The Rattlesnake Valley Ecology Project: An outdoor environmental education curriculum

Kari Mattson Lind
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THE RATTLESNAKE VALLEY ECOLOGY PROJECT:
An Outdoor Environmental Education Curriculum

by

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B.A., University of Montana, 1977

Presented in partial fulfillment of the requirements
for the degree of
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in Environmental Studies
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Approved by

[Signature]
Chairman, Thesis Committee

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Dean, Graduate School

May 6, 1993
Date
What a joy it is
   to feel the soft, springy earth under my feet once more,
   to follow grassy roads that lead to ferny brooks where I can bathe my fingers in a cataract of rippling notes, or to clamber over a stone wall into green fields that tumble and roll and climb in riotous gladness!

- Helen Keller
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CHAPTER ONE

Introduction

There is a place where the sidewalk ends
And before the street begins,
And there the grass grows soft and white,
And there the sun burns crimson bright,
And there the moon-bird rests from his flight
To cool in the peppermint wind.

Let us leave this place where the smoke blows black
And the dark street winds and bends.
Past the pits where the asphalt flowers grow
We shall walk with a walk that is measured and slow,
And watch where the chalk-white arrows go
To the place where the sidewalk ends.

Yes we'll walk with a walk that is measured and slow,
And we'll go where the chalk-white arrows go,
For the children, they mark, and the children,
they know
The place where the sidewalk ends.

-Shel Silverstein (1974)

Many children today seldom venture to the place where the sidewalk ends. Through personal contact and educational experiences with children, I have observed that many of them rarely spend their free moments exploring wild places and discovering the unique and wonderful things that await them beyond the chalk-white arrows. Instead, Nintendo, television, sports and other interests vie for their attention. Sadly, due in part to their "scheduled" lives, some children have neither the time, the opportunity, nor the inclination to journey into nearby nature areas.

Moreover, children are rarely provided with opportunities to experience these areas as part of their schooling. (Johns, 1986, Heath and Weible, 1979, Tanner, 1
Public school teachers and administrators cite several factors that inhibit or preclude the use of the out-of-doors as a learning environment. A lack of environmental education curriculum materials, insufficient funding for field trips and transportation, and safety concerns are but a few of the barriers mentioned that discourage visits to nature areas.

Technology has diminished our contact with the earth to such an extent that children living in today's world will likely have far fewer encounters with nature than their parents or grandparents had. The majority of our children are growing up in urban and suburban environments that are quite removed from the world of nature and as a result, many of them may never experience a truly "natural" environment - one that is relatively free of human intervention.

It is troubling to think that our children are not spending time in the natural world. Without the personal experience of interacting with nature, of immersing oneself in the sights, sounds and smells of living systems and communities, can we fully understand our connection to the earth or develop a sense of place within which we live?

Through exposure to our natural surroundings, we learn about nature's relationships: the interdependence and interrelatedness of all the various components of natural ecosystems, the interplay of dynamic forces that drive life's processes, and the human dimension of the environment.
- our relationship to other living beings and our effect on earth's rhythms and resources.

Steve van Matre (1990) believes that it is important for children to feel a bond with all forms of life and to understand that:

"Each living thing on earth is a spark of sunshine caught in a vast web of life. And each living thing is connected through energy and materials strands of that web to every other living thing. In reality, we are one family, a carbon-based family of life... Each of us represents but a brief manifestation of the flow and cycling of life here. In human families, we speak of blood lines, but in reality, each of us is intimately related to all the creatures of the earth." (van Matre, 1990)

Because of a lack of contact with nature, many of our young people (and adults) have become so removed from the land that they have little knowledge, concern or appreciation of nature. They do not understand how life functions on earth, nor how their lives are connected to and supported by those processes. Their experiences and points of reference lie within the manmade environment - a world of technology, concrete, plastic and noise.

There is danger in knowing only the manmade. Cathy Donckers (1985) believes that children whose daily experiences are primarily with the manmade may lack the perception of Earth as source. "Implicit in it is not only control, but predictability, utility and replaceability. The manmade is functional and not only made by man, but for him, to fulfill his needs or desires."

This ego-centric view of the world, sees earth's resources
as objects to be manipulated for human design.

While it is true that other species also exploit the environment, drawing from it the energy and materials necessary for growth, life and procreation, the human species tends to think that it can manage the earth - that it can control or direct its systems, resources and communities of life. Such a mindset has resulted in radically altered and degraded natural ecosystems and it threatens the future of life on earth.

Donckers suggests that the natural world operates on different principles: "it is cyclical, not linear, ever-changing, not static, connected, not isolated." The natural world offers a different way of being than the manmade realm and children can benefit from nature's teachings.

"Our children need the chance to discover in nature all that she has to offer, and they cannot do this through a one-hour class period of textbook science. They need the experience of her multitude of forms, the opportunity to spend some time with her as with a new friend, to discover the things hidden by the preoccupied mind and the non-seeing stare and to recognize that in nature which is also a part of them." (Donckers, 1985)

Our life experiences contribute to the way in which we perceive the world and they construct the framework through which we deal with new situations. If the experiences of children are primarily within a "manmade" context, this will influence the way they view the world - the actions they take, the decisions they make and how they choose to live their lives. Such a mindset will affect their relationships with other people and their relationship to the natural
world.

If we fail to foster in our children an understanding and appreciation for the natural world, how can we expect them to understand or even care about the earth or the threats to their environment?

If we hope to provide our future generations with a good quality of life and a rich, healthy environment, then we must nurture caring and responsible individuals that will take steps to preserve and protect it. We must engender in our children a reverence for all forms of life and help them to see that a natural community is a "synergistic entity, something to be respected, something not to be trod upon callously and heedlessly, but a place to be treated with great respect and esteem." (van Matre, 1990). We must help them to understand that we are merely one component of a vast and diverse ecosystem and that it is our responsibility to preserve and sustain a healthy environment for all species on the planet.

We begin by helping our children to acquire an appreciation and kinship for their natural surroundings. The best way to foster these attitudes and to learn about the earth is through direct contact with it.
"Children (and the adults they will become) need the emotional experience of feeling the out-of-doors. This includes using all the senses - taste, smell, touch, sight and hearing - in a total operation to absorb the various moods of the out-of-doors. Through this process, attitudes toward and appreciation of one's relationship to the land will be developed." (Johns, 1986)

**Purpose of this Study**

Concerns over our children's lack of exposure to the natural world and the need for environmental education programs that provide outdoor experiences as part of their schooling, inspired the Rattlesnake Valley Ecology Project (RVEP). The project was designed and developed for the Prescott Elementary School in Missoula, Montana.

The RVEP attempts to address the hypothesis that, when many of the barriers to the teaching of environmental education are reduced or eliminated, and when schools are provided with easy access to natural areas for outdoor experiences, then the attention given to outdoor environmental education by teachers is likely to increase.

The purpose of this study was to design an environmental education program for a local elementary school that: 1) utilizes nearby nature areas in the Rattlesnake Valley to foster outdoor educational experiences for children; 2) reduces or eliminates the barriers that interfere with the teaching of environmental education; and that, 3) increases the instruction of environmental
education and student visitations to the natural sites.

This paper addresses several aspects related to the project. It presents:

* a literature review of related research that supports the use of the outdoors for educational purposes and provides the program's theoretical foundation

* a discussion of the status of environmental education in Montana and the factors that influence its incorporation into the public schools

* a discussion of studies that identify and examine the barriers to environmental education and the methods employed for their reduction or elimination

* a discussion of the Rattlesnake Valley Ecology Project that includes the project's history, goals, features, planning and implementation

* an evaluation of the project and the implications for its expansion to other area schools
Environmental Education: History and Definitions

Though a relatively new addition to school curricula, "environmental education" is becoming the widely accepted vehicle for educating children about the natural world and for providing outdoor environmentally-related experiences.

Environmental education has evolved as an interdisciplinary process with significant historical roots in several educational movements. While the term "environmental education" is relatively new, its related forerunners - nature study, conservation education, science education and outdoor education have provided a firm foundation for its development. (Hammerman, 1980).

Much of the support, philosophy and methodology for environmental education (EE) has come from resident outdoor education - a valued and popular program for over 60 years. (Hammerman, 1980) Growth in EE has accompanied increasing public awareness of the plight of our threatened environment. This concern coupled with the recognition that most children today have little first-hand contact with the environment have brought demands that educators give more attention to the environment.

Public schools are now encouraged, and in some states required, to provide programs that teach environmental concepts, problem-solving skills and action strategies that prepare our children to tackle, as informed and intelligent
citizens, the environmental problems and issues that they will face. EE's emphasis on providing experiences that promote and foster environmentally responsible behavior distinguishes it from its predecessors.

While environmental education does not require a natural setting for instruction, most environmental educators believe that outdoor experiences should be a prominent component of EE programs, since, "some learning makes a deeper impact and is retained longer when a concept or an object is discovered, sensed, and interpreted in the natural setting." (Hammerman, 1980)

Finding a concise definition of EE is difficult, as few educators agree on one. For the purpose of this study, environmental education is defined as:

a process that assists individuals in understanding basic ecological concepts, in nurturing awareness, appreciation and positive attitudes toward the environment and in acquiring the tools, skills and dedication necessary for participating in responsible actions to improve and maintain the quality and health of the environment.

Over the past decade, support has grown steadily among environmental educators for the importance of developing individuals who behave responsibly toward the environment and are environmentally literate. (Hines, 1987, Stapp, 1969) Several have developed goals and principles that suggest
that encouraging environmentally sound behavior is a desired outcome of environmental education. Stapp et.al. (1969) proposed that environmental education should focus on developing 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."

Hungerford et.al. (1980) established a set of instructional goals that serve as guides for curriculum development. The following superordinate goal statement identifies the desired end result of a K-12 environmental education program:

"The goal of environmental education is to help students become environmentally knowledgeable, skilled, and dedicated citizens who are willing to work, individually and collectively, toward achieving and maintaining a dynamic equilibrium between the quality of life and the quality of the environment."

(Hungerford et.al., 1980)

Four major goal levels, as well as subgoals, were developed to help accomplish the superordinate goal. (See Appendix G) Based on the objectives originally defined by the 1977 Tblisi Intergovernmental Conference on environmental education and established in the Tblisi Conference Declaration, the four goal levels address: 1) ecological foundations; 2) issues and values awareness; 3) investigation and evaluation; and 4) action skills. The first two levels focus on conceptual awareness of ecological principles and environmental issues, while the latter levels
include goals that promote the development of skills necessary for investigating and analyzing environmental problems and issues and for participating in issue remediation. (Hungerford and Volk, 1990)

Curriculum developers and educators at all grade levels are encouraged to focus their efforts on developing curricula (or modifying existing curricula) that address all four goal levels.

For the purpose of this study the term, outdoor environmental education, will be used in reference to the Rattlesnake Valley Ecology Project in order to emphasize the focus on using the local environment for the instruction of environmental education.

Outdoor environmental education offers an approach to learning that acknowledges that children learn best from direct experience. It recognizes the child as an active learner and emphasizes discovery, observation and sensory interaction with nature.

Outdoor environmental education sees nature study as the foundation upon which a connection with and appreciation of the environment is formed. The goals of outdoor environmental education are:

1. To help people to understand the basic ecological concepts of how life functions on our planet.
2. To help people to understand that humans are interdependent with all living things and are directly tied to natural processes and communities.

3. To help people to understand that our actions affect life as a whole and that the planet's well-being is dependent on our making environmentally responsible lifestyle choices.

4. To provide people with the necessary strategies, skills and tools to craft more harmonious lifestyles and to actively work toward the resolution of environmental problems.

5. To help people to recognize that outdoor education is a continual educational experience, a life-long endeavor that should be enjoyed and cherished.
CHAPTER TWO

A Literature Review:
Research Supporting the Educational Use
of the Out-of-Doors

"The outdoors helps students become more receptive to everything around them by encouraging the use of their ears, noses, hands and other parts of their bodies to channel sensory impressions. The opportunity to awaken the child's senses is just outside the classroom door, a whole world of sensations waiting to tickle, tantalize, to spark the imagination, and to cause wonder."

Frank Johns (1986)

A review of the available literature revealed numerous studies that support the use of the outdoors for educational purposes and recognize the importance of providing outdoor experiences for children. Following is a discussion of some of the research.

FIRST HAND EXPERIENCES AND SENSORY INTERACTIONS WITHIN THE NATURAL WORLD INFLUENCE A CHILD'S COGNITIVE AND AFFECTIVE DEVELOPMENT

The research of Jean Piaget and John Pearce suggests that young children require "dynamic interactions with selected physical environments to enhance intellectual development." Piaget proposed that a child's mental development, like his motor skills and muscle development, requires full interaction with appropriate physical environments. (Pearce, 1971)
Expanding on this hypothesis, Pearce (1971) asserts that human intelligence can grow only through interaction with new phenomena - by exploring that which is unfamiliar in the environment. He believes that through physical contact with earth's creatures, phenomena and laws of interaction, a child learns about the patterns and relationships between the components of the environment. This understanding forms the child's structure of knowledge, or world view.

Pearce cautions that by failing to allow children to fully interact with natural phenomena, we threaten their healthy intellectual development. "Without a fully-dimensional world view structured in the formative years, no earth matrix can form, no knowledge of physical survival can develop and no basis for abstraction and creativity can arise." (Pearce, 1971)

Pearce believes that a child must be given adequate opportunities to play, explore and interact physically and mentally within a rich, natural environment so that he/she can cultivate a sense of place and belonging within his/her surroundings. The "concrete" structure of knowledge that is created from such sensory interaction is the foundation out of which abstract thought and creative ideas emerge.

Heath and Weible (1979) contend that most school programs give little support to the child's interaction with the physical world even though the importance of outdoor
environmental education is apparent. They believe it is essential that "educators at all levels address themselves to the development and implementation of opportunities early in the most formative school years for students to explore the interrelationships between the things and people around them."

EE programs centered around first-hand contact and interaction with the natural environment in both formal and informal settings "provide foundations for both cognitive and affective development in school and serve as catalysts for the development of effective citizens." (Heath and Weible, 1979)

Outdoor experiences facilitate the experiential learning process which takes place when one is actively involved in discovery, observation and sensory interaction with the natural environment. This "learning by doing process" involves full use of the senses and the three domains (cognitive, psychomotor, affective) of learning. Eiss and Harbeck (1969) examined the learning process and developed a model that illustrates the relationships among the cognitive, affective and psychomotor domains. It supports the contention that people do not deal with knowledge alone because knowledge, feelings and emotions are, in reality, inseparable. According to Eiss and Harbeck:

"The affective domain is central to every part of the learning and evaluative process. It begins with the
threshold of consciousness, where awareness of the stimulus initiates the learning process. It provides the threshold for evaluation, where willingness to respond is the basis for psychomotor responses. It includes values and values systems that provide the basis for continued learning and for most of an individual's overt behavior. It provides the bridge between the stimulus and the cognitive and psychomotor aspects of an individual's personality." (Eiss and Harbeck, 1969)

In essence, the Eiss and Harbeck model illustrates how sensory input may enter the subconscious, interact with the affective, cognitive and psychomotor domains and exit as overt behavior. They support the hypothesis that the affective domain is the "key" entry point in the learning process.

Louis Ioazzi (1989) supports the Eiss and Harbeck theory and believes it has significant implications for environmental education. In his study, "What Research Says to the Educator: EE and the Affective Domain" (Ioazzi, 1989), he discussed the Eiss-Harbeck theory and other relevant research conducted over the last twenty years. Based on an analysis of the research, Ioazzi identified some major ideas about how the affective domain relates to EE. They are:

1. EE is effective in teaching positive environmental attitudes and values when programs and methods are specifically geared to the affective domain.
2. Merely increasing knowledge of the environment is insufficient for inducing positive affective growth.
3. Positive environmental attitudes and values, once acquired, appear to be long lasting.

4. Development of environmental attitudes and values should begin before kindergarten and be further developed and regularly reinforced as a student progresses through elementary, middle and senior high school.

5. Outdoor education is an effective way of improving environmental attitudes and values.

6. The media are powerful sources for influencing environmental attitudes and values.

Lozzi suggests that incorporating these ideas into EE curricula may improve student's attitudes toward the environment. He therefore recommends that educators emphasize a "holistic" approach to the teaching-learning process when developing EE programs for children. Additional recommendations suggest that educators: (Lozzi, 1989)

1. Infuse EE with a focus on the affective domain into the existing curricula at all levels (K-12).

2. Use values analysis activities to help students understand their own environmental values, analyze how personal values and behaviors collectively impact on the environment, identify alternative environmentally sound behaviors, and take action to adopt and implement them.
3. Include outdoor experiences whenever possible because children learn best what they experience "first-hand".

4. Utilize a variety of teaching techniques that deal with the affective domain. These include, inquiry methods that directly involve students in investigating real environmental problems and issues; media - which rely on both visual and auditory stimuli; and case studies and simulation activities.

CHILDREN NEED TO DEVELOP A BASIC ECOLOGICAL UNDERSTANDING OF THE EARTH, HOW THEY ARE CONNECTED TO THESE SYSTEMS AND HOW HUMAN ACTIONS SIGNIFICANTLY AFFECT LIFE PROCESSES

Steve van Matre (1990) feels that environmental education has failed to adequately educate people about the ecological processes that support life on this planet. He argues that the programs have not clarified for their participants how their lives are directly connected to and supported by these processes. Nor have they suggested that the participants examine their own lifestyles in light of their new awareness.

He believes that our society's isolation from the natural world has resulted from our ignorance of basic life processes - the flow of energy, the cycling of materials, the interrelatedness of life and its dynamic nature. Consequently, most people don't understand our environmental
problems nor why they exist:

"For them, energy is oil and the middle easterners and the oil companies have teamed up to manufacture shortages in order to keep prices high. Cycles are Hondas or Yamahas, and diversity means tolerating your kooky neighbors!" (van Matre, 1990)

Some people fail to understand even the simplest of environmental connections:

"between fast-food burgers and the destruction of the world's forests; between decorative lighting or frivolous appliances and the accelerating costs of nuclear-generated electricity; between over-packaged and over-processed foodstuffs and our growing difficulty in maintaining clean drinking water;... or the very direct personal effect that such situations have on their own lives." (van Matre, 1990)

Van Matre's disenchantment with many existing EE programs inspired him to develop a program that fosters a different relationship with the earth - one that encourages people to live within nature's laws and limitations. Central to his EARTH EDUCATION program is the philosophy that "children need to develop some basic ecological understandings and first-hand feelings for the earth and its life before they set out to effect much change in their own surroundings." Since immersion in natural settings nurture this process, the outdoor experience is an essential component of the program.

REGULAR VISITS TO LOCAL NATURE AREAS FOSTER FAMILIARITY, A SENSE OF "BONDING" AND POSITIVE ATTITUDES TOWARDS THE ENVIRONMENT

The word "ecology" is derived from the Greek word "oikos" which means "home". Hence, ecology is the study of
our home. When we think of earth as our home, as a source of comfort and security rather than as something apart from us and impersonal, it becomes significant. We are more likely to protect our home than we are to protect something less personal because, if we harm our home, we harm ourselves. (Lutts, 1985)

Lutts proposes that a "home" is a special place with which we have a special kind of relationship. "If the earth and our particular spot upon it are truly to feel like home to us, they must become something alive and vibrant and wonderful in our lives." (Lutts, 1985)

In other words, a sense of home is built on a foundation of familiarity. Educators can foster familiarity by taking children on frequent visits to nature areas near their school or by exploring unique areas of the schoolyard.

By fostering an exploration of the places within which they live, educators can help children to understand the environments they experience, to value and celebrate their unique features, and to recognize the threats to them. They can also encourage children to adopt alternatives behaviors or strategies that serve to protect and preserve their valued environments.

Time spent in the out-of-doors during a child's formative years may be instrumental in the development of positive environmental attitudes and values and in producing
informed environmentally active citizens. A study conducted by Thomas Tanner (1980) supports this theory. Tanner surveyed 45 "active, informed citizen conservationists" asking them to "describe those experiences which were significant in founding their current interests" in the environment.

He found that "youthful experiences of the outdoors and relatively pristine environments" - in other words, a love of a particular place and frequent time spent there as a child, "emerges as a dominant influence in these lives" (the respondents). (Tanner, 1980) Parental and teacher influence ranked second in significance.

A carry-over study conducted by Peterson and Hungerford (1981), at Southern Illinois University, examined the significant life experiences of professional environmental educators. The factors cited as major determinants in developing their own environmental sensitivity corroborate Tanner's research.

Peterson defines environmental sensitivity as "a set of affective characteristics which result in an individual viewing the environment from an empathetic perspective." She believes that individuals who are sensitive to the environment possess a basic appreciation and concern for the natural world and that the development of environmental sensitivity appears to result from an interplay of frequent outdoor experiences in natural settings, favorable human
interactions, and knowledge about natural systems.

Peterson found that "role models appear to be equally as important in developing environmental sensitivity." Familial and non-familial role models, who were themselves empathetic toward the environment and actively involved in environmental interests and issues, were considered to be important influences. Teachers constituted the majority of role models named, having stimulated their students' interests in the ecosystem and by providing educational and professional guidance. (Peterson, 1981)

Additional studies and literature affirm the significance of environmental sensitivity. The objectives for EE as defined by the 1977 Tblisi Intergovernmental Conference on EE include two references to "sensitivity". The first objective "awareness", seeks to "help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems [and/or] issues." The second objective "sensitivity", seeks to "help social groups and individuals gain a variety of experiences in, and acquire a basic understanding of, the environment and its associated problems [and/or issues]." (Tblisi, 1978)

Hungerford et.al. (1980) consider environmental sensitivity to be a foundational goal, an important precursor to environmentally ethical and responsible behavior.
A study conducted by Sia et al. (1985) examined the relative contribution of several variables that foster environmental literacy in predicting responsible environmental behavior. Environmental sensitivity was found to be one of three major predictors. The researchers therefore recommended that EE instruction include experiences that nurture environmental sensitivity.

The related body of research previously cited suggests that: 1) "significant life experiences" seem to be influential in fostering sound environmental attitudes and values; 2) teachers were significant contributing influences in the life experiences of their respondents; and 3) environmental sensitivity is a major predictor of environmentally responsible behavior and may be significant in producing a committed environmental citizenry.

These findings have important implications for education. Public schools should recognize the significance of providing young children with frequent outdoor experiences in the natural environment and should strongly support the initiation of outdoor environmental education programs beginning at the elementary level and continuing throughout a child's school career. Educators should also recognize their own value as potential role models of enthusiasm and support for their students' interests in nature.
OUTDOOR EE CAN STIMULATE INTEREST AND ACTION IN ENVIRONMENTAL STEWARDSHIP AND HELP PEOPLE ADOPT ENVIRONMENTALLY RESPONSIBLE BEHAVIORS AND LIFESTYLES

As we attempt to nurture in children an awareness, appreciation and sensitivity for the earth, it is essential that we also provide them with the appropriate knowledge and tools to become responsible caretakers of the environment. To assist them in this evolution to action, educators should tailor discussions and activities around environmental problems and issues that have some direct relevance to their students and to their surroundings. The utilization of local outdoor nature areas can promote such awareness as students study problems related to development, pollution, and other forms of human impact.

Knowledge of environmental problems is clearly a prerequisite to appropriate action, but it is only one aspect of the catalyst required. The student also needs to understand what he/she can to do help. Several factors influence the development of environmentally responsible behavior. These include, an internal locus of control (an individual's perception of his/her ability to bring about change through personal behavior); knowledge of ecological concepts and environmental problems and issues; perceived skill in and an understanding of environmental action strategies; environmental sensitivity; a strong sense of responsibility; and a positive attitude. (Sia et.al., 1985)

Hines et. al. (1987) found that individuals with an
internal locus of control were more likely to participate in environmentally responsible behavior than those with a more external locus of control (those who attribute change to powerful others, such as, God, parents or government). Parents and teachers can be highly influential in promoting an internal locus of control by giving children a say in matters that will affect them and by encouraging them to make their own decisions. In other words, learners should not be persuaded or manipulated, but provided with the knowledge and skills to make future decisions for themselves.

Educators can help students develop environmentally responsible behaviors by providing a forum for the identification and analysis of environmental attitudes, values, and issues, by assisting them in identifying alternative solutions for solving environmental problems, and by lending support and guidance in helping students take responsible action on issues of ecosystem protection.

Hungerford et.al. (1988) believe that there is an ethical responsibility on the part of educators to help students become skilled in responsible citizenship action. However, they stress that teachers should not force students into taking action. Rather, they should encourage and stimulate in their students a sense of responsibility and personal control.

The following approach encourages attainment of such
attributes. Educators should, 1) allow students to investigate all sides of an issue; 2) teach and facilitate the practice of problem-solving and action-taking skills; and 3) defer to the beliefs and values of their students by allowing them to make decisions and/or take action on issues. (Hungerford et. al., 1988)

This strategy instills a sense of control in learners. It helps them to understand that power structures are accessible and that they can be reasoned with, and that their opinions and ideas are worthy of respect and consideration. When students perceive that they possess the ability to make changes and can help resolve significant environmental issues, they acquire confidence and feelings of personal investment and empowerment.

It is also important that educators help children to recognize that not all human actions are destructive to the environment. Media coverage often overwhelms us with distressing reports of environmental degradation and one can feel helpless in the face of such adversity. Educators can help students deal with this concern by focusing attention on the actions of concerned citizens who have come to the aid of wildlife and the environment. Environmental stewards can serve as positive role models and motivators for them.
We should also impress on our children that each responsible action, no matter how small, can have a positive impact and that each individual can make a difference in helping to alleviate our environmental problems.

Summary

A review of the literature indicates that our perceptions of and attitudes toward the natural world are influenced by our sensory interactions with the environment. The research underscores the importance of providing our children with frequent opportunities to experience nature "first-hand", so that they might learn from the earth and develop a sense of kinship and sensitivity to their surroundings. Once acquired, these understandings and feelings form the foundation of environmental literacy and they may be influential in stimulating an individual's interest and action in responsible environmental stewardship.
CHAPTER THREE

Environmental Education in Montana

From the wide-open prairies of the east to the forested peaks of the west, Montana boasts a landscape of unparalleled beauty and diversity. Montana's great physical size and low population density, provide vast areas of land that have remained relatively undeveloped. Some of this land has been designated for wilderness, national and state parks, wildlife preserves and recreational use. Montana's relative abundance of quality wildlife habitat and its wealth of natural resources provides endless opportunities for outdoor recreational and educational pursuits.

Despite the availability of outstanding areas for nature study, Montana's public schools have not fully recognized their potential for environmental education. While some excellent programs exist, (mainly due to enthusiastic and committed educators), few public elementary schools offer formal EE programs.

Anne Swisher Palen's (1991) study that focused on the status of EE in Montana public schools revealed that in 1991, only three public school systems (Billings, Great Falls, and Lolo) had formal EE programs. Several other schools incorporate some form of outdoor and/or environmental education programs and have developed their own resource materials or use materials prepared by federal
and state wildlife agencies.

Palen's survey of Montana high school administrators reported that, while a majority of schools provide some type of EE program, little time is devoted to it, generally less than one hour per week. EE is generally incorporated into science classes and planning and teaching are primarily done by teachers not formally trained in EE. The administrators cite a lack of funding, teacher training and a lack of room in the curriculum as major constraints to EE.

Factors that influence EE programs in Montana

Numerous factors influence the development and implementation of EE programs in Montana schools. The Office of Public Instruction (OPI) does not offer preservice or inservice teacher training programs; there is no full-time EE specialist employed by the state; and at the present time, no EE standards exist at the K-12 level. Also, EE programs often must compete with other interests, including drug prevention, AIDS education and child safety for a school's limited funding and support. These limitations along with the lack of a state-wide comprehensive EE curriculum and implementation plan have contributed to the sporadic nature of EE in Montana's public schools. (Gunderson, 1989)

Past research suggests that there is little
professional incentive for teachers to obtain either preservice or inservice training in EE. Palen's (1991) study found that only a small fraction of Montana's public high schools require inservice training and while opportunities exist in the state for inservice training, few teachers take advantage of them. She attributes this to the fact that teachers must travel great distances to attend them and on their own time and money.

The Board of Public Education is the governing body that sets education and accreditation standards for Montana's public schools and higher education institutions. OPI, the Board's administrative wing, implements its directives. Presently, Montana Teacher Program Standards require the state's higher education institutions to provide prospective secondary teachers with coursework that includes "preparation and experience in environmental science". However, state standards do not require that teacher education programs offer a specified course in environmental science. Rather, it is up to the individual institution to decide how it will meet the standards.

Some institutions offer specific courses in environmental science while others satisfy the requirements by infusing various science courses with an environmental science component or unit. (Bilderback and Midyett, 1993) Since the state education standards are written in a content-directive manner rather than in clearly-stated
prescriptive terms, the opportunity exists for a wide range of interpretation. This could result in varying degrees of depth and quality of teacher preparation.

Since 1955, the University of Montana has required that preservice elementary teachers complete a course in environmental science for certification in Montana. At present, two courses fulfill this requirement: Science 127 - General Science: Earth and Life Science - This course focuses on ecological concepts and provides a strong field science emphasis.

Science 350 - General Science: Environmental Perspectives - This course presents a critical analysis of the assumptions and effects of past and present patterns of land use based on readings drawn from both the sciences and humanities.

Prospective secondary teachers must also satisfy this requirement if their major is in one of the sciences. They may fulfill this requirement by taking Science 350 or EVST 101 - Environmental Science - This course uses an ecosystems approach and analyzes how we have created environmental problems derived from our land, water, resources and energy uses. (Bilderback and Midyett, 1993)

Teacher education standards in "environmental education" do not exist at the K-12 level in Montana. Many teacher education institutions, (including the University of Montana), attempt to address EE by infusing environmental
theory exclusively in science methods classes or they offer environmental science courses that focus on "science-related" concepts. Little attention is usually given to higher level EE goals - those that address advocacy, environmental issue investigation and evaluation and citizen action strategies. These approaches fail to emphasize the multidisciplinary and interdisciplinary nature of EE and thereby promote the misconception that science is the only appropriate curriculum for teaching EE.

Many teacher education programs also fail to prepare teachers to be effective role models, individuals that can facilitate the development of environmentally literate learners. Hungerford et.al. (1988) believe that preservice teachers should possess an understanding of the goals of EE and demonstrate specific competencies. They suggest that preservice teachers:

1. Embody the knowledge, skills, and attitudes reflected in environmental sensitivity, ecological foundations, concept awareness, issue investigation and environmental action.

2. Understand ecological concepts and principles and be able to effectively teach those ideas to children.

3. Recognize the importance of environmental issue investigation and citizenship action and acquire the necessary knowledge and skills to become
personally and responsibly involved in issue remediation and environmental stewardship.

Hungerford et al. (1988) feel it is necessary that preservice teachers possess these environmentally appropriate attitudes before they can develop them within their students in a competent and effective manner.

While recent research has indicated that EE does exist in Montana, the studies have found that program development and implementation is lacking in vision, structure and continuity. This situation does not seem to be attributed to a lack of interest in EE since Palen’s (1991) study indicates that high school administrators rank EE as a high priority, even above athletics. This is a positive indication that administrators and teachers value EE and would like to further promote it in Montana’s public schools.

Rather, the situation calls for competent leadership at the state level to coordinate program planning and development; establish clear EE standards (based on the accepted EE goals and objectives) and appropriate teacher certification requirements for K-12 levels; provide effective goal-oriented preservice and inservice teacher training programs in EE; and to strongly support the expansion of formal EE programs in all of the state’s elementary and secondary schools.
Environmental Education in Missoula

Missoula, like many other cities in Montana, offers several parks and natural areas in close proximity to town. Many of these areas are situated near schools and could be utilized as outdoor classrooms for environmental education. Unfortunately, our children are rarely provided with the opportunities to explore, study and recreate in these places as part of their school experience. (Johns, 1986, Heath and Weible, 1979, Tanner, 1980)

Research strongly supports the use of nature areas for outdoor educational experiences to nurture the attitudes needed for the conservation, preservation and wise use of natural resources. The statement of the literature presented in Chapter Two, is consistent and significant - children benefit from learning experiences that involve direct contact and active participation within the natural world. Yet, these excellent educational resources are not being utilized on a regular basis as outdoor classrooms.

Why is outdoor environmental education not being fully incorporated into the Missoula District One's elementary school curricula?

For insight into this problem and to better understand the reasons why teachers are not using the out-of-doors for
environmental education, I designed a survey that was administered to Missoula School District One fourth and fifth grade teachers in April of 1992. The survey questions were designed to obtain:

1. Information on existing outdoor environmental education programs and teacher use of natural settings.
2. Teacher opinions on obstacles that discourage them from teaching outdoor environmental education.
3. Teacher suggestions for encouraging the teaching of outdoor environmental education and for designing effective inservice sessions.

The survey data were used to appraise existing outdoor environmental education (OEE) programs, identify the perceived barriers to OEE present in Missoula area elementary schools, and to assess the needs and concerns of teachers regarding OEE.

Survey Procedure

1) The surveys were sent to Missoula District One's elementary science leaders.
(See Appendices A - C)
2) Letters of introduction accompanied the surveys describing the project, the reasons for the survey and a request that the science leaders distribute
them to the 4th and 5th grade teachers in their respective schools and later collect and return the surveys by a given date.

3) 44 of 49 possible surveys were returned.

Survey Results

1) 35 of 44 respondents said they presently teach some form of environmental education or outdoor environmental education. Nine respondents do not and attributed this to being too far from a site or that OEE was handled by another teacher.

2) A majority of teachers (24) visit outdoor natural areas 1-2 times a year. Most of the teachers would like to visit outdoor sites more often.

3) The respondents identified the following obstacles to their school’s ability to develop and implement OEE (ranked by dominant influence):

   a. Lack of funds
   b. Lack of transportation
   c. Safety and liability concerns
   d. Lack of curriculum materials
   e. Lack of planning time
   f. Lack of inservice training
   g. Length of school day
   h. Lack of qualifications in OEE

4) Most teachers (36) currently use resource specialists with expertise in the field of study to give classroom or field presentations.

5) Most respondents (35) use a combination of teacher-
written and initiated materials and commercially-prepared or agency-produced curriculum materials.

6) Several teachers (20) have participated in OEE workshops, courses and/or curriculum design, including Project Wild, Project Wet, Bison Range workshops, District inservices, etc.

**Teacher Suggestions**

When asked to offer suggestions for encouraging outdoor environmental education instruction, the teachers proposed the following:

* Provide more planning time and release time to attend inservices and workshops (17)

* Provide sequential, interdisciplinary curricula that are appropriate to grade level and that offer pre-, post- and "hands-on" activities. (15)

* The district should adopt an OEE program. (7)

* Provide access to local outdoor nature sites or funding for field trips. (20)

* Provide program development monies, equipment and materials. (20)

* Hire a specialist to teach OEE. (3)

The teachers also offered their opinions on what constitutes effective inservice sessions:

* Offer the workshops "on-site" so that teachers become
familiar with the nature area and can experience the activities first-hand. (18)

* Provide materials and methods for teachers to use in the out-of-doors. (18)

* Offer the sessions during the school day for district credit. (15)

* Excite and motivate teachers to want to teach OEE. (8)

Survey Summary

The results of the survey reveal that while eighty percent of the respondents currently teach some form of environmental education, less than fifty-five percent visit outdoor sites, and generally only once or twice a year. Although the majority of teachers said that they would like to visit natural areas on a more regular basis, they cite numerous obstacles that interfere with their ability to teach OEE. Lack of funding and transportation are considered to be the dominant barriers, although, safety and liability issues and a lack of curriculum materials also seem to be major concerns.

Many teachers frequently utilize resource specialists with some expertise in the field - perhaps because they feel unqualified or lacking in knowledge to adequately teach OEE.
Teachers who have participated in environmental workshops, courses or curriculum design, are more apt to teach EE and visit outdoor sites. However, the survey questions did not clearly identify whether the teachers utilize the curriculum materials obtained at the workshops or to what degree they are used in their respective classrooms.

Due to a lack of preparation time and a heavy teaching load, some of the teachers would prefer to see the district hire a specialist to teach OEE. This response may also reflect a feeling of ineptness for teaching EE, concepts and theory.

Several teachers stressed a need for inservice training, but added that they would like to receive credit and/or a stipend for the extra time commitment. Most teachers prefer inservices that are offered "on-site", that teach "hands-on" activities for students, and that provide materials that teachers can use for pre-trip and post-trip instruction in the classroom. Many of the respondents feel that inservice workshops are very beneficial and should be used to motivate and encourage teachers to teach OEE.
CHAPTER FOUR

A Literature Review

Barriers to Environmental Education

A review of the available literature on this topic disclosed an intensive study conducted by Sam Ham and his colleagues (Ham et al., 1988) which identifies and discusses the importance of barriers to EE in the Palouse-region public schools. A followup study involves the implementation of an inservice workshop specifically designed to reduce or eliminate the barriers.

Results of previous research (McCaw, 1979, Mirka, 1973) have indicated that barriers to EE do exist in the public schools and that they can be categorized into four broad groups:

1. **Conceptual barriers** stem from a lack of consensus about the definition of EE and its place in the curriculum.

2. **Logistical barriers** are those stemming from a perceived lack of time, funding, resources, instructional materials, suitable class size, and so forth.

3. **Educational barriers** stem from teacher misgivings about their own competence to conduct EE programs.

4. **Attitudinal barriers** are those stemming from teacher attitudes about EE and science instruction. (Ham and Sewing, 1988)
The four categories of EE barriers provide a framework for identifying and assessing teacher perceptions of the barriers to EE. Ham and Sewing interviewed 91 elementary teachers in the Palouse-region of eastern Washington and western Idaho in the spring of 1985. The results of their survey revealed that teachers saw logistical barriers as the most critical obstacles to EE. The primary barriers involved time - the lack of time in the school day to teach EE and the lack of preparation time. Other important logistical barriers identified were the lack of EE instructional materials, lack of funding, transportation problems and class size.

Conceptual barriers included the misconception that EE is relevant only to science curricula and failing to equate its infusion into other subject areas. Science was the curriculum area where 80% of the teachers indicated that they included EE.

When asked by the researchers to define EE, the respondents generally emphasized the cognitive aspects of EE - providing students with knowledge and awareness of the contents of the environment, ecological interactions and the wise use of resources. Largely overlooked were the affective components of EE - teaching students to appreciate the importance of the environment, and helping them to identify and analyze their values systems as they relate to the environment and/or environmental issues.
Educational barriers included the teachers' apprehensions about the suitability of their own backgrounds in EE. Many ranked their lack of knowledge about EE and the lack of a natural science background as important barriers. Hence, they feel inadequate teaching the subject.

The survey data revealed a disturbing fact. While almost all of the teachers possess positive attitudes toward teaching EE, many lack the commitment to do so. The modest amount of time spent teaching EE did not correspond to the teachers' positive attitudes toward EE. Ham and Sewing (1988) attribute this discrepancy to the fact that the "cumulative effects of the perceived barriers may preclude any inclination to conduct EE despite the generally favorable attitudes."

In a study based on the personal interviews of twelve Montana environmental educators, Kari Gunderson (1989) found that similar factors deter or prevent a strong emphasis on EE in Montana's public schools. Time constraints are mentioned as the most significant obstacles affecting the scheduling and planning of EE programs. Many of the teachers mention the difficulty of trying to "fit" EE into an already full curriculum. Other concerns regard the provision of release time for teachers to develop EE programs and to attend inservices.

Gunderson also found that the controversial nature of EE poses a challenge to teachers in Montana public schools.
Teachers expressed difficulties teaching EE in communities where extractive industries such as logging or mining make up the economic base.

Fear of science and lack of an adequate background in EE are seen as significant factors inhibiting EE programs. Other factors cited in the study include the lack of funding and teaching materials, lack of administrative support and the lack of an environmental education mandate in the state of Montana.

Reducing the Barriers to Environmental Education

Gunderson (1989) asked the Montana educators for suggestions on how to encourage teachers to include EE in their curricula. Most of the teachers supported the offering of "on-site" EE workshops and inservice training sessions to stimulate teacher interest in the outdoors. Access to nature study sites for field activities and contact with nature were considered essential. Sharing materials knowledge with colleagues and providing workable, easy to use teaching materials might also help teachers learn to incorporate EE activities into a variety of curricula areas.
Ham et. al. (1988) designed and implemented an inservice workshop for Palouse-region elementary teachers that specifically sought to reduce or eliminate the barriers identified in the former study and to increase the number of teachers conducting EE. The objectives of the workshop were to:

1. reduce conceptual barriers by decreasing the teachers' perceptions of EE as strictly science education or outdoor education and increasing their perceptions of EE as being both multidisciplinary and interdisciplinary.

2. reduce logistical barriers by increasing the teachers' knowledge of where to obtain EE materials and personal assistance, and decreasing the importance of lack of teaching and preparation time, lack of funding and class size.

3. reduce educational barriers by decreasing the perceived importance of a strong science background in conducting EE and increasing the number of teachers who feel they have an adequate background for conducting EE.

4. increase EE activity by increasing the number of teachers who voluntarily conduct EE activities.

The results of a survey following the inservice indicated that the workshop was able to reduce some but not all of the barriers to EE. The workshop was successful in
reducing some of the logistical and educational barriers. For example, the workshop increased the teachers' perceptions of EE as being interdisciplinary and also increased knowledge of where to obtain materials and assistance. It was also able to reduce the importance of the lack of funding. However, the lack of teaching and preparation time and class size remained important barriers to the participants.

Ham et. al. (1988) recommended that future workshops to reduce EE barriers present more EE materials that place less emphasis on science and provide teachers with time, materials and assistance in helping them incorporate EE into their present curricula. The potential benefit of attempting to reduce or eliminate teacher-perceived barriers is that when these barriers are reduced, attention given to EE classroom teachers is likely to increase.
Summary of the Status of EE in the Public Schools

Chapter Three and Chapter Four provide insight into the status of EE in Montana and the factors that influence its development and implementation in the public schools. Researchers believe that the slow progress of EE can be attributed to a set of common barriers that inhibit teachers from conducting EE and therefore recommend that educators attempt to reduce or eliminate these barriers in order to facilitate greater attention to EE in our schools. (Ham and Sewing, 1988)

It is important that as we focus on increasing teacher attention to EE, we also critically address the quality and effectiveness of the EE programs we promote. Recent studies indicate that EE programs in the public schools are not attaining the ultimate goal of EE - the development of environmentally responsible and active citizens. (Hungerford and Volk, 1983)

Childress (1978) believes that EE is loosely organized and has little sense of direction. In a national curriculum study of EE programs in public schools, he concluded that most of the programs placed more emphasis on knowledge of the environment and an appreciation of its resources rather than on helping students develop the knowledge and skills to solve environmental problems.

In a similar study, Volk et.al. (1984) found that goals
for EE are not being met with existing curricula and that "EE is failing in its endeavor to develop knowledgeable, concerned, competent and participatory citizens, i.e., environmentally literate human beings."

It appears that many EE programs do not focus on a clearly delineated framework. Educators continue to support the idea that citizen action can be brought about through a focus on environmental knowledge and awareness although a growing body of research indicates otherwise. (Childress, 1978, Hungerford and Peyton, 1980) Researchers advocate that EE curricula extend program objectives and instruction beyond information and awareness to include behavior change and environmental responsibility. They suggest that curriculum developers and educators develop programs, or modify existing ones, that address, 1) citizenship action strategies, 2) locus of control, and 3) environmental sensitivity. (Hungerford and Volk, 1990)

A citizenship action approach that embraces a cohesive framework of goals and objectives is widely endorsed in the field. (Childress, 1978, Hungerford and Peyton, 1980). Without this theoretical framework, EE programs will likely remain unorganized, fragmented and largely ineffective in developing environmentally literate and responsible individuals.
CHAPTER FIVE

THE RATTLESNAKE VALLEY ECOLOGY PROJECT

An experimental outdoor environmental education program
developed for Prescott School

History of the Project

In the Spring of 1991, I volunteered to guide elementary school classes on nature walks in the Rattlesnake National Recreation Area (RNRA) as part of the Missoula Trails Celebration. The response of both students and teachers was very positive and many commented that they wished there were more opportunities for outdoor environmental education in the Rattlesnake Valley. The Prescott Elementary School teachers expressed great interest in utilizing Greenough Park and the RNRA for this purpose.

Prescott School, located at the foot of Mount Jumbo in the Rattlesnake Valley northeast of Missoula, is situated near two outstanding nature areas. Greenough Park, the former estate of the Thomas Greenough family, lies to the west of Prescott School. The 42-acre parcel was given to the city of Missoula to be retained as a nature preserve for the enjoyment of Missoula citizens. Rattlesnake Creek meanders through the park and offers a wonderful riparian area, rich with a diversity of bird life.

The RNRA, comprised of 60,000 acres of the Lolo National Forest, is situated at the north end of the valley.
A well-developed trail network in the Rattlesnake's lower reaches and a protected wilderness area, offer a variety of recreational and wildlife viewing opportunities. Once the home of early Missoula homesteaders, it has become a favorite resource for local outdoor enthusiasts, providing opportunities to view many wildlife species, including beaver, deer, elk, mountain goats, black bear, Columbian ground squirrels, and over 40 species of birds.

In 1980, the Rattlesnake National Recreation and Wilderness Act (RNRAW) was enacted in an effort to protect the upper Rattlesnake's wildlife populations and to preserve it for recreation. The act mandates that a portion of the Rattlesnake be managed for recreation, water quality and wildlife habitat. The remainder of the area is to be managed as wilderness.

The RNRAW Act also mandates that the area be used for educational purposes to provide students with the opportunity to explore and learn about the wildlife and RNRA ecosystem.

Even though these two nature areas are easily accessible from Prescott School, they are rarely used for outdoor environmental education. While its teachers seem to recognize the importance of OEE, most have not taken advantage of the rich, natural environments in their own backyard. Many of the teachers instead rely on district-adopted science textbooks supplemented with occasional
presentations by area resource specialists or teacher-prepared materials. In general, EE instruction has been limited to the occasional science lesson conducted in self-contained classrooms.

Results of the district-wide survey of Missoula fourth and fifth grade teachers, conducted by the writer in April of 1992, (see pg. 35) revealed that similar situations are occurring at other Missoula District One schools. Natural areas close to schools have been minimally used for outdoor educational activities and for studying local environmental issues.

The survey identified a number of teacher-perceived barriers that seem to interfere with the teaching of OEE. It also disclosed a need for OEE programs that offer interdisciplinary curricula, inservice teacher training, the sharing of EE materials and resources, and access to local natural study areas.

The concern over our children's lack of exposure to the out-of-doors and an awareness of the need for a program that both reduces EE barriers and utilizes our local natural areas for outdoor experiences, inspired the design and development of an outdoor environmental education program for Prescott School - THE RATTLESNAKE VALLEY ECOLOGY PROJECT.

Outdoor experiences should be seen as an integral component of EE programs. The key to increasing the
frequency of EE instruction in the outdoors is to encourage the utilization of local nature areas close to schools. Hence, The Rattlesnake Valley Ecology Project (RVEP) was designed around the local environment of Prescott School in order to increase the time spent on EE and the frequency of student contact with their natural surroundings.

**RVEP's General Program Goals:**

1. To design and implement a program that utilizes Greenough Park and the RNRA to enhance the instruction of and participation in OEE.

2. To stimulate in teachers an interest in teaching in the out-of-doors by providing an awareness of the sites' available resources and educational opportunities.

3. To reduce or eliminate some of the logistical, conceptual, educational and attitudinal barriers that interfere with OEE at Prescott School.

4. To increase the likelihood that the teachers will incorporate OEE into their curricula and will utilize the nature sites on a regular and frequent basis.

**RVEP's Curriculum Objectives:**

1. To provide materials and a curriculum that:
   a) present basic ecological concepts through
classroom activities and first-hand explorations of the natural world

b) focus on the affective domain - in an effort to encourage students to identify, discuss, and evaluate human attitudes, values, and behaviors that significantly affect the environment and also offer activities and suggestions that assist students in making environmentally responsible decisions and personal lifestyle changes that lessen negative impacts on the environment

c) challenge students to actively participate in the investigation and resolution of environmental problems and issues in their school and community

RVEP's Long-Range Goal:

To expand and adapt the program to include other Missoula elementary schools and nature areas in the city.

Program Features

Nature Site Component

The key feature of the RVEP is its focus on the educational potential of Greenough Park and the RNRA as nature study sites for OEE. The accessibility of the nearby sites reduces some of the logistical barriers associated
with transportation and funding. Ease of access to a site is a major factor in increasing the frequency of visits throughout the school year.

Since Greenough Park is within walking distance of Prescott School, accessibility is not a problem, thereby eliminating the need for transportation and funding for field trips. The more distant RNRA site poses some transportation problems as it is over 2 miles from the school. The expense of renting a district school bus prohibits its use, however, Mountain Line, the Missoula County bus service, offers reduced fares for classes. Visits to the RNRA site are apt to occur less frequently due to this situation.

The use of local nature areas for outdoor environmental education provides many benefits: (Hale, 1986)

- it promotes a sense of place as children become familiar with the natural environment in which they live

- it provides opportunities for children to come into contact with living organisms in their natural surroundings which may encourage a greater understanding and respect for other forms of life

- it provides natural settings in which to observe ecological principles and concepts in action

- it allows teachers the flexibility to coordinate practical field study with related classroom study

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and to easily re-schedule trips if weather conditions are unfavorable
- it provides opportunities for students to observe seasonal changes and to monitor long-term environmental factors or human impacts on the local environment
- it demonstrates that ecological factors and natural communities are functioning (although somewhat modified) even in urban settings
- it provides opportunities for the investigation of environmental problems and issues and involvement in practical conservation and environmental action projects that affect the local environment

Also, the use of local sites for teacher inservice training has been shown to increase teacher confidence and comfort in teaching in the out-of-doors, recognition of the educational potential of the nature site, and utilization of the site with his/her classes.

The significance of using the local environment for OEE has been emphasized. A goal of the RVEP is to encourage teachers to make better use of their local environments and to help them recognize that visits to nearby nature areas should be an essential part of their students' school experience.
Project Planning and Development

A number of different sources were consulted during the planning and development of the RVEP curriculum. A study of Missoula District One's science curriculum objectives and the Silver Burdett science series [the district’s adopted science curriculum], provided a list of science-related concepts and objectives that are taught at the 4th and 5th grade levels.

The Prescott School teachers were asked to list curriculum topics of interest to them. The survey data offered additional suggestions on units of study that would be enhanced by activities at the outdoor sites. Frequent visits to Greenough Park and the RNRA during the planning stages, were helpful in assessing the educational offerings at each site - their ecosystem diversity, wildlife communities and unique characteristics.

A review of the Silver Burdett science series found it to be lacking in several respects. The text fails to address ecological concepts in a holistic manner, nor does it promote "hands-on" field study. The series neglects timely environmental and ecological issues and provides no means for student involvement in environmental action.

The district's science curriculum objectives, teacher input and the sites' offerings were the major determinants in the curriculum's development.
Curriculum Design

Based on a belief that the curriculum should be ecologically-centered, the RVEP was designed to examine the ecological concepts, processes and interrelationships of the natural systems and communities of the Rattlesnake Valley. The lessons and activities examine the concepts of animal biology and behavior, habitat types, and the components for healthy wildlife populations and quality habitat. Local environmental issues, human impact, and the importance of stewardship and participation in environmental action are also emphasized in the curriculum.

Environmental issues and concerns become personally relevant when they affect our immediate surroundings, especially if we've developed a sense of kinship or emotional attachment to an area. By including issues of local interest in EE curricula, we may foster increased student involvement in stewardship and environmental action.

The curriculum is multidisciplinary and interdisciplinary in nature. Lessons and "hands-on" activities incorporate language arts, social studies, art and math concepts that can be integrated into the daily instruction of several subject areas of the school curricula. Although it is designed for use by intermediate elementary age children (4th and 5th grades), the curriculum could be modified to meet the cognitive and affective abilities of children one to two levels higher or lower.
Pre- and post-trip activities are included to help prepare the students for the field trips and to expand and reinforce the concepts presented in the field.

Supplementary materials and equipment used in conjunction with field and classroom study accompany the curriculum. Student manuals, available for each child, include log sheets for field activities, diagrams and illustrations, and reading material for specific lessons.

RVEP's Attempts to Reduce or Eliminate the Barriers to Outdoor Environmental Education

The RVEP curriculum attempts to reduce or eliminate a number of barriers identified by the Prescott School and District One teachers. Lack of planning time and curriculum materials were cited by Missoula teachers as major concerns. Planning and development time for the RVEP was substantially reduced for the teachers since the writer volunteered her time to do the research, planning and writing of the curriculum. The teachers participated in the initial planning sessions and were consulted on occasion throughout its development. As a result, each teacher received a comprehensive teacher's guide and a set of student handbooks designed for his/her grade level that required a minimum of teacher time and effort.

In an attempt to reduce teacher preparation time, the
curriculum guide is designed to be "teacher-friendly". Each lesson or activity includes student objectives, a list of materials needed to perform the activity, pre-trip preparation tips, field activity procedures, and discussion questions. In addition, a well-stocked storage closet containing supplemental materials and equipment for field and classroom use is conveniently located for easy access.

The interdisciplinary nature of the curriculum seeks to reduce teacher concerns over the lack of teaching time. By integrating environmental activities and issues across the curriculum, we eliminate the need to try to "fit" EE into a separate time slot in an already full schedule.

While it may take a little extra planning time and creativity to incorporate OEE into the scope of other disciplines, the educational advantages make the additional effort worthwhile. Viewed in a "holistic" sense, OEE can enrich and expand the student’s knowledge and perceptions of how ecological understandings and environmental issues relate to all discipline areas and to life outside the classroom.

While curriculum infusion seems to be the method of choice for most public schools, many teachers tend to treat EE primarily as an enrichment of the science curriculum. Ham and Sewing (1988) found that when EE is included in teacher preparation programs, it is usually placed in science methods classes, therefore teachers are drawn to the
conclusion that EE fits best in the science curriculum.

Teachers need to be shown that a strong background in science is not a prerequisite for teaching EE. By providing teachers with a variety of materials that emphasize different subject areas and by showing them how materials and resources can be adapted for use within non-science subject areas, we can help to alleviate teacher concerns over EE infusion.

Lack of funding is considered to be a significant barrier. Aside from funding for transportation, teachers cited a need for money for program development. Initial program development usually requires some monies for the purchase or printing of curriculum materials and for equipment and teacher inservice workshops.

An inventory of Prescott Schools's existing supplies and equipment revealed a need for additional materials. The RVEP was able to obtain funding from the Montana Department of Natural Resources and Conservation through a matching fund grant program. Grant monies were used to purchase classroom materials and equipment for field study while printing costs for the teacher curriculum guides and student handbooks were assumed by the school district. (See Appendix D) Aside from the initial investment, costs of maintaining the program will be minimal, since the curriculum guides and student manuals can be reused each year.
Some of the teachers regard the lack of an adequate background or qualifications to teach OEE to be a barrier. To help reduce these feelings of inadequacy, background material for teachers that discuss EE concepts and natural history information is included in each curriculum lesson or content area. Also included is a list of resource persons that can offer assistance or give presentations on specific topics and a list of supplemental multidisciplinary materials.

**RVEP's Teacher Training Component**

The teacher training component of the RVEP is an essential element of the project. Since the success of a program is measured by teacher support and enthusiasm, I felt it necessary to design an inservice session to accommodate the needs of the Prescott School teachers and to make it fun and worth their time.

Results of the teacher survey and a review of related research provided insight into the development and implementation of the inservice workshop. The studies recommend that to be effective, teacher inservice sessions should meet the teachers' expressed needs and interests, and also attempt to reduce or eliminate the obstacles that interfere with the teaching of EE.

With these thoughts in mind, the workshop objectives were:
* To reduce or eliminate teacher-perceived barriers to OEE instruction

* To offer "on-site" experiences for the teachers in order to help them recognize the educational potential of the Greenough Park and RNRA sites and to participate in "hands-on" activities at each site.

* To familiarize the teachers with the interdisciplinary nature of the program's curriculum materials, equipment, and available teaching resources

* To address field trip planning, transportation and safety issues

* To share tips and techniques to use in the field

* To encourage frequent, regular visits to the sites throughout the school year

* To motivate and excite teachers to use the curriculum and to promote its continuance in future years

The inservice training session was held last October, during teacher conventions. The full-day session involved classroom discussion of the curriculum format and content. Natural objects for "hands-on" manipulation, posters, and other materials were displayed around the classroom for teachers to observe how they can be utilized for instruction.

Visits to both nature sites provided teachers with the
opportunity to get acquainted with each site's special features and trail systems, and a chance to participate in "hands-on" activities. The remaining time was used to address field trip preparation and teacher questions or concerns.

**Teacher Evaluation of the Inservice Session**

At the conclusion of the workshop, the teachers were asked to complete a written evaluation of the inservice. (See Appendix E) Their comments provided insight into whether the inservice met their expectations and needs and to what degree it was able to reduce or eliminate some of the barriers.

Responses to the inservice were very favorable. The teachers felt the overview of the program was most helpful and they appreciated the opportunity to visit the sites and to participate in "on-site" activities. Below are some of their comments:

"Visits to the nature areas helped us gain some familiarity with what the sites have to offer."

"I've never been off the main trail in Greenough Park and I haven't been up in the RNRA. I will feel more confident about taking students there now that I've been in the bushes."

When asked whether they would visit the sites on a more regular basis with their classes, most said they would like to, but some still expressed concerns:

"I hope I can. It depends upon my class. Greenough Park can be dangerous when the creek is high. Without
a class I can trust, I'd be reluctant."

"We will visit Greenough Park more regularly, but probably not the RNRA, because of the distance." (to the site)

"I'm not sure. We have so much we have to do everyday. I have to keep moving or I'll rot!"

"Yes, both with my class and on my own. I feel it is more motivating to the students to experience what we're studying rather than only read about it."

All of the teachers felt they would use the equipment, posters, materials and multimedia resources in their classroom instruction and outdoor studies, and appreciated the efforts involved in obtaining them.

To ensure continuous use of the program in future years, many stated that additional inservices and "refresher" workshops would be helpful.

**Writer's Evaluation and Comments Regarding the Inservice Session**

Teacher comments revealed that the workshop was able to reduce some, but not all of the barriers to OEE. Transportation and funding issues were no longer considered major concerns when the teachers recognized the educational potential and accessibility of Greenough Park as an outdoor educational resource. Arrangements to the RNRA, via the Mountain Line will take a bit more effort, but occasional trips are possible.

Safety and liability issues are still a concern for some teachers, especially during periods of high water.
These fears could be reduced by scheduling trips to the creek during times of calmer water or by using areas away from the creek for study.

The pressure of a full teaching schedule is still considered an obstacle for some teachers. Failure to significantly decrease the importance of this barrier may indicate that not enough emphasis was placed on the multidisciplinary and interdisciplinary nature of OEE or that teachers still feel that OEE requires additional instruction time. More attention should be given to this barrier in future inservice sessions.

All of the teachers seem to possess a positive attitude toward OEE and a desire to include it in their curriculum. While the session may have reduced some teachers' feelings of inadequacy regarding their backgrounds in natural history or EE, others expressed an interest in acquiring further knowledge in the subject and assistance in integrating OEE into their teaching schedule. The teachers were encouraged to contact me for assistance and as a resource to accompany their classes on field trips.

The one-day session did not allow enough time to sufficiently cover all of the content areas and to adequately address infusion techniques and teacher concerns over planning, preparation and teaching time. A 2-3 day workshop or several mini-workshops may be more effective. It would also provide additional opportunities for the
teachers to experience the sites.

The writer volunteered to offer "refresher" workshops in the spring that would address these concerns and also increase teacher awareness of the seasonal changes occurring at the sites - the returning migratory bird life and the emergence of aquatic insects and wildflowers.

Followup visits to Prescott School during the winter months and teacher interviews conducted in February of 1993, yielded information on the program's usage following the inservice. (See Appendix F)

Results of the Followup Interviews

Four of the seven teachers reported using parts of the curriculum and supplementary materials since the teacher inservice. Only one teacher visited Greenough Park or the RNRA with his class. The other teachers cited extremely cold weather and icy conditions as reasons for not taking their classes outdoors. (This winter has brought more snow and colder conditions than those in recent years). Many commented that they plan to visit the areas, especially Greenough Park, when the conditions improve. One teacher commented that in the spring, he usually spends 2-3 days per week in the outdoors with his classes.

Aside from the weather, time factors were again mentioned as a concern. Some teachers have not had the time to adequately peruse the curriculum guide and to work out a
plan to incorporate the lessons and activities into their curriculum and teaching schedule. Other demands and special programs like D.A.R.E., a drug awareness program, compete for teaching time. Most expressed a need for additional time to become familiar with the guide and to "try it out". Some of the teachers felt that "refresher" workshops might be helpful in stimulating interest for springtime visits to the sites and they would be willing to attend if the district provides release time.

The interviews also provided some insight into how the teachers incorporate EE into their curriculum. While some of the teachers said that they infuse related EE topics and issues across the curriculum, (i.e. language arts, reading, social studies, and art), it is still perceived to be primarily a science subject. One teacher mentioned that EE infusion is difficult if the activities are not relevant to the basic skills requirements teachers are expected to teach. Another teacher stated that teachers must be motivated and creative to recognize and integrate EE into all subject areas.

Most of the teachers discuss environmental issues in their classrooms, covering a wide range of topics - land use issues, clear-cutting, air and water pollution and endangered species. Generally, the discussions arise from student interest in issues presented in the local newspaper, Weekly Reader articles and from other media sources. Some
of the teachers also incorporate issues when discussing related lessons in their science texts.

When asked whether lessons involving environmental activism should be included in the elementary curriculum, most of the teachers found this to be acceptable as long as both sides of an issue are presented and if students are free to express their opinions and to reach their own conclusions on an issue.

Lastly, the teachers were asked to comment on how to make OEE a viable, effective program at Prescott School. Some of their responses were:

"I believe that we've made a good beginning with the RVEP curriculum. If teachers care about the environment, they should use the program."

"Inservices and the use of resource specialists and teacher-leaders can be effective."

"The school could work on an environmental project."

"Just what you're doing - give us a tap on the head as a reminder."

"Teachers that are motivated and committed will teach EE. They know the importance of providing outdoor experiences for their students."

Based on teacher comments from the October inservice and the follow-up interviews, it is obvious that the teachers will need more time to become familiar with the program - to try the lessons and activities and to explore areas in their curriculum and teaching schedules where the material can be incorporated. Essentially, they need time to "road test" the program.
CHAPTER SIX

**Evaluation of the RVEP**

**and Recommendations**

Based upon the experiences derived from the planning, development and implementation of the project and a study of related literature in the field of environmental education, I offer the following assessment of the RVEP's strengths and weaknesses and recommendations that should be considered when planning future inservice sessions and modifying the curriculum.

**Strengths of the RVEP**

The curriculum -

* is presented in a teacher-friendly format
* is ecologically-based and is developed around the local ecosystem
* contains multidisciplinary and interdisciplinary lessons and activities for classroom and field study
* includes environmental issues of local interest
* contains content areas which correlate with Missoula District One's science objectives, teacher interest, and site offerings
* is a custom-tailored program requiring minimal teacher time and effort
* includes a teacher resource section containing ideas
and techniques for field trip planning, seasonal applications, and supplemental resources

The program-
* utilizes easily accessible nature areas for outdoor educational experiences
* provides a variety of field and classroom study materials and equipment at no cost to the district
* offers teacher inservice sessions that include visits to local outdoor nature sites to demonstrate their educational potential

Weaknesses of the RVEP

* The teacher inservice session was held in mid-October. A workshop offered in September, soon after school begins, would make better use of good autumn weather for field trips.
* The inservice was not sufficient in length to adequately cover all of the material and to address infusion strategies.
* Many of the lessons are too "science" oriented. (More emphasis should be placed on "non-science" activities).
* More emphasis should be placed on the higher level EE goals - those that focus on advocacy, skills
development and participation in environmental problem-solving.

* The program was not successful in reducing or eliminating all of the barriers to OEE.

Recommendations

1. Provide annual inservice training sessions in the fall to familiarize new teachers with the program and periodic "refresher" sessions to encourage regular visits to the sites throughout the school year.

2. Stress the importance of frequent class visits to the nature areas to discover and experience seasonal changes.

3. Emphasize the "holistic" nature of OEE - that it not be regarded as merely a "science" subject, but as a process and the foundation for all of education.

4. Provide lessons and activities that place less emphasis on science and more materials that can be adapted to non-science subject areas.

5. Attempt to further reduce the barriers concerning preparation time and teaching time by providing the teachers with suggestions and methods for incorporating OEE into their existing curriculum.

6. Encourage the teachers to share materials,
expertise and ideas for infusion with their colleagues. Teachers may wish to team teach by choosing content areas of interest to them and rotating classes.

7. Encourage the teachers to select 2 or 3 sections of the curriculum to incorporate each year and to add to them annually.

8. Encourage the teachers to utilize parents, resource specialists and other community members in OEE field trips and activities.

9. Encourage the teachers to provide their students with knowledge of and skills in the identification, investigation and analysis of environmental issues and action strategies.

10. Encourage the teachers to provide opportunities for students to practice these skills by involving them in projects that address environmental issues and problems in their school and community.

While the RVEP contains some lessons and activities concerning environmental issues and student involvement, it could be strengthened by providing more activities that emphasize advocacy and environmental action.

Teachers that are hesitant to address controversial issues in the classroom, or could use assistance in learning how to involve their students in environmental projects, would benefit from a teacher workshop that incorporates
methods and strategies for involving students in the investigation, analysis, and positive action toward the resolution of environmental problems and issues of local, national and international concern.

**Additional Comments**

At this paper's writing, it is too early to determine whether the RVEP has been successful in achieving its principal objective - to increase the instruction of OEE at Prescott School. Cold winter weather has deterred most of the teachers from visiting the sites with their classes. An evaluation conducted at the end of the school year will provide a more accurate assessment, as the teachers are more apt to utilize the curriculum and to visit the sites during the warmer spring months. Additional workshops offered in the spring may also influence teacher use.

The year-end assessment will be helpful in appraising the areas of the curriculum that need modification, whether barriers still remain and how they should be addressed, how future inservice training sessions should be designed, and the steps that should be taken to ensure continued use of the program. An evaluation of teacher use of the program will be of significance in deciding whether to expand the program to other schools and nature sites in Missoula.

The principal goals of the RVEP are to increase the frequency of student/teacher contact with their natural
surroundings and to increase the instruction of OEE. The program was specifically designed for use by the classroom teacher with his/her students for a number of reasons.

1. If the classroom teacher possesses the knowledge, skills and the commitment to incorporate OEE into his/her curriculum, then the time spent on OEE will very likely be more than that afforded by the occasional visit of an EE specialist or resource person.

2. The opportunity exists for improved teacher/student relationships when teachers share the experience of discovery and learning in the outdoors with their students. In the more relaxed atmosphere often present in the outdoor setting, students may view the teacher for the first time as a "real" human being. This relationship may carry-over into the indoor classroom as well.

3. The potential also exists for classroom teachers to serve as significant role models in stimulating interest in the environment and in developing attitudes of environmental awareness and responsibility in children.

4. The outdoor experiences may nurture in the classroom teacher a renewed delight and interest in their local environment which could stimulate personal involvement in local and global
environmental issues and concerns.

The potential benefits of participating in OEE experiences seem apparent for both students and teachers. This program has attempted to reduce the obstacles to teaching OEE and has provided the materials, equipment and training for teachers in order to ease the facilitation of OEE and to increase teacher attention to it. It is hoped that the Prescott teachers will make a personal commitment to the program and will take seriously their responsibility to help their students become environmentally literate individuals.
Implications for a District-Wide Program

Expansion of the RVEP to other schools and nature areas in Missoula could be accomplished with some minor curriculum modifications. Several local sites - Blue Mountain, McClay Flats, Pattee Canyon, the Big Flat, the Clark Fork River drainage, and neighborhood parks and natural areas could be utilized in a similar fashion for OEE. It would involve tailoring some of the existing lessons to the unique features available at each of the sites. Lessons and activities focusing on environmental issues and concerns relevant to a particular site and its local school community could also be included.

If Missoula School District One is interested in expanding the program to other elementary schools in the district, it might consider identifying a few target teachers in schools located near nature areas in the county that would be willing to adopt the program as an OEE project. The target teachers would implement the program for one year and then serve as mentor teachers training peers interested in incorporating the program into their schools' curricula.
CHAPTER SEVEN

Conclusion

Research indicates that to be successful, an EE program must win the support and commitment of the teachers who will be using it. Teachers are key decision-makers in curriculum planning and development, in textbook selection and in implementing instructional strategies. Therefore, it is essential that they be considered an integral part of EE program development in their schools.

Jody Stone (1989) states,

"If change in the educational system is to come about, teachers can be the primary instigators of these changes. It is the teachers who hold the key to the presently locked EE door."

Why has EE not been accorded an established place in the curriculum of most public schools? While most teachers possess positive attitudes toward teaching EE, many lack a personal commitment to do so. The fact that most teachers spend only a modest amount of time teaching EE does not correspond with their generally favorable attitudes toward EE. (Ham and Sewing, 1988)

Researchers believe this situation may be attributed to the cumulative effects of barriers that interfere with the teaching of EE, such as: a perceived lack of teacher preparation and instruction time; an already overcrowded curriculum; the lack of funding and appropriate curriculum materials; transportation and safety issues; and teacher
apprehensions about the suitability of their own backgrounds in EE and related subjects. (Ham and Sewing, 1988)

Attempts should be made to identify and reduce teacher-perceived barriers to EE. Studies conducted by Ham and Sewing (1988) indicate that "when such barriers are reduced or eliminated, attention given to EE by classroom teachers is likely to increase."

The RVEP is an experimental program that attempts to reduce or eliminate the obstacles identified by classroom teachers at a Missoula elementary school so as to increase the time spent on OEE. Other existing (and potential) OEE programs might benefit from similar attempts to identify and reduce barriers in their schools. Since barriers and teaching conditions vary from school to school, it is recommended that educators tailor OEE programs around a school's individual needs and develop strategies that address specific barriers and issues of importance to its teachers.

While attempts to reduce or eliminate barriers to EE are of critical importance, if teachers express apprehension about their competency or willingness to teach EE, it will affect their commitment to do so. Many on-the-job teachers received little, if any, environmentally-focused instruction during their preservice education. Having limited knowledge of EE goals, ecological concepts or EE instructional methods, they are often hesitant to teach a subject for
which they have had little preparation. (Ham and Sewing, 1988)

Effective teacher preparation programs and inservice training sessions for experienced teachers can motivate teachers to unlock the EE door and become active contributors to their students' environmental literacy, though, unfortunately, effective preservice EE training programs are few and far between. (Wilke, 1985).

In Montana, such programs are non-existent, due to a number of constraints present in our higher educational institutions. These include, the lack of a state mandate that requires preservice EE training for teacher certification; an already crowded teacher training program; and a lack of teacher education faculty trained in EE theory and methodologies.

Stone (1989) believes that efforts to prepare teachers to become effective and motivated environmental educators will continue to be hit-and-miss until higher education institutions adopt strategies that encourage and support teacher educators to include EE in their courses.

She makes the following recommendations:

1. the components of an effective EE teacher education program must be identified;
2. rather than force demands for new courses on college curricula, EE components should be infused across the curriculum into presently existing
teacher education courses;
3. teacher education faculty and other education policymakers must be convinced to make a commitment to EE training for all teaching majors;
4. teacher educators must be educated in EE theory, concepts and methodologies and in the strategies for incorporating EE training into their existing courses;
5. state EE coordinators need to press for the enforcement of state EE standards and mandates;
and,
6. textbook writers and publishers should be influenced to include EE materials in college methods and content textbooks.

Stone adds that while it is important that teacher educators acquire the knowledge and skills to effectively infuse EE into their courses, "until (they) possess positive attitudes toward EE, it is unlikely that they will be able to inspire preservice teachers effectively to incorporate EE into their teaching once they secure their own classrooms." (Stone, 1989)

Studies conducted by Peterson (1981) and Tanner (1980) supporting the influence of "significant life experiences" and teacher role models in fostering environmental sensitivity, also render important implications for teacher education. While teacher education institutions cannot
guarantee that students entering their programs have had access to "youthful outdoor experiences", they can provide preservice teachers with interesting and informative EE coursework conducted in natural settings. They can offer informal opportunities that allow their students to spend time in the outdoors so that they might rediscover their childlike "sense of wonder". Efforts should also be made to provide professors who are themselves environmentally informed and active individuals who can serve as educational and professional role models.

While much of this discussion has focused on the preservice teacher, "on-the-job" teachers must also be given opportunities to grow professionally and personally in their understanding and appreciation of the outdoors. Inservice training workshops can be very effective in motivating teachers to incorporate OEE into their curriculum. Inservice workshops should:

1. provide teachers with a knowledge of EE theory and goals and help them to understand the importance of addressing all goal levels in EE curriculum development and instruction.
2. assist teachers in acquiring the knowledge of how to plan, execute and apply EE concepts and principles to the out-of-doors.
3. provide teachers with the knowledge, skills and strategies needed to involve their students in the
investigation of environmental issues and in active participation in the remediation of local environmental problems in their communities.

4. stress the multidisciplinary and interdisciplinary nature of EE and demonstrate how to apply a variety of subject matter to the outdoors.

5. be offered "on-site" to allow teachers to experience nature "first-hand" and to become familiar with the site.

6. help teachers recognize the educational potential of the site and its potential safety hazards.

7. provide teachers with access to curriculum materials and teaching resources.

If the major goal of EE is to help our children acquire the necessary knowledge, attitudes, skills and dedication to become responsible stewards of the earth, then we must have enthusiastic teachers who recognize the value of teaching EE and who will make the commitment to incorporate it into their curricula.

Educators and concerned citizens who are interested in promoting EE in our public schools and would like to see it afforded an established place in the curriculum can support this process by lobbying their state educational policymakers and teacher education institutions to press for
the implementation and enforcement of state EE standards and mandates, and to provide effective teacher education programs that assist preservice teachers in acquiring the knowledge, skills, and confidence they need to teach EE.

We can also encourage public school administrators and school boards to provide support and professional incentives for experienced teachers to attend inservice teaching workshops, conferences, and continuing education classes in EE.

Teachers should also make a personal commitment to EE in their own classrooms and should recognize that their involvement and efforts in teaching EE can make significant contributions to our children's educational experience.

Teachers who value the environment and actively contribute to its preservation, appreciate the influence they have in helping shape their students' attitudes about the environment. These teachers find the time to take their students outdoors, they delight in discovery and seek to share nature's "sense of wonder" with them. They also recognize the importance of helping children to understand their role as members of the ecological community by emphasizing the importance of stewardship and by providing them with the necessary knowledge and tools to make present and future decisions concerning the environment.
Appendix A: Letter to the Science Leaders
Dear Science Leader: April 20, 1992

I am a graduate student in environmental studies at the University of Montana. As a master's thesis project, I plan to develop a curriculum guide of outdoor education activities for teachers to use with their students in Greenough Park and the Rattlesnake National Recreation Area (RNRA), north of Missoula.

The guide will be designed to serve as an extension of School District One's science curriculum, and will provide activities that examine biology and behavior, natural history, habitats, ecological interactions, and human impact.

In addition, I plan to conduct a teacher inservice training session that will provide teachers with the opportunity to use the guide "on-site".

The project will be conducted at Prescott School. Based on its success, it may be expanded and adapted to other schools and natural sites in the city.

In order to design a curriculum guide and inservice training session that will be effective and meet the needs of teachers and students, I wish to survey School District One 4th & 5th grade teachers to appraise existing programs and possible barriers to the teaching of outdoor education.

Enclosed in the manilla envelope are the surveys. Each survey is accompanied by a cover letter, (personally addressed to the 4th & 5th grade teachers in your building), which explains the reason for the survey and requests that it be returned to you by May 1st.

I would greatly appreciate your cooperation and participation in the survey process. A check-off list is included in the packet to help you keep track of the returned surveys. Once collected, the surveys should then be placed in the manilla envelope and returned via the dray system to the curriculum office in the Ad Building.

The survey information provided by the participants will be confidential and will be utilized solely by me in the development of the curriculum project.

Thank you for your time and help with this matter.

Sincerely,

If you have any questions regarding the survey process, my phone number is 543-4037.
Appendix B: Letter to the Teachers
Dear __________________________: April 20, 1992

I am a graduate student in environmental studies at the University of Montana. As a master's thesis project, I plan to develop a curriculum guide of outdoor education activities for teachers to use with their students in Greenough Park and the Rattlesnake National Recreation Area (RNRA), north of Missoula.

The guide will be designed to serve as an extension of School District One's science curriculum, and will provide activities that examine biology and behavior, natural history, habitats, ecological interactions, and environmental issues. The concept of human impact on the environment will be addressed and the importance of stewardship will be emphasized.

The lessons will include:
* "hands-on" activities and observations
* discussions and multidisciplinary extension activities
* background material for teachers and pre-trip activities

A teacher-training component will focus on:
* "on-site" use of the guide
* pre-trip planning ideas
* transportation and safety measures
* tips and techniques in the field
* encouraging regular visits to the site to observe seasonal changes

The project will be conducted at Prescott School. Based on its success, it may be expanded and adapted to other schools and natural sites in the city.

Missoula is unique in that it offers so many natural areas in close proximity to town. Kids must be able to EXPLORE - EXPERIENCE - and LEARN about the natural world through personal interaction. We can foster that awareness via outdoor education and perhaps through such contact, nurture the values of environmental appreciation and preservation.

Attached is a survey form designed to obtain information from you which will be valuable in the development and implementation of a curriculum project that will be effective and useful to teachers and students. The information garnered from the survey will be confidential and utilized solely by myself in the development of the project.

Thank you for your attention and cooperation on this matter. Sincerely,
Appendix C: The Survey Instrument
CURRICULUM GUIDE SURVEY

SCHOOL ___________________ NAME ________________________________

GRADE LEVEL _______________ TOTAL YEARS TAUGHT _____________

1. Do you presently teach outdoor/environmental education?

2. If not, why do you choose not to teach it?

3. Currently, how often do you take your class to an outdoor natural area? What areas have you visited?

4. How often would you like to visit a site, if transportation wasn’t a problem?

5. Which of these restrictions do you consider to be major obstacles to your school’s ability to develop and carry out an environmental education program? (x - all that apply and * the 2 most critical factors)

   ___ lack of funds
   ___ lack of inservice training
   ___ lack of curric. materials
   ___ lack of mandatory policy
   ___ length of school day
   ___ safety & liability concerns
   ___ lack of qualifications in environmental education

   ___ lack of planning time
   ___ lack of transportation
   ___ length of school day
   ___ controversy
   ___ other

6. Do you use:

   ___ teacher-written/initiated materials
   ___ commercially prepared or agency-produced materials
   ___ resource specialists for presentations to class
   ___ other _________________________

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7. Have you participated in any environmental education workshops, courses and/or curriculum design? Which ones?

8. What factors would be most effective in encouraging the use of the curriculum guide and easing facilitation of the program for teachers?

9. Do you have any suggestions for making inservice training sessions more effective and worthwhile for teachers?

10. What units of study do you currently teach that would be enhanced by learning activities at the RNRA (or other natural site?)

11. What topics relating to seasons would you like to see represented?

12. Further suggestions or comments?

PLEASE RETURN THIS SURVEY TO ____________________ BY MAY 1st.

THANK YOU FOR YOUR TIME. YOUR HELP IS VERY MUCH APPRECIATED!
Appendix D: Letter to the Montana Department of Natural Resources and Conservation
October 19, 1992

Debra Parry, District Administrator
Missoula County Conservation District
5115 Hwy. 93 South
Missoula, MT  59801

Dear Debra:

Enclosed are the receipts for the equipment and materials that will be used in the outdoor education program at Prescott School.

I have paid for the equipment out of my personal funds. Below is a list of the equipment, the supplier and costs:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Supplier</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Bushnell binoculars</td>
<td>BobWards</td>
<td>$204.71</td>
</tr>
<tr>
<td>Misc. equipment</td>
<td>Elementary Specialties</td>
<td>$337.36</td>
</tr>
<tr>
<td>(see invoice)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screening material and dowels for making kick nets,</td>
<td>Mahlum Ace Hardware</td>
<td>$10.12</td>
</tr>
<tr>
<td>battery for microscope</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 - 5&quot; kitchen strainers</td>
<td>Osco</td>
<td>$12.76</td>
</tr>
<tr>
<td>(for aquatic insect study)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$564.95</td>
</tr>
</tbody>
</table>

Thank you again for funding the Rattlesnake Valley Ecology Project for Prescott School. Last Thursday, I conducted a 6-hour teacher inservice to present the curriculum and to familiarize teachers with its use in the nature sites (Greenough Park and the Rattlesnake National Recreation Area). I will be providing additional after-school sessions in the Spring and will be available to accompany classes on field studies.

The teachers will begin using the curriculum shortly and will give periodic reports on its utilization and implementation. I will send you a report letting you know what is happening. I plan to stay in touch with the school so as to assist them and encourage their continued use of the program.

Sincerely:

Kari M. Lind
3816 Timberlane
Missoula, MT  59802  # 543-4037
Appendix E: Inservice Evaluation Form
Thank you for attending the inservice last Thursday. I hope that it was worthwhile for you and that it provided some new ideas for teaching outdoor environmental education. Your responses to these questions will help me in evaluating the inservice session and in planning future workshops.

Due to time limitations, we were unable to cover all sections of the curriculum. It may help to look over the material in the Teacher Resource Section before planning your field studies as it provides information on field trip planning, preparation and safety issues.

Feel free to call me if you have any questions or would like additional information on environmental/outdoor education. I would enjoy accompanying your class on a trip. Also, I'd be happy to offer some after-school sessions if anyone is interested in trips to Greenough Park, Mount Jumbo or the Rattlesnake Recreation Area.

1. What aspects of the inservice were most helpful? Least?

2. Was the discussion of the curriculum contents and activities and how they are used, helpful to you?

3. Were the trips to Greenough Park and the RNRA worthwhile? How?

4. Which subject areas in the program most appeal to you?

5. Did the inservice adequately explain the program and provide ideas for its facilitation?

6. Will you be more apt to use the curriculum at Greenough Park or the RNRA after participating in the workshop?
7. Do you think that you will use the curriculum or parts of it?

8. Can you offer any suggestions or modifications in the curriculum's format or content? in the inservice session?

9. Do you think that you will utilize the posters, materials, equipment and videos in your classroom instruction and outdoor studies?

10. Do you foresee visiting Greenough Park and the RNRA on a more frequent basis throughout the year? Why or why not?

11. Do you feel that further assistance is needed to incorporate the curriculum into your teaching schedule? Explain.

12. What steps might help to ensure continuous use of the program in future years? (Additional inservices, refresher sessions, new lessons and activities, other ideas?)

13. Do you think programs such as this should be adapted and expanded to natural areas near other schools in the district?

Thanks again for your time and assistance. I thoroughly enjoyed working with you all and hope the program will serve your needs in exploring and experiencing the natural world with your students.

Kari
Appendix F: Interview Questions
INTERVIEW QUESTIONS FOR PRESCOTT TEACHERS

February 18, 1993  Name __________________________

1. Have you been using the Rattlesnake Valley Ecology Project (RVEP) curriculum and equipment since the teacher inservice in October?

2. What sections have you used? are currently using?

3. How have you "fit" environmental education into your curriculum? Do you teach it as a separate subject or "infuse" it into other subject areas?

4. Have you visited Greenough Park or the RNRA with your class since the inservice? What activities did you do at the site?

5. If you have not been using the program, what factors have prevented you from using it?

6. What are your concerns and needs?

7. For those of you that are using the program, are there barriers that affect the amount of environmental education that you can fit into your daily schedule or overall curriculum? What are they?
8. How can we reduce or eliminate some of these barriers and meet your needs in order to encourage greater use of the program and more frequent visits to the nature sites?

9. Do you feel that the RVEP curriculum is too comprehensive, too overwhelming? What suggestions do you have for modifying it or adapting it to fit your time schedule and curriculum?

10. Would a refresher workshop help to stimulate interest and revitalize the program?

11. Would you be willing to attend a workshop this spring? When would it be most convenient for you? (Perhaps we could arrange to offer it as a PIR day)

12. Do you discuss environmental issues in your classroom? What issues have you addressed? How have you incorporated them into your curriculum? (lessons, activities, action strategies?)

13. Can we add them to the RVEP curriculum?

14. Is it appropriate to include lessons around environmental activism in the curriculum? If so, how might we accomplish this?

15. What are your opinions as to how can we make environmental education a viable, effective program at Prescott School?

16. How can we encourage its continuance in future years?
Appendix G: The Goals of Environmental Education
LEVEL I: ECOLOGICAL FOUNDATIONS . . . THE KNOWLEDGE OF KEY CONCEPTS AND ALLIED ECOLOGICAL PRINCIPLES

1. Students gain sufficient knowledge of ecology to permit them to make ecologically sound decisions with respect to both humans and the environment.

LEVEL II: THE AWARENESS OF ISSUES AND HUMAN VALUES . . . THE KNOWLEDGE OF HOW HUMAN ACTIVITIES MAY INFLUENCE THE RELATIONSHIP BETWEEN QUALITY OF LIFE AND QUALITY OF THE ENVIRONMENT

2. Students gain an understanding of the ways in which human cultural activities (economics, religion, politics, social customs, etc.) influence the environment.
3. Students gain an understanding of the ways in which individual human behaviors impact on the environment.
4. Students gain an understanding of a wide variety of environmental issues and both the ecological and cultural implications of these issues.
5. Students gain an understanding of the various alternative solutions for solving (or partially solving) particular environmental issues. The ecological and cultural implications of these solutions are considered.
6. Students gain an understanding of the roles played by differing human values in environmental issues.


7. Students develop those skills which will enable them to identify and investigate environmental issues using both primary and secondary sources of information.
8. Students develop those skills which will enable them to analyze environmental issues and the associated value perspectives with respect to their ecological and cultural implications.
9. Students develop those skills which will enable them to identify alternative solutions for particular issues and to evaluate those solutions with regard to their cultural and ecological implications.
10. Students develop those skills which will enable them to identify and evaluate their own value positions related to particular issues and to the solutions proposed for those issues.
11. Students are provided with opportunities to participate in the valuing process in order to examine their own values with respect to both quality of life and quality of the environment.

LEVEL IV: CITIZENSHIP ACTION . . . THE DEVELOPMENT OF THOSE SKILLS NECESSARY FOR STUDENTS TO TAKE APPROPRIATE ENVIRONMENTAL ACTION

13. Students develop those citizenship skills which will enable them to take either individual or group action (i.e., persuasion, consumerism, political action, legal action, ecomanagement) where such action is appropriate for the purpose of solving, or assisting to solve, particular environmental issues.
14. Students are provided with opportunities to apply citizenship skills in making decisions concerning appropriate environmental action strategies to be used with respect to particular environmental issues.
15. Students are provided with opportunities to take citizenship action on one or more environmental issues.

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