisms with handbook. Students sketch their findings, and compare their pond water sample with specimens collected at other sites.

Evaluations: Teacher observation, field sketches and identification, student participation



Directional Discoveries

Objectives: Students will understand how to use a compass.

Materials:

- Compass for each pair of students
- Treasure map, using the school grounds/local area
- Prize for finding the treasure

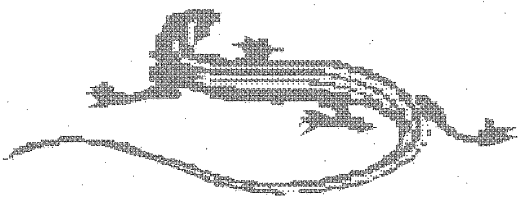
Grade Levels: 2-5

Curriculum Links: Geography (mapping), Reading, Language Arts, Mathematics (measurement), and Physical Education

Procedure: After reviewing the basic features of a compass and map, students are directed to use these to find a prize. Students are divided into pairs or small groups, and are given a treasure map. Groups follow clues on the map, which lead to a raffle ticket. This can be redeemed in the classroom for a prize, candy bar, or homework pass.

Evaluation: Teacher observation and student success in finding their treasure.

Variation: Teachers may wish to read a story about hidden treasure or pirates before doing this, or use it as a culmination activity for a gold rush unit. Several maps may be used to assure that each group wins something.



Habitat Search

Objectives: Students will be able to:
Discuss the difference between fiction/non-fiction books
Recognize that every living thing requires a specific habitat
Identify different habitats on their school grounds

Materials:
- The Salamander Room by A. Mazer (1991, New York: Dragonfly Books, Alfred A. Knopf)
- Magnifying glass or binoculars
- Paper or Nature Journal
- Pencil/Colored Pencils

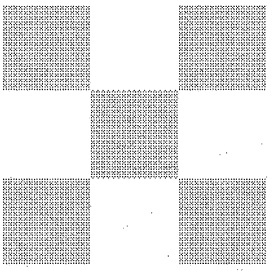
Grade Levels: K-6

Curriculum Links: Language Arts, Life Science, Fine Arts, and Physical Education

Procedure: The Salamander Room is read aloud and discussed with students, specifically with regards to habitat requirements. Students are taken outdoors to search for different types of habitats on their school grounds, or a walking field trip to a local park or natural area might be arranged. Students are directed to look specifically for dry, damp, human-made and natural environments. Students record their findings in their journal and draw a sketch of creatures they find. Upon returning to class, the class brainstorms about the habitat required for creatures they have discovered, and reflect upon the materials necessary to reproduce it.

Evaluation: Teacher observation, student drawings and journals

Extensions: This procedure can be applied to any children's literature which relates to the environment. Use stories as a springboard to discuss environmental education topics such as habitats, the water cycle, life cycles, etc.



B-I-N-G-O!

Objectives: Students will:
Identify objects in the natural environment
Draw objects in nature

Materials:

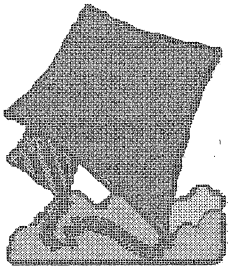
- Blank bingo cards for each student (These can be ready made or made by the students using a ruler, and pencil or marker)
- Pencils, crayons, or markers

Grade Levels: 2-6

Curriculum Links: Mathematics, Science, and Fine Arts

Procedure: Students create bingo cards making a grid of nine, 16, or 25 squares (if making 25 squares, the middle square is traditionally a free space). In each square, draw or write the name of something found in nature: an insect, bird, plant, leaf, rock, etc. These should all be things found in your local area or on your school grounds. Take a walking field trip. When students spot something that is on their bingo card, they mark off that square. The first person to mark a row, horizontally, vertically, or diagonally wins the game.

Evaluation: Teacher observation, bingo cards (measuring skills and drawings)



Blowing in the Wind

Objectives: Students will:

Recognize the type of wind on a Beaufort Scale
Create and fly a kite
Understand that the wind is responsible for many things: weather; transportation of seeds and dust; erosion.

Materials:

- Copy of the Beaufort Scale for each group of students from 365 Nature Crafts and Activities by Bledsoe & Norvell (1997, Lincolnwood, IL: Publications International, Ltd.)
- Kite making supplies or kits (tissue or wrapping paper, two kite sticks (18" and 36"), tape, kite string, etc.)

Grade Levels: 2-6

Curriculum Links: Mathematics, Science, and History/Social Studies

Procedure: The teacher will introduce the concept of wind speed. The class will brainstorm about the various types of winds, and create a corresponding scale. The standard Beaufort scale will then be introduced. At this point, students will work in groups to build a kite. When completed, students will fly their kites, noting the wind speed on the Beaufort Scale. Upon returning to their room, the class will discuss wind transportation with regards to seed dispersal and erosion.

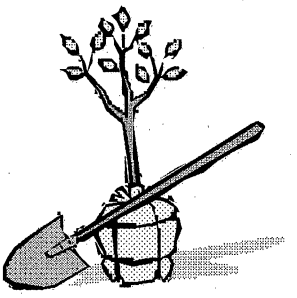
Evaluation: Teacher observation, kites, student responses

Variations: Using a piece of cardboard approximately 8X8", tack or tie a string to it and hang outside on a windy day. Spread petroleum jelly on one side and leave alone for at least an hour. Collect the cardboard and identify objects found on it. You may want to use a magnifying glass to make small objects more visible.

The Beaufort Scale:

Type of Wind		Clues on Land
0	Calm	Smoke rises straight up
1	Light air	Smoke drifts sideways
2	Light breeze	Leaves and weather vanes move
3	Gentle breeze	Twigs move
4	Moderate breeze	Branches move; flags flap
5	Fresh breeze	Small trees sway
6	Strong breeze	Large branches sway
7	Strong wind	Large trees sway; flags stand straight out
8	Fresh gale	Twigs break; hard to walk
9	Strong gale	Signs blow down
10	Storm	Trees fall over
11	Violent storm	Widespread damage
12	Hurricane	Widespread destruction

(in Bledsoe & Norvell, 1997, p. 36)



Plant a Tree

Objectives: Students will:

Acknowledge the role of citizens in community service
Recognize the value of trees in site beautification
Understand the meaning of stewardship
Identify a tree's requirements for life
Learn how to plant a tree

Materials:

- Tree seedling/sapling for planting
- Shovels
- Tree stakes
- Elastic ties or nylon hose and rope
- Water source for irrigating the new tree

Grade Levels: K-6

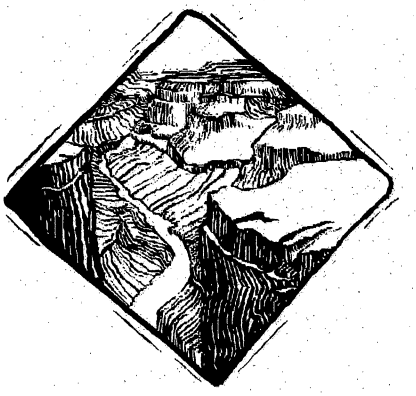
Curriculum Links: Science, Social Studies, and Service Learning

Procedure: Determine a site for planting the tree. Students discuss citizenship and the importance of community service. Brainstorm ways that children can help in the community. The teacher may need to guide the students in recognizing beautification projects. Discuss citizens' role in stewardship of the environment. Review trees' habitat and survival requirements. Plant the tree(s) as a group. Stress the tree's need for a deep enough hole to give the roots room to grow. Loosen the soil at the bottom of the hole, and make a small mound in the center. Place sapling into the hole, spreading the roots evenly around the mound. Be sure roots do not bend into a "J" shape, as this may kill the tree later on. Fill the remaining space with soil, stomping the dirt down as you go to eliminate air pockets. Mound a small ring of earth around the tree to act as a water basin. Pound stake at edge of hole, and use elastic ties or ropes covered with nylon hose to stabilize the trunk. Water immediately, and as needed thereafter, especially

during the first year. Students adopt this tree and take responsibility for its stewardship.

Evaluation: Teacher observation, class discussion topics

Extensions: Students reflect on this experience and write about it in their nature journals. Upper grade students may invite lower grade students to participate in the tree planting as a peer leadership/service learning project. Students could chart the growth of this sapling and other trees on campus, graphing the results of their study. Students may sketch the tree as a sapling; studying the leaves and bark. Compare the sapling with an adult specimen of the same species.



Erosion Excursion

Objectives: Students will:

Become aware of the effects of erosion in their local environment
Find evidence of vegetation's effect in slowing erosion

Materials:

- Rock collection (including samples of broken and weathered stones)
- Writing journals

Grade Levels: 1-6

Curriculum Links: Earth Science, Language Arts, and Life Science

Procedure: Introduce the concept of the forces of erosion and deposition by showing the students a collection of rocks. Try to have samples of polished, fractured, and river-bottom stones made of the same rock type. Ask students to hypothesize how the rocks came to appear so different. Discuss the effects of weathering and erosion. Take a walking field trip to find signs of erosion caused by water on hillsides and near storm drains. Look for places with vegetation, and compare to see if there is more or less evidence of erosion. Have students write about their discoveries in their writing journals.

Evaluation: Teacher observation, student journals

Extension: Students plant vegetation for erosion control

APPENDIX B

Resources for Teachers

Acorn Naturalists
17300 East 17th Street, #J-236
Tustin, CA 92780

AIMS Teacher Guides
PO Box 8120
Fresno, CA 93747

A Visit to a Green Planet
American Farm Bureau Federation
225 Touhy Avenue
Park Ridge, IL 60068

A Walk in the Woods
California Forest Products Commission
2150 River Plaza Drive, Suite 270
Sacramento, CA 95833

Banana Slug String Band - Environmental songs
PO Box 2262
Santa Cruz, CA 95063

California Dept. of Water Resources
PO Box 942836
Sacramento, CA 94236

California Foundation For Agriculture In The Classroom
(Ask for teacher resource guide and classroom materials)
1601 Exposition Blvd. FB16
Sacramento, CA 95815

Children's Gardens - A Field Guide
University of California Cooperative Extension
Common Ground Urban Garden Program
2615 South Grand Avenue, Suite 400
Los Angeles, CA 90007

Collecting Rocks
US Geological Survey
Distribution Branch
1200 South Eads Street
Arlington, VA 22202

Conserving Soil
National Assn. of Conservation Districts Service Center
PO Box 855
League City, TX 77573-0855

Cuisenaire Company of America
PO Box 5026
White Plains, NY 10602-5026

Ecosystem Matters
U.S. Forest Service
U.S. Dept. of Agriculture
Rocky Mountain Region

Farm and Wilderness
Outdoor Education
Plymouth, VT 05056

Farm Facts Folder
American Farm Bureau federation
attn: Rita Walaszek
225 Touhy Avenue
Park Ridge, IL 60068

High Country Coloring Book
Mt. Kare
PO Box 1785
Wrightwood, CA 92397

Journey to the Heart of Nature
Dawn Publications
14618 Tyler Foote Road
Nevada City, CA 95959

Kaleidoscope
1922 University Ave.
Madison, WI 53705

Kid's Gardening
National Gardening Association
180 Flynn Avenue
Burlington, VT 05401

National Geographic Society
Education Services
PO Box 98019
Washington, DC 20090-8019

National Audubon Society
950 3rd Avenue
New York, NY 10022

National Wildlife Federation
1400 16th Street NW
Washington, DC 20036-2266
Ask for the NatureScope Environmental Education Series
The following issues are especially applicable:

- 75001 - Incredible Insects
- 75003 - Wild About Weather
- 75004 - Birds, Birds, Birds
- 75005 - Discovering Deserts
- 75021 - Trees Are Terrific
- 75023 - Amazing Mammals I
- 75024 - Amazing Mammals II
- 75025 - Wading Into Wetlands
- 75032 - Geology: The Active Earth
- 75033 - Endangered Species
- 75034 - Reptiles & Amphibians
- 75035 - Discovery Pac: Insects
- 75043 - Wild & Crafty
- 75044 - Rain Forests: Tropical Treasures
- 75045 - Pollution

Planting Seeds, Growing Minds
California Association of Nurserymen
4620 Northgate Blvd., Suite 155
Sacramento, CA 95834

Project Learning Tree (PLT)
American Forest Foundation
1111 19th Street NW, Suite 780
Washington, DC 20036
Web site: http://eelink.umich.edu/plt.html

Project WET
Culbertson Hall, Montana State University
Bozeman, MT 59717-0057

Project WILD
5430 Grosvenor Lane
Bethesda, MD 20804
Web site: http://eelink.umich.edu/wild/

Schoolyard Habitats
National Wildlife Federation
1400 16th Street NW
Washington, DC 20036-2266
Web Site: http://www.nwf.org/

Sierra Club
Public Affairs Division
730 Polk Street
San Francisco, CA 94109

Soil Savers Club
Riverside-Corona Resource Conservation District
1299 Columbia Avenue, Suite E5
Riverside, CA 92507

Smogbusters
South Coast Air Quality Management District
21865 Copley Dr.
Diamond Bar, CA 91765

Talk About Trees
Christine Grupp
1784 Caliban Drive
Encinitas, CA 92024

The Story of Drinking Water
American Water Works Association
6666 West Quincy Avenue
Denver, CO 80235

Think Earth
Education Development Specialists
5505 East Carson Street, Suite 250
Lakewood, CA 90713-3093

Understanding Our Environment: Activity Guide
The Dept. of Public Instruction
John G. Townsend Building
Dover, DE 19903-1402

Water Education Foundation
717 K Street, Suite 517
Sacramento, CA 95814

What On Earth Can You Do With Your Kids?
Good Apple
1204 Buchanan Street, Box 299
Carthage, IL 62321-0299

What's Buzzin'
National Honey Board
390 Lashley Street
Longmont, CO 80501-6010

Where Fantasy Meets Reality
Soil and Water Conservation Society
7515 Northeast Ankeny Rd.
Ankeny, IA 50021-9764

Windows on the Wild
World Wildlife Fund
1250 24th Street, NW
Washington, DC 20037-1175

Windows on Science (Teacher Resource binder and lessons on Laser Disc)
Optical Data Corporation
Warren, NJ 07059

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