



Implementation and evaluation of the NESAs program at Glacier National Park, Montana  
by David Vernon Pettitcord

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE  
in Earth Science

Montana State University

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Abstract:

The National Environmental Study Area (NESA) program was instituted by the National Park Service in 1968 to make the natural and cultural resources of the National Park System formally available to the nation's educational community, Glacier National Park's participation in the program began in 1970. Central to the program has been the selection of environmental study areas, called NESA sites, to be used by students from local schools for environmental study in the park.

The educational objectives of the program were formulated by the National Park Service and the National Education Association, Of primary concern in implementation of Glacier's NESA program was the means of meeting these objectives to provide the student with an effective environmental education experience. Considerations included selection of NESA sites that had viable educational potential, development of instructional activities relevant to out-of-classroom learning in the sites, preparation of teacher resource information materials, and teacher orientations providing useful insights into NESA site utilization.

After selection of NESA sites in 1970, the first NESA teacher workshop was held in 1971 with Columbia, Falls School System, This resulted in occasional use of park NESA sites by teachers of this school system. The need was then recognized to promote full-scale interest in and awareness of the program in the entire park locale. This was accomplished through various means and resulted in a pilot NESA program involving the Whitefish and Kalispell school systems.

The findings of the study, based on the pilot program and questionnaires completed by participating teachers, indicate that the most relevant type of instructional activity is based on inquiry methods. The two methods found to be effective were student analysis of study plots and random exploration of NESA resources under the guidance of a teacher or parent. Findings also indicated that small, informal teacher orientations were preferred over large, and lengthy formal workshops; and that the field aspect of the orientations provided the teachers with the most useful insights into NESA utilization, The study also indicated that teacher resource information materials needed improving to provide more detailed information on resources of the NESA sites. Finally, the study provided insight into definition of the respective roles of teachers and resource persons in the NESA program, determining that the role of the resource person is to provide information to teachers on NESA resources, and that the teachers provide instruction to their classes at the sites.

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AT GLACIER NATIONAL PARK, MONTANA

by

DAVID VERNON PETTICORD

A thesis submitted in partial fulfillment  
of the requirements for the degree

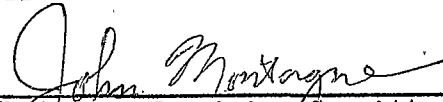
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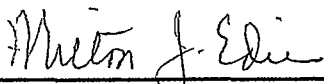
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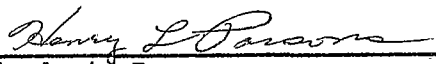
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Approved:

  
Chairman, Examining Committee

  
Head, Major Department

  
Graduate Dean

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ABSTRACT

The National Environmental Study Area (NESA) program was instituted by the National Park Service in 1968 to make the natural and cultural resources of the National Park System formally available to the nation's educational community. Glacier National Park's participation in the program began in 1970. Central to the program has been the selection of environmental study areas, called NESA sites, to be used by students from local schools for environmental study in the park.

The educational objectives of the program were formulated by the National Park Service and the National Education Association. Of primary concern in implementation of Glacier's NESA program was the means of meeting these objectives to provide the student with an effective environmental education experience. Considerations included selection of NESA sites that had viable educational potential, development of instructional activities relevant to out-of-classroom learning in the sites, preparation of teacher resource information materials, and teacher orientations providing useful insights into NESA site utilization.

After selection of NESA sites in 1970, the first NESA teacher workshop was held in 1971 with Columbia Falls School System. This resulted in occasional use of park NESA sites by teachers of this school system. The need was then recognized to promote full-scale interest in and awareness of the program in the entire park locale. This was accomplished through various means and resulted in a pilot NESA program involving the Whitefish and Kalispell school systems.

The findings of the study, based on the pilot program and questionnaires completed by participating teachers, indicate that the most relevant type of instructional activity is based on inquiry methods. The two methods found to be effective were student analysis of study plots and random exploration of NESA resources under the guidance of a teacher or parent. Findings also indicated that small, informal teacher orientations were preferred over large, and lengthy formal workshops; and that the field aspect of the orientations provided the teachers with the most useful insights into NESA utilization. The study also indicated that teacher resource information materials needed improving to provide more detailed information on resources of the NESA sites. Finally, the study provided insight into definition of the respective roles of teachers and resource persons in the NESA program, determining that the role of the resource person is to provide information to teachers on NESA resources, and that the teachers provide instruction to their classes at the sites.

## CHAPTER I

### INTRODUCTION

The National Environmental Study Area (NESA) program is an environmental education endeavor initiated by the National Park Service in 1968. It was formulated with the intent of making the natural and cultural resources of the National Park System formally available to the nation's educational community. Central to the program has been the development of environmental study areas, called NESA sites, for school use in various parks across the country.

Assisting in the development of the NESA program have been the National Education Association, which in 1969, in support of the program, established Project Man's Environment (NEA, 1970a); and the U.S. Office of Education which maintains a registry of NESA sites in park and non-park areas.

Implementation of the NESA program in Glacier National Park, a major unit of the National Park System, was begun in Fall, 1970. Four NESA sites were selected within the park, and preparation of descriptive resource materials was begun. School administrators and teachers in Flathead, Glacier, and other counties in the park locality were then informed of the program and of the environmental education potential of the park NESA sites. This led to initiation of pilot programs with two school systems near the park.

The educational objectives of the NESA program, set forth by the National Park Service and the National Education Association (NEA, 1970b),

are:

1. To introduce the student to his total cultural and natural environment, past and present.
2. To develop in the student an understanding of how man is using and misusing his resources.
3. To provide an opportunity for the student to work directly with environmental problem-solving.
4. To equip the student to be a responsible member of the world that is shaping him and that he is shaping.

The park NESAs are, in essence, windows into the ecological, geological, and historical processes and events that have created the park environment. They are used to introduce the student to the natural and cultural environment of the park. This knowledge provides a foundation for helping the student understand other environments, and man's use or misuse of these environments. Hopefully, this will lead the student to become involved in environmental problem-solving and decision-making through available avenues.

#### STATEMENT OF THE PROBLEM

Glacier's NESAs program, having only recently been instituted, is still in the formative stages. The NESAs pilot program, involving the park and local elementary schools, is concerned with certain basic questions. What type of instructional methods and techniques are appropriate to out-of-classroom learning and to the resources of the NESAs sites? What must NESAs resource information materials contain to make them effective? How should teacher NESAs orientation be conducted?

What types of resources do NESA sites need to make them useful educational tools for the teacher and classes?

These and other aspects of the program, including the activities involved in promoting interest and awareness of the program in the local educational community are the core of the study problem. All aspects of the study are concerned, in the last analysis, with developing the park NESA program as a useful means of outdoor environmental education for local schools.

#### STUDY METHODS AND PROCEDURE

The study will include a report on the activities and steps contained in the implementation of the program. The report on implementation will be in narrative form. Sources of information for this will include participating teachers, park resource persons, and park files and records.

An essential part of the implementation has been the preparation of NESA resource information materials. These include the teacher NESA classroom and field guides. They have been prepared primarily by the investigator, assisted by other park resource persons, and by incorporating materials and suggestions of participating teachers.

Evaluation of the program has been accomplished mainly through administration of questionnaires to teachers involved in the pilot program. The questionnaires solicit teacher opinion on teacher orientation and student instructional activities, with emphasis on how these can be improved. The evaluation is presented in narrative and

tabular form.

#### LIMITATIONS

The study focuses on NESAs implementation activities beginning in Fall, 1970, and extending through Spring, 1974. It also briefly includes the events from 1968 to 1970 which, although not part of the NESAs program, helped lay some of the foundation for its implementation.

Distribution of questionnaires is limited to teachers participating in the pilot program which extended from Spring, 1973, to Spring, 1974; and included six first grade teachers and classes of the L.A. Muldown Elementary School, Whitefish, Montana, and eleven teachers and classes, grade one through six of the Peterson and Edgerton Elementary Schools, Kalispell, Montana.

For the most part, the teacher guide materials developed during the study are intended for elementary grade teachers, since the greatest demand for utilization of the park's NESAs sites is made by elementary schools. However, the materials are adaptable for secondary use also.

Consideration was given to evaluation of the environmental knowledge and aptitude of students from the above-mentioned schools. However, since the focus of the study is on teacher evaluation of the program through the teacher questionnaires, student evaluation was judged to be beyond the scope of this study. It would, however, be a possible problem for any subsequent studies of the park NESAs program.

#### DEFINITION OF TERMS

Environmental Study Area. A place, usually a plot of land on or

off school property, that contains resources used in teaching those aspects of environmental curriculums which can best be taught outside the classroom.

N.E.S.A. or NESAs. The National Environmental Study Area program administered by the National Park Service, the National Education Association, and cooperating agencies and institutions.

NESA site. An environmental study area on National Park or other public or private lands. Normally, to qualify as a NESAsite, it must meet designated educational criterion, and be registered with the U.S. Office of Education on an inventory of NESAsites.

National Park area. As used in this study, any unit of the National Park System, whether designated as a National Park, National Monument, National Recreation Area, or National Park Service Regional, State, or Field Office.

Resource person. Refers in this study to an employee of the National Park Service who has job responsibility in some aspect of the NESAs program. Officially, this person might be a Park Naturalist, Park Ranger, Park Historian, Biologist, Geologist, Environmental Specialist, or other.

NESA resources. These are the various geological, ecological, and cultural factors contained in a NESAsite, including plants, animals, soils, landforms, streams, historical sites and artifacts, and the like.

Investigator. Refers to the author of this study, who, as an

employee of Glacier National Park, served as principal resource person and NESA Coordinator, during the park NESA pilot program.

## CHAPTER II

### REVIEW OF THE LITERATURE

There is a wealth of literature dealing with the subjects of environment and environmental education. The review of literature will focus mainly on those aspects which are most pertinent to implementation and evaluation of environmental study area programs.

#### ENVIRONMENTAL EDUCATION LEGISLATION AND OBJECTIVES

In 1970, Congress passed the Environmental Education Act:

...to authorize the U.S. Commissioner of Education to establish education programs to encourage understanding of policies and support of activities designed to enhance environmental quality and maintain ecological balance (Woock, 1972).

A main thrust of the Act was to encourage and to provide financing and grants to support environmental education innovations, including curriculum developments and pilot studies. The Act also established the Office of Environmental Education, now called the Division of Technology and Environmental Education, to administer the grants.

Prior to, and concurrent with legislative proceedings, educators were defining environmental education objectives. Stapp and associates (1971) wrote this definition:

Environmental education is aimed at producing a citizenry that is knowledgeable concerning the bio-physical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution.

Stapp expressed the concern that urban man, not having intimate contact with the basic biological and physical resources that support life, has lost perspective on their meaning in his life. He believes



that traditional conservation education programs fail to relate the importance of these resources to man's everyday needs. His aim, as expressed by the foregoing definition, is to insure that citizens are equipped with a fundamental understanding of biological, physical, and social processes pertaining to the environment. Thus informed, citizens should be able to analyze and judge actions that affect the environment, and be motivated to express their judgment through social, economic, and political decision-making processes.

Clark's (1971) view of environmental education is:

...to bring home to every citizen, so that he knows it deep in his heart and bones, the simple facts that he is absolutely dependent on his environment, that he is affected by his environment, and that he affects his environment.

Total environmental understanding, according to Clark, involves the engineer who is fully cognizant of the ramifications of soil erosion, the industrial lawyer who is aware of the effects of pollution on watersheds, the realtor who recognizes the suitability of various types of soils for land subdivision, and the sportsman who understands the mechanics of wildlife population regulation. And perhaps most important, the school administrator who considers development of environmental conscience in students on equal terms with other curriculum demands.

Clark (1972) also wrote of the responsibilities of government field level personnel in environmental education, which includes park resource persons. He believes that they are major avenues of contact and education for the public and must be fully informed of

the land management policies of their employing agencies in order to keep the public informed.

A summary of environmental education objectives found in the literature reveals three common fundamental steps. They are first, to help the student understand the environment, of what it is composed and how it operates. Second, to help the student understand man's affect on the environment, positive or negative. Third, to motivate the student to become involved in the environmental action and decision-making processes. Pervading each of these steps is the consideration for development of the student's environmental ethic.

#### THE MEANING OF ENVIRONMENTAL ETHIC

Leopold (1966) stated that an ethic develops to replace free-for-all competition. Such an ethic occurs in lower life forms in the function of "symbiosis." Symbiotic relationships between organisms involve cooperative mechanisms that assist in support of life of these organisms. Leopold believes that politics and economics, for example, are advanced forms of symbiosis in humans; that is acceptable methods of cooperation to replace free-for-all competition.

Yet, according to Leopold, we have not yet evolved to the point where we have developed a code of ethics in dealing with our environment. He states (Leopold, 1966):

We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.

Regarding land as a commodity, if we see no economic value to it,

including the air, water, plants and animals, we waste or deplete it. In doing so we may be short-circuiting the processes that sustain our existence.

McHarg (1971) writes of the role of man in the environment, observing that man is the most "uniquely perceptive and conscious animal." Man is capable of regulation of the biosphere and conscious of this ability. Because man is of the biosphere, entirely dependent on it, and able to perceive what needs to be done to protect it, the responsibility for environmental management rests with him. The role of man, then, is "steward of the biosphere." Whether or not man accepts this responsibility depends on the development of a citizen environmental ethic and this depends largely on environmental education endeavors.

#### THE LAND AS A FOCUS OF ENVIRONMENTAL STUDY

The spectrum of environmental problems is broad and confusing. In environmental study it is difficult to know where to begin, on which aspect of the environment to focus. This question is especially significant to the National Park Service in operation of NESA programs because of the need to focus on that aspect of environment which most closely relates to park resource management.

There are writers who offer some valid perspectives for school study of environmental study areas. The Citizen's Committee on Environmental Quality (Jeske, 1973) states:

Of all the factors that determine the quality of our environment, the most fundamental is the use we make of our land.

Similarly, Train (Jeske, 1973) contends:

Land use is the number one environmental problem facing the nation today. The problems of land use are rapidly reaching crisis proportions. There is no environmental problem more serious than our land use dilemma.

For the purpose of this study, these statements help narrow the gamut of environmental problems to focus on understanding the land and its use.

Leopold (1966) said that land is "not merely soil; it is a fountain of energy flowing through a circuit of soils, plants, and animals." Land has both structure and function. Structure means the type, quantity and physical arrangement of soils, plants, and other resources. Function includes primarily energy flow through these resources. Leopold is concerned with man's effect on these energy circuits.

McHarg (1971) illustrates how environmental study areas can provide an insight into how man's misuse of resources can affect the quality of the environment and the quality of living. He explains the geological and ecological processes in operation in a sand dune community; a type of natural community frequently used by schools accessible to coastal or desert areas as environmental study areas.

Sand dunes and the organic life that inhabit them are closely interrelated. Plants adapted for survival in dune fields form complex intertwined networks of root systems that stabilize dune movement, especially in the face of storm winds. Understanding this concept is a fundamental in preservation of property and life along heavily inhabited

ocean coastal areas. Barrier dunes prevent flooding of these areas during times of storms. Dunes and dune plant life that have been disturbed by the impact of man's activities, such as house or road construction, are more readily breached by waves, allowing flooding of bays, beaches, and beach communities.

#### ENVIRONMENTAL STUDY AREAS AND RELATED PROGRAMS IN THE UNITED STATES

A joint study by the Educational Facilities Laboratories and the National Park Service (1972) provides insight into the scope of environmental study programs in the United States. It describes 46 projects that are related directly or indirectly to utilization of facilities outside the classroom for environmental study.

The projects vary in size, from the resident program at Clear Creek Camp in the San Gabriel Mountains near Los Angeles which serves 10,000 students of the school system annually, to a relatively small program serving sixth grade students on Alaska's Kenai Peninsula. The study describes programs found in diverse geographical terrain, from the examination of rain forests by Crescent City Schools in northern California, to the investigation of desert environments by Alamogordo, New Mexico Public Schools, or alpine studies in Aspen, Colorado.

Many of the programs originate in major metropolitan areas, including New York City, Baltimore, Miami, and Pittsburgh. Students in these programs are transported to resident facilities on the fringes of the areas, or conduct their environmental study right in the heart of urban areas. In a blighted area of Brooklyn, for example,

junior high students inventory and catalogue the physical characteristics of their immediate school environment.

Hill (1972) describes environmental study area related programs funded under Title III (ESEA). The Fall River, Massachusetts Public Schools designed a program emphasizing study of water. The students assist in the study of a small pond beset by algae nuisance. They also study the local water supply and a nearby bay, focusing on thermal pollution. The Topeka, Kansas Unified School District No. 501 program takes students on field trips to examine various aspects of the environment. Returning to the classroom the students develop solutions to environmental problems encountered.

The National Education Association (1970a) reports on a comprehensive statistical study of environmental education programs in public schools. A main emphasis is the use public schools make of local and National Park services and other similar resources. It covers all school systems in the United States with 1,000 or more pupils, totaling ninety per cent of the pupils in the country.

#### MONTANA PUBLIC SCHOOL PROGRAMS

Bennett (1971) describes the Falls Creek Project located near Missoula. Secondary students and teachers went into the Bob Marshall Wilderness to study biotic communities as a basis for comparison with human communities. Subsequent field trips took students along the Columbia River drainage from Missoula to examine rural and urban communities, including Portland and Seattle. Along the way they

studied judicial law to illuminate the conflicts between this and natural law.

In a program with the theme "Environmental Education in a Rural Setting," Swant (1972) has developed a program serving elementary and secondary students and teachers in the Deer Lodge area. Included in the program are six environmental study areas that represent the major types of ecological systems, including forest, prairie, lake, and river. The program also provides comprehensive materials, such as classroom audiovisual equipment and field equipment. The overall intent of the program is to assist the teacher and student in environmental education development.

Parsons (1972), in a master's thesis study, outlines six objectives for environmental study. The two most relevant to the Glacier NESAS study are:

1. To move the learning experience from an entirely artificial classroom setting to the real life environment.
2. To provide learning experience that cannot be structured in the classroom.

The project involved a unit of ten lessons taught to third and fourth grade students dealing with such things as sensory awareness, the concept of environment, the web-of-life, and various ecological processes. The first seven lessons take place in the classroom; the final three out of the classroom on the school grounds. The unit was then culminated with a field trip to an environmental study area. The study describes in detail methods and techniques of classroom and

and field environmental study.

GENERAL FACTORS INVOLVED IN UTILIZATION  
OF ENVIRONMENTAL STUDY AREAS

In a survey of teachers, Mirka (1973) listed various factors of concern to teachers in utilization of out-of-classroom environmental study facilities. Among those indicated are:

1. Recognition of outdoor sites as teaching areas.
2. Knowledge of outdoor education activities.
3. Availability of resource persons.

He believes that improvement is needed in these and related areas of teacher training in environmental education.

In regard to "recognition of outdoor sites as teaching areas," the NEA (1970b) feels that educators and resource managers should work cooperatively in the selection and planning of sites as environmental study areas. Teachers should enlist the aid of the resource person for information on the qualifications of the site; and resource persons should consult with teachers and administrators in developing the education potential of the sites.

The NEA lists certain characteristics which the sites should display:

1. Specific educational possibilities.
2. Contain elements that illustrate the effects of human activity.
3. Be easily accessible to students.
4. Have such facilities as parking areas, drinking fountains, and restrooms.



5. Be resistant to repeated use by groups for study.

Hammerman & Hammerman (1969) state, regarding teacher knowledge of outdoor education activities, that the teacher's role is not to lecture and to factualize, rather to "lead pupils to familiarize themselves with ...unknown objects (environmental study area resources) by close first-hand study." The teacher acts as a catalyst to promote inquiry, capitalizing on student curiosity to direct student observations.

Stefanich (1973) writes that "teaching strategies that encourage children to develop skills of inquiry for use in analyzing scientific phenomena ...are of utmost importance." He describes two approaches: (1) conceptual schemes and (2) scientific processes. In the conceptual schemes approach the student comes to an understanding of a concept or "big idea" through assigned exercises and observations. Scientific processes involves those steps which a scientist takes in making scientific investigation. In this process, the scientist observes, measures, classifies and formulates hypotheses. This is done by the student, with skill dependent on his grade level.

Suchman (Stefanich, 1973) offers further insight into the processes of inquiry, defining it as "messing around with stuff, getting ideas, messing around with ideas, developing hypotheses, and messing around with stuff again." His suggested procedure for engaging students in inquiry learning is summarized as follows:

1. Create proper conditions--provide freedom and responsive environment. This may require teaching certain cognitive facts.

2. Present a problem for solution--a discrepant event.
3. Students ask questions to gather data. Questions should be phrased for a yes or no answer.
4. Promote and encourage as many questions as possible.
5. Pupils confer with each other.
6. Theories should be encouraged. Teachers should remain as objective as possible. Students should be encouraged to think out theories with teacher refraining from filling in the gaps.
7. Encourage students to test their theories.
8. Teachers review and summarize concepts presented, and try to relate to concept about the problem.
9. Theories are reviewed and accepted or rejected by the group through discussion.
10. Teachers should follow up with activities relating to the concept that helps student internalize the concept.

Regarding the availability of resource persons, the Mirka survey questions the role of such persons in implementation of an environmental study area program. In reference to this, resource persons of the Bureau of Sports Fisheries and Wildlife state that "our job is not to teach, but to help make our resources available to those who can" (Charles, Landin, Personius, 1973). They stress that teachers do not have to be experts on subject matter to lead successful learning experiences for their students. Through the inquiry approach, the curious and open teacher can captivate his student's interest, and help him get a better "feel" for problem-solving while searching together for answers.

## CHAPTER III

### NESA PROGRAM IMPLEMENTATION

The period beginning in Spring, 1968, and extending through Fall, 1970, saw Glacier Park personnel involved in environmental education activities which, although not as yet formally designated as NESA activities, were to play an important role in implementation of the NESA program in the park. There is no clear-cut definition between the end of this period and the beginning of NESA implementation. One period more or less blended into the other. However, for the purposes of this investigation, the park's formal involvement in the NESA program began in the latter part of 1970.

### PRE-NESA ACTIVITIES--1968-1970

The first formal record of Glacier Park's involvement in environmental education is documented in an inventory of potential environmental education resources in the park (Park Files, 1969). This survey included the names of personnel who would be utilized as resource persons, an inventory of existing, ongoing naturalist conducted programs, and a description of facilities that related to environmental education in some way. These facilities included exhibits, visitor centers, audiovisual programs, nature trails, photo and slide files, and park publications.

Also in 1968 a park Environmental Education Keyman was appointed to coordinate the various park efforts in this regard. An environmental education progress report about this time indicated the park had begun presenting film and slide programs on environmental subjects to local schools; during which time, pupil opinion on environmental matters

was solicited (Park Files, 1968).

The most significant environmental education effort on the part of the park in cooperation with local schools during the 1968 to 1970 period was the initiation of an "environmental awareness" program with Cutbank Public Schools. This brought park resources into formal environmental education use for the first time. It was a relatively concisely programmed effort, involving pre-site, on-site, and post-site studies by sixth grade students.

Objectives of the program included study of park ecosystems, as well as study of man's need of and use of the park. Students came to the park in fall, winter, and spring to study lake ecosystems, plant adaptation, prairie-forest transition, and animal migrations. These processes were then related to the student's home environments, in order to study man's impact on these and related environmental processes (Park Files, 1969).

#### NESA SITE SELECTION

Initiation of formal NESA activities in the park began during late 1970. During this time, park resource persons were engaged in a survey and consideration of sites which would meet criteria outlined by the National Park Service and the National Education Association (1970b). The four sites described in the following pages are those selected, and later submitted on an inventory of NESA sites maintained by the U.S. Office of Education, giving them formal status as National Environmental Study Area sites.





























































































































































































































































































































