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Natural Areas for Community Colleges: Their Role in Environmental Education

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NATURAL AREAS FOR COMMUNITY COLLEGES:
THEIR ROLE IN ENVIRONMENTAL EDUCATION

by

John Henry Gerdes

A Project Report
Submitted to the
Faculty of the Graduate College
in partial fulfillment
of the
Specialist in Arts Degree

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John Henry Gerdes

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TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	ii
MAPS	v
INTRODUCTION	1
NATURAL AREAS	5
What They Are	5
Their Status	6
VALUES OF NATURAL AREAS FOR ENVIRONMENTAL	
EDUCATION	8
The Outdoor Laboratory	8
The Land Ethic	11
Aesthetic Values	12
Scientific Values	13
CRITERIA FOR NATURAL AREAS	16
Establishment	16
Size	16
Location	17
Permanence	18
Utilization	20
Management	21
Administration	22
THREE EXAMPLES OF NATURAL AREAS	25
Muskegon Community College	25
Description	25
History	25
Use	26
Management	27
Problems	27
Harford Community College	28
Description	28
History	28

Use	29
Management	29
Problems	29
University of Minnesota at Duluth . . .	30
Description	30
History	30
Use	31
Management	31
Problems	31
A PROPOSED NATURAL AREA FOR NORTH PLATTE	
COMMUNITY COLLEGE	33
Description	34
General Region	34
Natural Area Site	36
Development and Management	38
Utilization	39
SUMMARY	42
SOURCES CONSULTED	46

MAPS

	Page
1. Map of Nebraska, Showing Lincoln County and Selected Cities and Rivers (from Weaver, 1965).	35
2. Map of Proposed Natural Area for North Platte Community College in Relation to Major Topographic Features (from Lake Maloney Quadrangle, Lincoln Co., Neb.). .	37
3. Map of Proposed Natural Area for North Platte Community College, Showing Major Physical Features and Proposed Developments.	40

INTRODUCTION

About the mid-1960's the various communications media began to publicize issues in ecology and the environment. This publicity has increased public awareness of environmental problems, worldwide as well as in the United States. In this country, the response of those involved in education was to design and produce a variety of teaching materials and curricula labelled "environmental education" directed at every learning level.

Unfortunately a wide range of opinions about what environmental education should be still exists. Environmental education needs to be redefined in terms of the total human experience. The most comprehensive view is indicated in an excerpt from a U.S. Senate report explaining the Environmental Education Act of 1970 (Pratt, 1971):

Environmental education is an integrated process which deals with man's interrelationship with his natural and man-made surroundings including the relation of population growth, pollution, resource allocation and depletion, conservation technology, and urban and rural planning to the total human environment. Environmental education is a study of the factors influencing ecosystems, mental and physical growth, living and working conditions, decaying cities, and population pressures. Environmental education is intended to promote among citizens the awareness and understanding of the environment, our relationship to it, and the concern and responsible action necessary to assure our survival and to improve the quality of life.

Initial attempts at environmental education consisted of slight revision of existing teaching materials or merely renaming subject matter previously taught as nature study or conservation. The study of nature and resource management are both important

aspects but are only part of environmental education. Other efforts were directed toward developing supplemental materials for traditional curricula in areas such as English, mathematics, history, and biology. Some problems related to these previous attempts still exist:

1. Educators tend to catalog environmental curriculum materials under "science". This reinforces precisely the educational process that has been ineffective in the past. It nearly always imposes a strong biological emphasis which is not always ecological.
2. Few schools are committed to implementing programs that include: (a) more flexible daily schedules, (b) modification or integration of curricular subject matter, and (c) greater freedom and the increased involvement of students and citizens in planning programs.
3. Persistence in removing the child from his real environment and transporting him to wildlands or nature centers, where he is taught the environmental mechanics of a nonsocial Nature (Naylon, 1970).

Some educators have recently proposed entirely new programs and curricula for all grade levels as a significant advance in the development of environmental education (Stapp, et al., 1970; Naylon, 1970; Arnstein, 1971). They share the belief that environmental education must begin with a person's awareness of his dependency on natural resources. This awareness must lead to an examination of his relationship to his total environment, and ultimately to a change in attitudes and values. For many people, the change essentially must be from single-minded concentration on a personal, profitable goal to the realization that they are part of a sensitive biophysical system that can be affected in many ways by their actions (Stapp, et al., 1970).

Concerning the teaching of values, the American Association for the Advancement of Science Council Study Committee on Natural Areas as Research Facilities (1963) states that until an intellectual discipline to implement the philosophy of looking beyond economic values is developed and achieves a place in the education system, the field will be left by default to economics. Our culture will stand out in the world as one of crass materialism, and we will be defenseless against domination by economic motivation (AAAS, 1963).

As a growing segment of the educational system, the two-year colleges may be assuming a major role in environmental education through their outreach to all members of the community and their philosophy of responding to the needs of the community. The Environmental Education Studies Staff of the Office of Education, Department of Health, Education, and Welfare (1971), predicts that within the decade of the 1970's the formal education system, from preschool through continuing education, will directly affect about 50% of the American people. A large number of this percentage, including most of the college freshmen and sophomores, will attend community colleges, which now number well over one thousand (Gunstream, 1971). The two-year colleges are unique among institutions of higher education in being dedicated to the principle of education for all people, the so-called "open-door policy". Even more significant than the increase in numbers of these institutions is the phenomenal growth since 1965 of community college programs designed to train environmental technicians. New programs have been stimulated by increased financial support, recent emphasis on environmental concern, and a desire of students and faculty to have their school be committed

to the environmental cause (Carsey and Schwing, 1971).

At the same time that there is an increasing need for undisturbed areas to develop the basic attitudes of environmental education, there is also a trend toward rapid urbanization and continuing radical modification of the land. It seems imperative that certain areas be permanently set aside for those parts of environmental education requiring first-hand knowledge of ecosystems and intimate contact with the land. These so-called natural areas should be representative portions of our biological and physical environment. If community colleges are assuming a more significant role in environmental education, then the importance of natural areas for these institutions needs to be examined.

The discussions of values, criteria, and examples of natural areas in this paper were generated by an interest in proposing a natural area for North Platte Community College in west-central Nebraska.

NATURAL AREAS

What They Are

The phrase "natural area" has different meanings for different people. To a forester it may be a natural stand of trees; to a researcher in ecology it may be a wilderness area; to a city-dweller it may be a weedy vacant lot. In a survey of natural areas in Indiana, Lindsey *et al.* (1969) have defined a natural area as ". . . any outdoor site that contains an unusual biological, geological, or scenic feature or else illustrates common principles of ecology uncommonly well." In the context of environmental education, all of the preceding examples can be considered natural areas, as long as each area, entirely or in part, can meet the following basic requirements:

1. It must preserve at least a small portion of the natural landscape.
2. Its features must clearly illustrate ecological principles.

The breadth of the definition allows inclusion of areas that may have been disturbed, perhaps recently, but which are well-suited for teaching purposes. Minor occasional disturbances may even be a desirable event, as there is likelihood of their producing good examples of succession of biotic communities or increasing diversity within the area.

Within the broad definition of natural areas, there are some that are unsuitable for teaching purposes. At one extreme are the wilderness areas which, though well-suited for the purposes of preservation and research, are generally too large, too isolated, and too restricted for educational use. At the other extreme are intensely-managed areas, such as tree

plantations, botanical gardens, parks, and golf courses (Lindsey et al., 1969). A much better area for environmental education is a combination of a "pocket wilderness" with an outdoor laboratory, included within one to ten acres. The wilderness portion can generate and nourish values by way of the senses. The outdoor laboratory is for the more practical pursuit of learning fundamental ecological principles. In such a natural area, one can observe life literally at the grassroots level and get physically involved with hands, feet, and elbows in the muck, the tangled thickets, the rock, or whatever is available. Although education would be the primary reason for establishment of the area, there almost certainly would be opportunities for research.

Their Status

The area of unexploited land is rapidly diminishing worldwide. Even vast and once nearly impenetrable areas such as the rain forests of the Amazon Basin are marked for extensive destruction in the very near future. The world's largest deposit of iron ore and get-rich-quick agricultural schemes in this unique region of South America are temptations too great to overcome for those with more interest in profits than in natural resources (Iltis, 1972). On a somewhat smaller scale but no less important are the constant inroads on the natural ecosystems in our own country. It is evident that increasing population, pressure for economic growth, the general desire for material goods, and a high degree of technology have all contributed to a steady reduction in the area of undisturbed land. Efficient methods of modern agriculture have enabled farmers to have "clean" fence lines and ditches, but what has become of the relict patches of prairie vegetation and wildlife they harbored (Leopold, 1966)?

In our desire for neatness and efficiency, we are losing part of the future as well as the past. The construction of highways, dams, housing, and commercial buildings are taking their steady toll of land, sometimes destroying prime agricultural land as well as small sites of rare and unusual biological, geological, or archeological quality. It is disturbing to realize that in our National Parks and Forests, where protection is supposed to be greatest, disturbance and attrition also occur. It is not unusual to discover new camp sites, inundating waters, power lines, or other feats of engineering or agriculture performed in areas of special beauty or scientific interest that had long remained undisturbed (AAAS, 1963). Even parts of college campuses which have been utilized as natural areas for many years are frequently threatened from within by administrations seeking land for development (Zinke, 1970).

In surveying natural areas in the United States which could be considered research areas, the American Association for the Advancement of Science Council Study Committee on Natural Areas as Research Facilities (1963) found a number which have been lost due to a lack of adequate preservation and foresight in providing a continuing policy for their preservation. Others in which productive research has been going on show few or no attempts at preservation. If measures are not taken to halt the current trend of extinction of natural areas, there may be a shortage of research natural areas, particularly close to universities. A similar trend of extinction is likely for all types of natural areas unless measures are undertaken for their protection.

VALUES OF NATURAL AREAS FOR ENVIRONMENTAL EDUCATION

There has been a trend over the past fifty years for people in the United States to migrate from rural to urbanized areas. By 1980, as many as eight of ten Americans may be urbanites. While he was in a rural environment, man had close contact with the land and its resources. With his withdrawal to the city, he has tended to lose sight not only of the natural resources themselves, but also of his dependency upon them (Stapp, 1970).

Since the basis for his survival depends on the careful stewardship of natural resources, the land itself seems to be a necessary starting point in environmental education. No matter where he lives, man must have an opportunity to rekindle his acquaintance with the land. One of the best provisions for this opportunity can be a natural area under the administration of a community college. There are a number of benefits which can be derived from such natural areas.

The Outdoor Laboratory

As an outdoor laboratory, a natural area can be a valuable source of ideas, inspiration, and vitality in teaching and learning. This is particularly true for classes in general biology, botany, ecology, and conservation, although it need not be limited to these disciplines. Students in geology and art, for example, could find ample opportunities to pursue their studies in the field. Compared to a specimen brought indoors, the study of something in its natural setting has the distinct advantage of being in context, as part of a functioning ecosystem.

The ideas stimulated by outdoor observations can be sorted and developed elsewhere. Paul Zinke (1970) has postulated a set of principles regarding the derivation of ideas from natural areas:

1. Observation of the idea in nature.
2. Separation of the underlying physical, chemical, or biological principle.
3. Returning to the original natural context to understand the relevance of the principle, and to test its truth.
4. Teaching of the concept in the context of the natural area where it can be observed by students or others.

Zinke compares natural areas to libraries, in being ". . . not only a source of knowledge, but also a prime place of teaching for teachers who understand the principles."

Although the concept of totality in environmental education is new, that of using nature as a laboratory is not. In the early 1900's, L.H. Bailey (1919) at Cornell University, along with several others, was advocating "nature study" not as a body of knowledge, but as a spirit, an attitude of mind, which concerned itself with one's outlook on the world. He believed that the nature study method would be particularly useful for "unspecialized students" at all levels of education. When the words "environmental education" are substituted for "nature study", many of Bailey's statements appear very up-to-date. For example:

Whatever may be the opinion of individual teachers and writers on the nature-study movement, it is a fact that our educational methods are reshaping themselves in such a way as to allow the pupil to develop a sympathetic and vital contact with his usual environment.

Bailey and many of his contemporaries had been influenced by Louis Agassiz, a world-famous zoologist,

explorer, and Harvard professor who vigorously urged his students to "Study nature, not books." Seemingly contrary to his dictum, Agassiz was quite literary and apparently confined his students to rigorous examination of preserved specimens in the laboratory. Nevertheless, the method of the "hands-on" inquiry approach was there (Cooper, 1945).

A contemporary of L.H. Bailey and a well-known, controversial figure in education, John Dewey had this to say about laboratory experiences in science:

This problem of turning laboratory technique to intellectual account is even more pressing than that of utilization of information derived from books. Almost every teacher has had drummed into him the inadequacy of mere book instruction, but the conscience of most is quite at peace if only pupils are put through some laboratory exercises (Archambault, 1964).

The outdoor experience in a natural area is by no means a guarantee for environmental education, but it has the potential for stimulating learning.

In regard to learning experiences, Dewey (1938) commented that an experience can be deadening or stultifying, or it can be strengthening and invigorating. He further suggested that educators should learn to recognize what kind of surroundings are conducive to having experiences which are mentally stimulating and lead to growth. He described what he called a "continuum of education", in which one experience determines another, every experience affecting for better or worse the attitudes which help decide the quality of further experiences. I would like to draw a parallel between Dewey's generalized continuum and the series of experiences one must have to reach maturity in environmental education. I suggest that the natural area can provide the surroundings needed for the initial stimulating, thought-provoking experiences.

The Land Ethic

The very essence of environmental education consists of developing in the individual an attitude of responsibility toward the land and the life it supports. For centuries, man has felt he must conquer and subjugate nature and that this relationship involved certain privileges, rather than obligations. The land is to be used simply for what it yields and then discarded when no longer useful, much as a conqueror would dispose of worn-out slaves (Leopold, 1966). A different kind of attitude that extends into all aspects of an individual's environment must be encouraged and developed in every citizen. This new attitude must be one of harmony with nature, where man sees himself not as the proprietor of a commodity but as an integral part of a system. He must not only be aware of the fact that he is part of a complex system, consisting of himself, his culture, and the biophysical environment, but also that his actions can produce profound and lasting effects on the interrelationships within this system.

In his essays originally published about thirty years ago, Aldo Leopold (1966), a pioneer in American forestry and wildlife management, eloquently proposed the need for what he called the "land ethic":

That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics.

The land ethic involves stewardship of the land, a feeling of harmony and oneness with it, but it is often limited to those who have a share in the land. Leopold goes on to say:

We shall never achieve harmony with land, any more than we shall achieve absolute justice or liberty

for people. In these higher aspirations the important thing is not to achieve, but to strive. The problem, then, is how to bring about a striving for harmony with land among a people many of whom have forgotten there is any such thing as land, among whom education and culture have become almost synonymous with landlessness.

In order for anyone to have a land ethic, he first must have a mental image of land as a living system, a community rather than a commodity (Leopold, 1966). This image can become concrete in the observation of ecosystems and understanding how they function. A natural area can provide the opportunity for the necessary observations and comprehension.

Aesthetic Values

There are a number of values or benefits to be derived from experiences in natural areas that can stir one's emotions. One of these values is the inspiration of beauty in nature. Nature has always been a source of inspiration for aesthetic expression, as shown in the literature of Thoreau and Emerson and the art of Audubon in America, and in practically every culture, past and present (Stillman, 1972). The ugliness and harshness that is often associated with man-made surroundings apparently can be reflected in the attitudes and behavior of people.

The importance of aesthetic appreciation in environmental education is stressed by several writers. Stillman (1972), in discussing the multidisciplinary nature of environmental education, has this to say about aesthetics:

. . . the underlying force which inspires interest in the subject of the environment . . . is a matter of feeling, emotions, and aesthetic appreciation, and thus properly in the domain of humanities.

Kormondy (1971) pursues the same general line

of thought, but stresses aesthetic appreciation by the biologist in particular:

Having such a view of nature and having at his disposal the whole of modern biologic knowledge, the biologist could rightfully occupy a crucial, even a central role in achieving the ends of environmental education. But if this is not his perspective, he should at least have the integrity to stand aside.

Another value akin to aesthetics is the revitalization of spirit that can accompany the smell of pine woods or the sight of a covey of quail. In my opinion, it is practically a physical thing, but certainly one can experience renewal that is long-lasting. Leopold (1966) believed that widespread interest in at least some kinds of wild creatures to be deep-seated in man, and that a complete lack of this interest suggested some "super-civilized" state of mind that is not particularly desirable.

A third kind of aesthetic value is that numerous opportunities are often presented for the artist and the photographer to interpret and record some segment of the natural area, or even for someone to receive some lasting impression on his senses. These may be considered "trophies" in the sense that something beautiful is desired and removed, but with the added benefit that the "original" may remain to be equally enjoyed by others (Leopold, 1966).

Scientific Values

Although in discussing the needs and purposes of natural areas, most writers have in mind very large areas within national forests, or vast wilderness areas, much of what they have to say can and should be true also of the smaller areas characteristically established

for community colleges. Even though the latter areas cannot harbor a grizzly bear under natural conditions, they could have an especially significant role in all of the functions I will shortly discuss, precisely on the basis of their number and distribution throughout the country.

Scientists generally seem to agree that one of the most important values of natural areas is that they should be considered baselines, or controls, against which the extent of change caused by disturbance on other areas can be assessed (Leopold, 1966; Lindsey et al., 1969; Norris, 1970; Zinke, 1970). For example, Norris (1970) states that:

Untrammelled nature is the baseline from which ecologists must work to appraise the course and effect of human alteration. . . . The monocultures of agriculture, or the disrupted systems where human society has intervened are poor places to work.

Or, as Leopold (1966) asks, how do we know what to expect of "healthy" land if we have no norms for comparison?

Community college natural areas can provide the opportunity to preserve remnants of vanishing biota, particularly in arid regions where protection has been minimal. A series of these areas representing as many biotic communities as possible, can and should be kept (Leopold, 1966).

A second value of community college natural areas would be the protection of rare or endangered species (Lindsey et al., 1969). Although it does not seem possible that most large mammals or birds could be

included within such an area, certainly rare or unusual plants could be protected, as well as many small animals.

A third value is that by preserving a segment of the natural community, natural areas can retain environmental diversity (Iltis, 1972; Lindsey et al., 1969). The importance of this cannot be overemphasized, as pointed out by Iltis (1972):

We will never reach a point where we shall know which organisms are going to be of value to man and which are not. . . . The only alternative for intelligent planning is to save all the pieces; that is, to preserve sufficient diversity of species and of ecosystems in their purest states, so that we will never have to be regretful of their loss.

CRITERIA FOR NATURAL AREAS

No two natural areas are alike in any particular aspect, but there are certain basic criteria which have been developed through experience, some of it bitter, which can serve as guidelines for the establishment, utilization, management, and administration of natural areas intended for environmental education in community colleges.

Establishment

Size

Probably the foremost question in the mind of anyone thinking of establishing a natural area is how large it should be. There are so many practical aspects to consider, such as the price of land, cost of maintenance, number of persons using it and types of ecosystems included, that the decision of how much acreage to include can be a formidable one. Davis and Grimm (1973) recommend an area that is large enough to contain a wide diversity of conditions and life, particularly for terrestrial ecosystems. If there is a premium on space, the pond system is probably the best. A pond with an area of a half-acre or less can provide an abundance of different living things compared to a forest ecosystem which would ordinarily require a much larger area just to maintain its character as a forest.

Both large and small areas have distinct advantages and disadvantages. On the one hand, a large area would tend to be less severely affected over all by such destructive forces as fire, violent winds, and insect invasions. It would also be less sensitive to activities such as collecting specimens and to human

impact in general (Zinke, 1970). On the other hand, a small area would (1) probably be more economical, both in initial purchase price and in cost of management, (2) have fewer threats to its existence by economic interests, (3) stand a better chance of being conveniently located for school use, and (4) be physically easier to manage (Davis and Grimm, 1973).

In my opinion, the optimum size of a natural area for a community college would be one to ten acres. Besides the advantages already listed, a small area such as a pond would also tend to provide a feeling of ease and convenience to a teacher and class that a vast stand of trees or a large lake would not.

Location

A natural area should be located close enough to the community college so that it can be used during the two- or three-hour block of time usually allotted for laboratory or field work. A convenient location, preferably a part of the school's campus, avoids the use of expensive transportation and allows efficient use of time. Proximity to school encourages more frequent use by more faculty and students.

Cook (1970) describes two distinct types of natural areas that he believes are needed for grade-school children, but which could be just as useful for community colleges. One type he refers to as "nearby" would be located within a half hour of each school, and subject to fairly heavy use in learning basic concepts, gaining factual knowledge, and developing environmental awareness. "Distant" areas would be larger, more remote, and relatively more wild, but provided with facilities including small dormitories. Students would remain here for extended periods to experience further growth in knowledge of ecologic processes, to

develop increasing awareness of their environment, and a chance to develop "split-rail" values.

In addition to convenience, some thought needs to be given to locating a natural area where there would be the least chance of future conflict with commercial or agricultural development. Consideration should be given to selecting an area with either natural buffer zones or adjacent areas of relative stability to reduce the impact of man's activities. Whenever possible, buffer zones should be established by mutual agreements between owners of adjacent property and school officials (Zinke, 1970).

Permanence

Encroachment upon "undeveloped" land is always a threat in an economically oriented society. It can come from two distinct sources:

1. Individuals who see in anything not actively exploited as a potential source of profit for themselves.
2. Engineers, public planners, and politicians who regard any preserved area or land that is not obviously being used, as easily available land for public development. This is sometimes done ostensibly in the interest of economy or for benefits to constituents, but is often just "plain inability to see anything broader than the specific problem on which they are working" (AAAS, 1963).

A more subtle threat is that from school administrators who may see in unused land only a potential site for a new building complex or a football stadium (Zinke, 1970).

Areas that are informally used or informally dedicated as natural areas but that have no specific,

permanent plan for their preservation too often fail to be preserved. In order to protect natural areas from whims of owners and local administrators, there should be as much formality as possible in establishing an area. City officials, influential members of the community, and possibly state officials should be among those prominent in dedication activities. These activities should be well-publicized, as an official public commitment is less likely to be violated than one that is made casually or in secret (AAAS, 1963).

Along with formal recognition there should be legal safeguards in the form of deeds, wills, or contracts that may be employed for preserving a natural area in private ownership. An effective legal device is the "reverter clause" that provides continuity of protection. These can be legally binding restrictions that allow a property to revert to a specified agency or group in case of mismanagement by or dissolution of the initial managing body (AAAS, 1963).

While formal dedication and legal safeguards are important aspects in securing permanent status for a natural area, local interest and the activities of local groups seem to play a major role in both establishment and prevention of encroachment. The Council Study Committee on Natural Areas as Research Facilities of the AAAS strongly asserts that:

The importance of good public relations in natural area preservation cannot be overemphasized. Legal techniques may fail where local understanding and support are lacking. Thus, educational programs aimed at gaining such understanding are essential (AAAS, 1963).

The cooperative efforts of interested citizens can do much toward fending off threats of encroachment and preventing vandalism and poaching, while the efforts

of others, including conservation agencies, may be ineffective.

Utilization

As part of the physical and educational structure of a community college, a natural area should be available to the community as a whole, consistent with the philosophy of the college. However, there must be limitations and regulations on uses other than teaching. The natural area should serve to bring into focus many of the facets of environmental education. The heaviest use would be as a field laboratory for college classes in the natural sciences. Other uses confined to the college would be classes in other subject areas such as physical sciences, art, and geography, and faculty research projects.

Grade schools in the community should have frequent opportunities to expose their children to the lessons available in the natural area, particularly if they do not have their own area as Cook (1970) recommends.

In order to gain the community interest and support that is vital to the existence of the natural area, use by individuals and groups from the community should be actively sought. Key members of the community should be involved not only in the earliest stages of establishment of the area, but also in the plans for its utilization. These same individuals also must be aware of the sensitive nature of ecosystems, the values which may be derived from a natural area, and the possible consequences to these values if an area is misused.

Management

With the use that a natural area intended for education purposes receives, it is imperative that it be managed to preserve the integrity of the environment. It must be protected against encroachments and activities which would produce dramatic changes in existing natural conditions. In regard to management, Zinke (1970) states:

Frequently administrators assume that all one needs do is to purchase or accept an area and leave it alone. It wouldn't be long, however, before trash begins to pile up in the area, or a fire burns through it, or people are hunting on it.

However, for research natural areas it is extremely important to maintain a "hands-off" policy, particularly when in doubt about what to do. This can also apply to a certain extent to the management of natural areas intended for environmental education. Since even light use can produce changes, there is a time to know when not to do some of the things often regarded as good conservation practices. Activities such as clearing of dead timber, controlling insect pests, damming streams, and even fire prevention in some cases, may be very appropriate on public lands, but can produce havoc on natural areas. Over-use for any purpose must be guarded against (AAAS, 1963).

People impact can present serious problems for community college natural areas. Seemingly harmless activities such as collecting specimens, sampling ecosystems, and walking in sensitive areas can destroy the very things the natural area was established to preserve and to demonstrate. The smaller the area, the less such activities can be tolerated (Zinke, 1970).

Policy guidelines need to be established to

regulate and restrict certain activities. From the beginning it must be made clear which parts of the natural area are to receive the most use. The majority of traffic can be inoffensively regulated by well-placed trails and strategically located natural barriers to prevent off-trail wandering. Some activities, such as picnicking, camping, hunting, indiscriminate collecting, and use of any motorized vehicles should be prohibited (Ashbaugh and Kordish, 1971).

A series of procedures for management of natural areas has been recommended by The Nature Conservancy (Buchinger, 1969):

1. Establish the boundary on a map, from a land description or survey. Mark the physical boundary on the property itself, but preferably not with a fence.
2. Develop a master plan. The first step is to inventory the flora and fauna, and then develop a long-range plan.
3. Set up a suitable preservation policy.
4. Protect from vandalism, fire, and insects.
5. Set up regulations for public use. Trails can help determine areas for light use.

Among criteria for management of natural areas listed by the Society of American Foresters (Lindsey et al., 1969), boundary marking is preceded by identification of purposes and objectives in administrative records.

Administration

Although the terms management and administration are often listed as synonyms in dictionaries, I am treating them separately in this paper as I see them functioning in somewhat different areas and at different levels in regard to natural areas.

From the collective discussions of several authors, four characteristics seem necessary for the administration of natural areas.

Basic to effective administration is a clear understanding of environmental education generally and what role the natural area plays in this. If ecologic thinking is not foremost, administration of the land will fall easy prey to the philosophy that to be useful, something very concrete must be done with the land (Norris, 1970). Second, and closely allied with the necessity for ecologic thinking, is the need for control to be in the hands of a committee, rather than an individual. Dowling and Goodwin (1963) found that in a survey of nearly 100 colleges having natural areas, most were under the control of more than one individual. Activities were frequently supervised by special committees, consisting of people knowledgeable in and sympathetic with environmental education. Joint authority provides greater diversity of ideas and certainly a better chance of continuing activities on the natural area. Third, the administrative structure should be at a high enough level to obtain support for the area and to be able to defend it. Thoughts of economic gain, from within the committee itself as well as from outside sources, are probably best countered from a position of authority. Finally, in the face of continuing competition for land, it will be necessary to document the usefulness of the natural area. Bulletins, monographs, or publication series would serve not only as evidence of usefulness of an area, but would also maintain a continuity of teaching and research effort and contribute to the educational goals for the area (Zinke, 1970). Further documentation can be in the form of developing a regional landscape plan and pointing out the importance of a natural area within that plan. In discussing this aspect of natural area administration, Keith (1963) comments:

Landscape planning may be actually the key to many of the problems we have in dealing with university administration, with public bodies, and with public objections to the type of thing we are doing. It may give us an educational tool which we may use to justify, in the minds of the public, why we are closing off certain areas.

Although Keith is speaking about natural areas belonging to four-year institutions, what he says can be applied to community college natural areas.

THREE EXAMPLES OF NATURAL AREAS

The following examples of natural areas demonstrate some of the points already brought out concerning establishing, using, and managing natural areas in actual situations and point out some of the problems that arise. Although the area owned by the University of Minnesota at Duluth is considerably larger than the two community college areas and more money is available for its development, it has many similarities to the other two, as well as some problems of its own.

Muskegon Community College

Description

The Kasey Hartz Natural Area of Muskegon (Michigan) Community College consists of approximately eight acres of upland woods adjacent to the school on the west. A broad creek bed habitat is formed by Four Mile Creek, which flows through the area on its way to the Muskegon River. Two distinct woodland habitats consist of oak-pine and red maple-witch hazel. North and south slopes in the area provide additional variations of habitat. A self-guiding nature trail, about one-eighth of a mile long, has been developed in the eastern part. Most of the western part remains undisturbed (Hartz, no date).

History

The history of the natural area at Muskegon Community College centers principally around the determined efforts of Mary K. ("Kasey") Hartz, an instructor in biological sciences at the college. She conceived the idea of establishing a natural area on the campus soon after property for the new buildings was

purchased. Biology and ecology classes had used the area for several years prior to completion of the buildings, and in 1967 her ecology class began development of the nature trail. She continued to inspire her students and stimulate the support of fellow faculty members and key individuals within the community. The activities at the natural area were thoroughly publicized, and in the spring of 1968 she conducted an informal field trip for interested members of the community, the Board of Trustees, and the college administration. In 1970, a Land Use Council for the college was established, and on April 20th of that year, the Board of Trustees officially established the natural area. In 1974, after the area was finally delineated, the Michigan Department of Natural Resources performed the formal public dedication. After more than seven years, the major battle was won with the determination and cooperation of students, faculty, administration, and community. It had truly been a group effort (Hartz, 1974; personal communication).

Use

Students from the college, in fine arts, humanities, biological sciences, geology, geography, chemistry, and physics make use of the natural area. The nature trail which has been developed is available for use by any interested person or groups.

Guided tours for groups of ten to twenty-five persons are available from September through May. Families and individuals are encouraged to tour the nature trail anytime during daylight hours. During the first half of 1974, over one thousand school children in class groups had visited the area (Hartz, no date).

Management

The Life Science Department, with the assistance of the Land Use Council, serves as an advisory committee and is responsible for maintenance of the area and making reservations for group use. A course has been designed by the Department to prepare and train college students who are interested in serving as guides and interpreting features within the area. Maintenance is performed by members of ecology and conservation classes (Hartz, 1974; personal communication).

Problems

There is what might be considered the usual amount of vandalism in the area, mostly in the form of damage to the self-guiding station posts along the nature trail. Some destruction has occurred when young boys from adjacent residential areas entered the area and cut down several small trees. However, the most serious threats come from within the community college itself. Maintenance personnel consider dead trees and "unsightly brush and weeds" as a challenge to their grounds-keeping abilities and would like to clean these out and to clear the edges of the area by burning. The athletic department was allowing cross-country runners to practice on the route of the nature trail until they were asked to stop. Compaction of the soil in the trail and subsequent water erosion was destroying the trail. Coordinating and handling reservations from large numbers of school groups and others has been a big job. All of this has been done by students, faculty, and staff volunteers who have generously donated their time and effort. Plans for the future include the budgeting of funds to provide pay for students serving as part-time trail guides (Hartz, 1974; personal

communication).

Harford Community College

Description

The natural area is a three-acre site at the edge of a 204-acre campus in suburban Bel Air, Maryland. It is partially wooded, contains a stream, and is topographically diverse. The site was selected by two biological science instructors for the following reasons:

1. It is high in biological and physical diversity.
2. It would not interfere with future building plans of the campus.
3. It is large enough to accommodate up to 120 students.
4. It is far enough away from the main buildings to prevent much unauthorized student use and still be an aesthetically pleasing part of the campus (Davis and Grimm, 1973).

History

A proposal containing a detailed description of the area and the estimated cost of establishing it was drawn up and submitted through channels. The board of trustees subsequently officially set the area aside as an outdoor laboratory. Increased enrollment at the college forced the two biology instructors to find another natural area that could withstand the additional student pressure. They obtained permission to use a pond prepared with the help of the Soil Conservation Service, and located in a nearby housing development. Looking ahead to the day when the use of this pond may be ended, the science faculty is working on plans to develop a pond on campus (Davis and Grimm, 1973).

Use

The three-acre site on campus has been used extensively by botany, zoology, and ecology classes for a demonstration area and for individual projects, such as vegetation analysis, soil sampling, photomicrography, and chemical and biological investigations of the woodlot stream. For the past several years, general biology students have used the off-campus pond for a series of limnological investigations. Recent developments of the campus natural area suggests that future uses will include self-guided nature walks and extensive recreation for the school and the community (Davis and Grimm, 1973).

Management

The community has been involved in both the wooded area and the proposed pond on campus. In the wooded area, Boy Scouts under Project SOAR have established trails to points of interest. Plans are being made with local foresters to make the area more suitable for demonstration of forestry and ecological principles, with the possible inclusion of several "managed" sections and explanatory signs along trails. People from the community are also involved in the planning of the campus pond, and are being consulted about the inclusion of such things as an arboretum, a band shell, and a picnic area (Davis and Grimm, 1973).

Problems

A major problem at Harford was that of the small size of the original natural area. This seemed to be solved by restricting its use to students in more specialized courses while general biology students make use of the pond. Plans for more intensive management and use of the wooded area will impose more stress on

an already heavily-used area. Severe restrictions will have to be placed on its use to prevent degradation. The proposed inclusion of a band shell and a picnic area, apparently in the vicinity of the new pond, could spell ecological disaster unless the activities associated with these developments are very carefully controlled. Although recreation is a necessary part of everyone's environmental "wholeness", these particular activities are in conflict with the educational aims of the natural areas and should be more appropriately placed in another part of the campus.

University of Minnesota at Duluth

Description

Rock Hill wooded natural area of twenty-four acres is within easy access to students, staff, and the community. It is an excellent example of native, northern Minnesota forest, including good stands of balsam fir, maple, and basswood. Other features include a man-made 1.3-acre pond, a natural ski slope, and a system of trails that wind through a natural arboretum, with bridges, stairs, rest areas, and a scenic overlook at the hill top (On Campus Nature Area, 1972).

History

The land was donated to the University more than twenty years ago by a Duluth resident. Over the past five years, Rock Hill has been made more accessible and usable by a \$57,000.00 matching grant from the Department of Interior. An architectural firm was hired to draw up plans and develop the nature trails, ski slope, and pond (On Campus Nature Area, 1972).

Use

The most intensive use is recreational skiing during the winter. The physical education department sponsors this activity during weekends for students, staff, and public for a nominal fee. The pond is a major point of interest for biology classes, as well as being an area of continuing study by students in limnology. About the only other sanctioned activities are biology tours of the natural arboretum and leisurely walks. Future plans for development include construction of a permanent shelter that will serve as a ski chalet and warming area and as a starting point for guided tours of the arboretum (On Campus Nature Area, 1972).

Management

The Long Range Planning Committee for Physical Facilities is in charge of design and operations for the natural area. The most notable aspect of management for this area is the ineffectiveness or total lack of it in some areas, that has resulted in problems of over-use and misuse (On Campus Nature Area, 1972).

Problems

Problems center around public use of the pond as a swimming facility. The University's current budget does not include salary for a lifeguard, and officials are concerned that if anyone drowned in the pond, the University would be held responsible. The present policy is to have security officers discourage swimmers periodically instead of posting a full-time guard at the pond.

Besides becoming more of a legal headache for the University by being an attractive nuisance, the

pond, along with much of the remaining twenty-four acres, is showing signs of over-use. Nevertheless, the physical education department has found its class offering of fishing so popular that it plans additional sections.

Some have recognized that pressures of legitimate as well as inappropriate use will bring about changes in the natural area unless strict control measures are taken. It has been recommended that use be restricted to short-term visits by pedestrian traffic and that all forms of recreation except skiing and picnicking be expressly prohibited.

A PROPOSED NATURAL AREA FOR NORTH PLATTE COMMUNITY COLLEGE

The natural area I am proposing for North Platte Community College presents a paradox. No part of this area could be considered untouched by man. Much of it has been plowed, irrigated, and grazed by livestock. There are no trees on it, it has been invaded by weeds, and the waters of the pond and slough included in it are polluted by the by-products of agriculture. It is surrounded by thousands of square miles of open, sparsely populated ranch and farm land. Yet with these apparent flaws, it can be a prime example of what a natural area for environmental education should be: a place for learning ecological principles, a place for acquiring values, and with time and careful nurturing, a place to enjoy for its simple beauty.

This natural area is needed for the very reason that makes it seem superfluous. People in this region are accustomed to wide open spaces, and they can see either hilly grassland, cultivated fields, or tree-lined river bottoms practically anywhere they go. Most of the land is privately owned, and utilized for agriculture in some way. Community college students who have been brought up on a farm or a ranch in the area usually know many of the local plants and animals and where to find them, but they often know little of how these organisms interact and what effects they have upon the land. Much of the thinking of these rural people conforms to agricultural practices and benefits; that is, more a single-target economic point of view than the broader or holistic concept of environment and land use.

Description

General Region

North Platte Community College is located in the city of North Platte, in Lincoln County, west central Nebraska, at an elevation of 3300 feet (Figure 1). The North and South Platte Rivers join immediately east of the city to form the Platte River, that flows eastward to the Missouri River. The Platte River and its two main branches in Lincoln County form the dividing line between the Sandhill region to the north and the High Tablelands to the south. The Sandhills are a vast area of sandy soil of wind-blown origin (loess), covered almost entirely by a lush growth of grasses. The soils of the High Tablelands are more compact clay-loam types which once also supported grasslands, but now produce mainly wheat. The soils of the narrow floodplain of the Platte are alluvial and sandy to clayey in texture (Searcey, 1964).

The climate in this part of Nebraska is one of extremes and is commonly characterized as semi-arid. There are large-scale wet and dry trends, with some years being humid while others produce desert-like conditions. The average precipitation for the region is eighteen to twenty inches, much of it in the form of heavy summer rain showers. Precipitation is frequently poorly distributed, and drought strikes at unpredictable intervals. Effects of summer rains are reduced by commonly bright, sunny days and drying winds (Searcey, 1964; Weaver, 1965).

Vegetation in Lincoln County is mostly mixed prairie, composed mostly of medium height and short grasses, which average several inches shorter than those in the true prairie to the east (Most of the

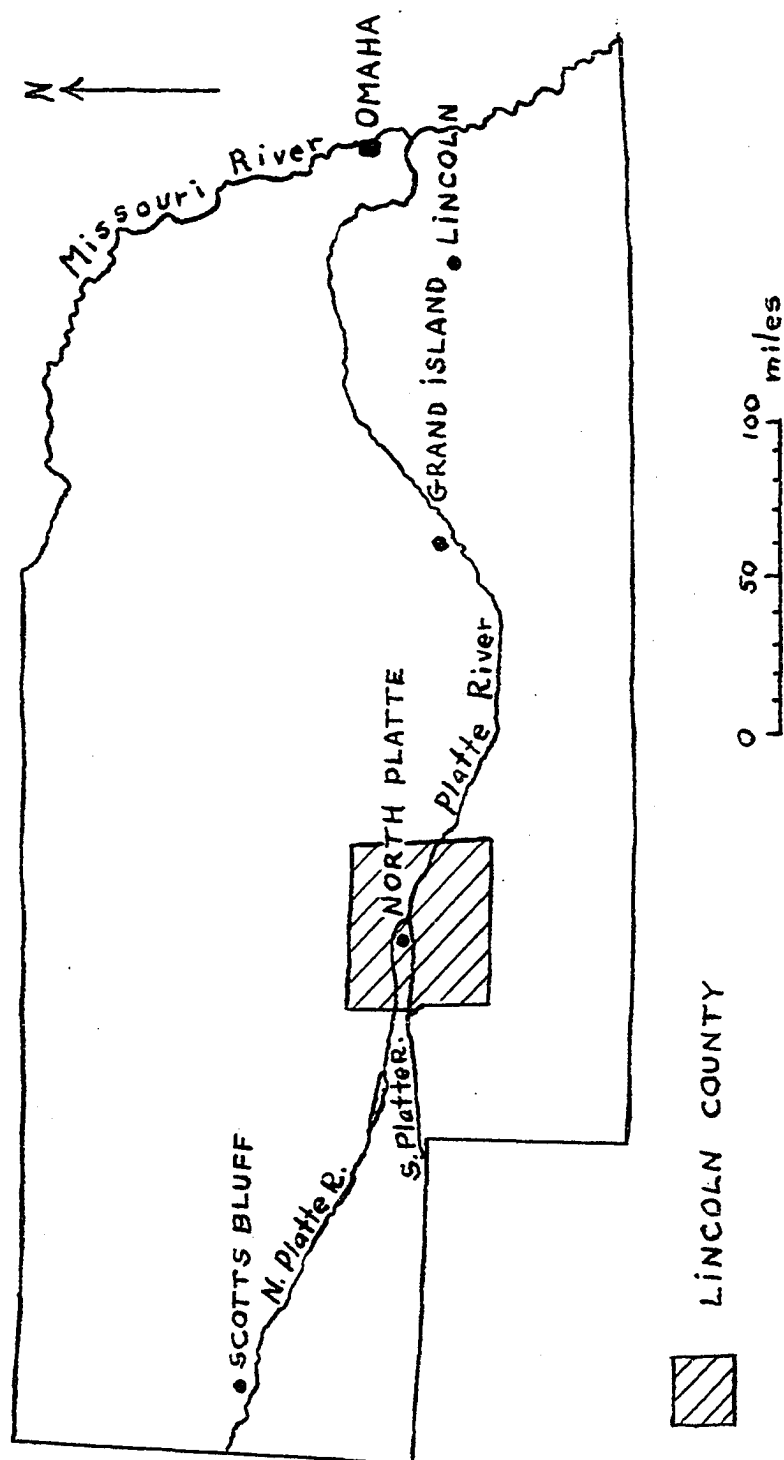


Figure 1. Map of Nebraska, showing Lincoln County and selected cities and rivers (from Weaver, 1965).

grasses in the Sandhills are about waist high; grasses of the true or tall grass prairie are often over a man's head) (Searcey, 1964). The two principal species of short grasses include blue grama (Bouteloua gracilis) and buffalo grass (Buchloe["] dactyloides). Grasses of the mixed prairie include a larger number of species. The most commonly occurring are side oats grama (Bouteloua curtipendula), needle and thread (Stipa comata), western wheat grass (Agropyron smithii), sand dropseed (Sporobolus cryptandrus), and three species of bluestems (Andropogon spp.). Only a few species of woody plants occur along the streams of central and western Nebraska, and these are noticeably smaller in every aspect than those in the eastern portion of the state (Weaver, 1965).

The arid character of the climate of western Nebraska is reflected in many of the life forms found there. Animals such as the kangaroo rat (Dipodomys ordi), and plants including prickly pear and cholla (Opuntia spp.), yucca (Yucca glauca), and prickly poppy (Argemone polyanthemus) are typical arid land forms.

Natural Area Site

Early in 1973, North Platte Community College acquired 100 acres of cultivated bottomland located approximately one and one-half miles south of the South Platte River and the city of North Platte, and one-tenth of a mile west of U.S. Highway 83 (Figure 2). By mid-summer, work had begun to prepare portions of the southern three-fourths of the property for construction of one large new building and an athletic field for the college.

The natural area I am proposing for the college

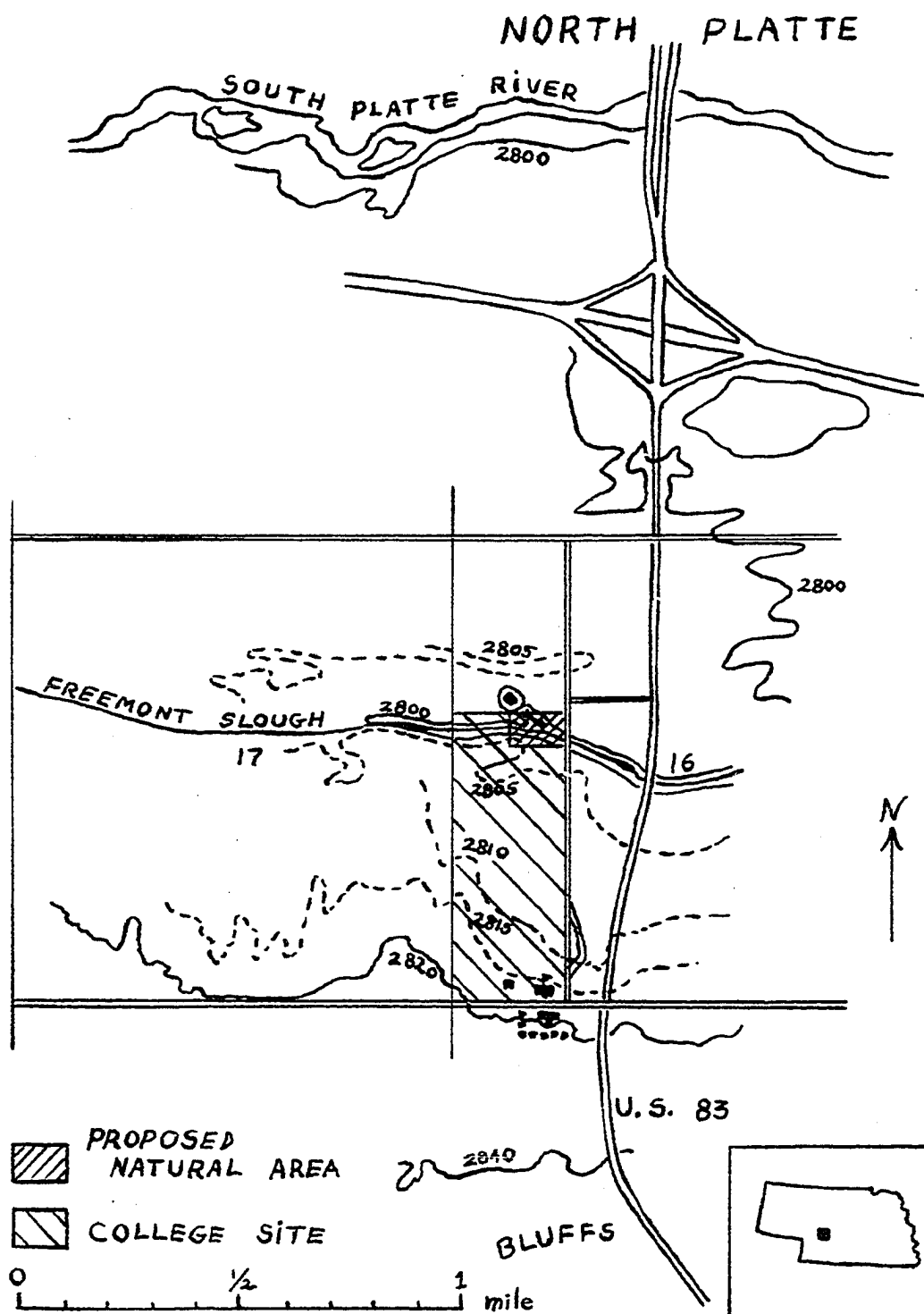


Figure 2. Map of proposed natural area for North Platte Community College in relation to major topographic features (from Lake Maloney Quadrangle, Lincoln Co., Neb.).

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UNIVERSITY MICROFILMS.

boundaries of the area visible, or perhaps a native shrub species could serve as a natural fence. To prevent indiscriminate trampling of vegetation by students and others, pathways should be cleared to the points of heaviest use, which I have tentatively indicated as the south edges of the pond and slough (Figure 3). Two protected areas, that would be relatively unused and receive little management, would be situated north of the slough, on either side of the pond. More precise plans for development and protection would have to be based on a thorough inventory of the flora and fauna, as some sensitive spots may be identified in the process. Study plots are indicated for the southwest corner of the area. These could be for demonstrations of community succession, experimental plots, or attempts to reintroduce native vegetation. Serious efforts should be directed to reestablishing a plot of prairie vegetation and then protecting this plot.

Students would be involved in as much of the development and management of the natural area as possible. One of the major tasks after establishing the boundary of the area would be a thorough survey of the flora and fauna, as the first step in developing a master plan. Data on seasonal or other changes could be recorded and graphically displayed within the school as part of a program to publicize the natural area.

Utilization

The heaviest use, at least initially, would be by students in biology, botany, and zoology at the college. At North Platte Community College, numbers of students in these classes combined average about 125 for the fall semester and about 100 for the spring semester, with class sections limited to twenty-five

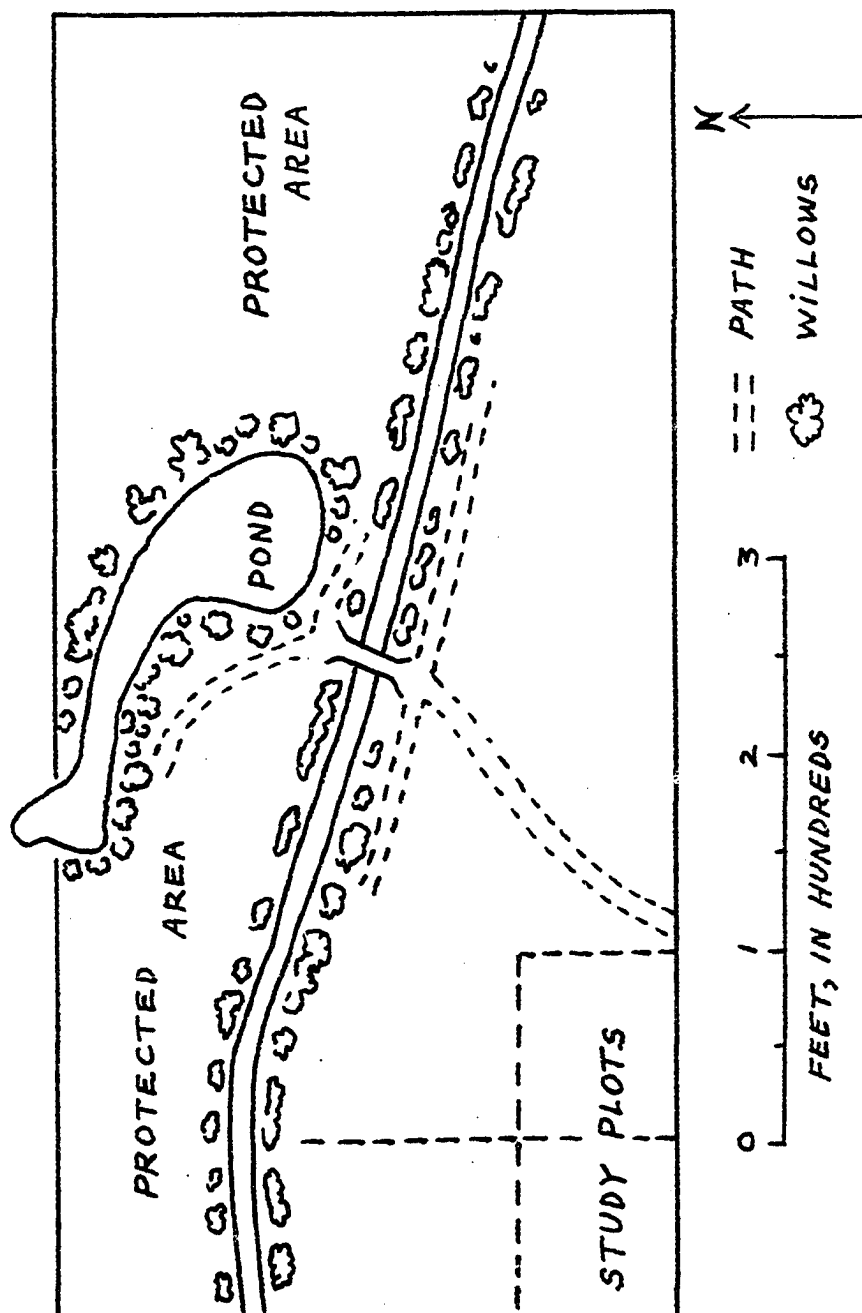


Figure 3. Map of proposed natural area for North Platte Community College, showing major physical features and proposed developments.

students. I would encourage faculty in non-science disciplines at the college to investigate the possibilities of the natural area for their own classes' use.

Once a long-range management plan had been developed for the natural area, groups of children from local schools would probably be the next largest category of people to make use of it. One school is only three-fourths of a mile distant.

Some effort would need to be spent in acquainting certain members of the community that are not part of the college, such as 4-H clubs, Scouts, and civic organizations, with the purposes of the natural area and the values it has for the entire community. Interest generated by guided tours of the area for these groups, as well as information programs, would hopefully lead to sharing in its development, use, and protection. Interested citizens might thus be more easily persuaded to donate their time or money to such projects as prairie restoration or even to donating land for an expanding system of local natural areas.

SUMMARY

Environmental education is a way of providing people with the means to recognize and work toward solutions of many of the problems facing their society. Beginning with an examination of basic natural laws pertaining to the interrelationships of organisms in an ecosystem, the student can become aware of man's position in the total environment. He can then proceed to the point where he needs to examine his own personal values and attitudes toward other individuals, society as a whole, and nature. Man's near-sightedness in thinking only in terms of economics must be overcome if he is to survive.

The longer it takes for an ecological point of view to become widespread, the more difficult it will be to correct those situations caused by lack of environmental understanding. The community colleges appear to be well suited to meet this urgent need, by the breadth of their service to communities and their recent increase in number. The establishment of permanent natural areas for these community colleges would provide a learning laboratory for that segment of environmental education that requires some understanding of interrelationships of plants and animals and coming in direct contact with them in their natural surroundings.

Natural areas for community college teaching should be relatively small, usually no more than a few acres which will combine parts of rather intense use with areas that are carefully protected.

The status of land that can be set aside for natural areas, and even that of some natural areas

already established is not secure. Even in areas that are supposedly protected, the attrition of undisturbed land continues.

While natural areas are useful in teaching conservation and technical skills, they have other values:

1. As outdoor laboratories, they are reservoirs for ideas and inspiration, and vitality in teaching sciences.
2. They can be the seed bed for developing a land ethic.
3. They provide aesthetic values.
4. By preserving a small portion of an ecosystem, they tend to retain environmental diversity.

The importance of this cannot be overstressed.

Several criteria have been developed for the establishment, utilization, management, and administration of natural areas:

1. The size of an area depends on many factors, but generally an area of one to ten acres seems well-suited for teaching purposes.
2. A natural area should be located close enough to the school itself that it is easily accessible, preferably on foot.
3. Because of the constant threat of encroachment, a natural area should be established with formal recognition and underlying legal safeguards.
4. Community interest and support are essential for the continued existence of a natural area, with or without formal and legal recognition.
5. A natural area must have a long-range plan for its management, otherwise it may succumb to over-use or unwise practices and activities.
6. For the administration of a natural area, it is wise to have a committee knowledgeable in the

holistic approach to environmental problems, rather than a single individual. The former is more likely to counteract the pressure of economic single-mindedness.

The examples presented of two community college natural areas and one at a university demonstrate some of the problems of establishment, utilization, and management.

The Kasey Hartz Natural Area of Muskegon Community College shows the necessity of both community and school support in sustaining efforts to both establish and protect a natural area. The majority of threats to the area come from within the college itself.

Harford Community College in Maryland has a heavily-used three-acre natural area. The effectiveness of a proposed pond at a new site appears threatened by plans for a public band shell and picnic facilities for the same area.

The University of Minnesota at Duluth has a twenty-four acre site richly endowed with natural features and man-made developments, but it is suffering from over-use. Unauthorized use of a small pond as well as overuse by the school may destroy the effectiveness of a key attribute of the area.

A five-acre natural area proposed for North Platte Community College in west-central Nebraska would be situated in a corner of a new 100-acre site for the college on bottomland of the South Platte River. Anticipated difficulty on the part of the community in realizing the necessity for this natural area arises from the predominantly rural nature of the region, a vast area of beef cattle ranching and wheat

farming. Although much open country exists, few parts have escaped the touch of man's activities, even in this spacious country. Perhaps this suggests an even more urgent need to set aside a plot to preserve a portion of this land and provide an opportunity for the beginning of environmental education.

What little development is foreseen for the proposed natural area would be expected to be accomplished mainly by students at the college. The heaviest initial use would probably be by the college students, followed by local grade school groups. Some effort needs to be expended to arouse community interest in the values and utilization of the area. Hopefully, interest developed from guided tours and information programs would lead interested citizens to become involved in the development, use, and protection of the natural area.

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