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"Environmental education programs for children are often based on what we think adults need to know. This is a worthy goal; however, the approach to attaining it must be tailored to the child's changing level of comprehension" - George H. Moeller

Research Priorities in Environmental Education

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ABSTRACT. Although natural processes operate in urban areas, they are difficult to observe. Much discussion during the symposium-fair was devoted to finding ways to improve urban children's environmental understanding through environmental education programs. But before effective environmental education programs can be developed, research is needed to: test the effectiveness of various approaches to teaching environmental education in relation to differences among children; help define testable program goals that relate to a child's level of comprehension; develop better methods of training teachers and administering environmental education programs; and identify ways to use elements found in the urban environment to foster an understanding of environmental concepts.

ONCE UPON A TIME, not so very long ago, the relatively undisturbed natural environment lay at the doorstep of the "urban" resident. To experience nature, all that was required was to stand on ones toes and peak over a stone fence, hedge, or city gate. By necessity, an understanding of natural processes was an integral part of life. Little had to be done to formally "educate" the maturing child about his place in the natural world. Very often survival depended on how well "environmental education" lessons were learned.

The urban resident of today, even after climbing to the top of the highest skyscraper, may get only a fleeting glimpse of nature. The same natural processes are still operating all around him but they are harder to see because they are less dramatic and their effects less immediate. The contemporary urban resident has become increasingly divorced from the natural framework of trees, forests, fields, and natural processes that were an integral part of the developmental environment of earlier generations. The effects that this separation from nature may have on today's urban children, in terms of their psychological development,

self-concept, and preparation for responsible citizenship, are not known.

The trend toward increasing urbanization cannot be reversed. But as demonstrated during sessions of this symposium-fair, a great deal can be done to foster the urban child's understanding of natural processes. These processes still operate in cities, but they are much less obvious than in years past. We can no longer expect children to understand their place in the natural world intuitively, without assistance.

Because of the trend toward separation from natural processes, some kind of environmental education has become a basic need for the urban child. Without background knowledge and understanding of the natural world, and a concept of their place in that world, urban children will not be prepared to make the complex environmental decisions that they will be forced to make as responsible adults. Environmental education should not be treated as a luxury in modern education systems. Environmental education is vital to man's ultimate survival as well as to maintaining and improving the present-day quality of life (Pullias 1968). It is of utmost importance that environmental educa-

tion programs be carried out universally and that they be carried out properly.

The introduction of environmental education programs into the Nation's schools is progressing at an unsteady rate. According to a recent report of the National Center for Educational Statistics, United States Office of Education, "18 percent of the 23.9 million elementary school pupils, and 9 percent of 17.2 million secondary school pupils" were enrolled in environmental courses in 1970 (*Science, Mathematics, and Environmental Information Center* 1972). Most environmental education programs were in suburban and rural school systems. In a study conducted by the National Education Association (1970), only 11 percent of the Nation's schools with enrollments of 1000 or more (schools that account for 90 percent of all public school pupils) were found to carry out environmental education programs that met the National Education Association's criteria. While a few areas of the country have excellent records of achievement in developing environmental education curricula, most have had no central leadership or coordinated effort. Environmental education programs are most often the result of one teacher's awareness, enthusiasm, and dedication.

This lack of support is indeed sad. It is extremely important that environmental education programs be universally introduced in the Nation's public schools—particularly in urban schools. The favorable environmental attitudes that result from such programs would help people make the wide range of environmental decisions they face in everyday life, but the greatest benefit might be realized at the polls (*Schoenfeld* 1971). Just as every citizen is affected by environmental degradation, all have the opportunity to take part in the national decision-making process through their votes. Efforts of government agencies, private enterprise, and conservation groups cannot succeed in achieving and maintaining a wholesome environment without the firm support and understanding of the citizenry (*Conservation Foundation* 1963). As a National Audubon Society report (1967) so well expressed it, "People will not safeguard what they do not know, let alone what they do not understand. They will not protect or treat kindly what they do not appreciate".

During the past 2 days it has been my

pleasure to listen to 34 speakers—educators, practitioners, and theoreticians—who shared their experience and knowledge about the development of environmental education programs. The active participation of Washington, D.C., elementary school children added a sense of reality to these discussion sessions. Topics ranged from the relationship between nature appreciation and child development to practical techniques for introducing children to environmental concepts. I will attempt to summarize what I perceived as some of the major problem areas for environmental education research that were suggested during the discussion sessions. I must, however, caution that what follows is only a partial listing. Continual evaluation and much more input are needed if we are to organize a research package on which to base the design of comprehensive environmental education programs.

In her remarks at the first session of this symposium-fair, Margaret Mead stated, "We don't know what children do at different stages. The child as a universal concept is largely a myth". She argued that the needs of children vary—across cultures, regionally, between urban, suburban, and rural areas, and even from neighborhood to neighborhood. Although these differences are recognized, we tend to develop standardized approaches to teaching about the environment. Research should be done to evaluate the effectiveness of various approaches to teaching environmental education in relation to sociocultural and regional differences among children.

Environmental education programs for children are often based on what we think adults need to know. This is a worthy goal; however, the approach to attaining it must be tailored to the child's changing level of comprehension. As pointed out during the symposium-fair, an adult philosophy cannot easily be reconciled with that of a child. In most sciences we have a pretty good idea about what needs to be known and how to measure learning progress quantitatively. But a child's progress in understanding environmental concepts cannot easily be measured because goals are stated in adult terms and we do not have precise measuring devices. A child may be taught to differentiate different kinds of tree leaves, but we must ask ourselves if this achievement represents a successful environmental educa-

tion effort. Environmental education involves more than the transfer of knowledge—it involves the child's comprehension of his place in the natural world around him. If environmental education is to achieve an adult goal, it is necessary to break down this goal into subgoals that correlate with the child's level of comprehension. Research should be undertaken to help define these goals.

First, however, the goals of environmental education need to be operationally defined. Unless this is done, it will be impossible to evaluate the progress of an environmental education effort. Part of an operational goal definition for environmental education needs to be knowledge transfer. But, as pointed out in the previous paragraph, knowledge acquisition does not necessarily bring greater environmental understanding. A more desirable goal of environmental education is to foster favorable environmental attitudes—a longer lasting dimension of personality. Once goals have been operationally defined, research can develop methods of measuring change in environmental attitudes that result from exposure to environmental education.

Teaching about the environment is a relatively new undertaking. The environmental educator should have a background in biological and social sciences as well as in the philosophy of education. Educational programs to provide this background are now just being organized. Although there is great enthusiasm for teaching environmental education, little is known about the combination of talents needed to teach it effectively. When research has identified these talents, it can help design programs for educating the environmental educator. Basic research is also needed to study the process of environmental education—who should teach it, how should it be taught, and what materials and methods are best to foster an understanding of environmental concepts.

A related issue is that little agreement has been reached on whether environmental education should be taught as a distinct subject or whether all teaching should be done environmentally. Although this question has no absolute answer, research into the process of environmental information exchange would help to identify consequences of alternative approaches to teaching environmental concepts.

The administrative organization of systems

for exchanging environmental information also needs research. For example, what are the roles of nature centers, schools, and other supportive institutional services (libraries, television, periodicals, the greater "community", etc.) in an integrated environmental education program? A symbiotic relationship may develop among these institutions that will lead to a more efficient environmental information exchange system. A related research problem is the need to determine how environmental education programs can best be incorporated into existing educational systems.

How should environmental education be taught? The materials available for teaching environmental education vary widely, as do instructional techniques among educators. Yet little research has been done to determine the informational needs of environmental educators in different institutional and geographic settings. During these sessions, many innovative approaches to teaching environmental education have been discussed. Very few of these have had their influence on children's environmental attitudes quantitatively evaluated. Basic research is, therefore, needed to identify the educational techniques that are most effective in influencing children's environmental attitudes.

Research is needed to find out how children grasp environmental concepts. This research must take into consideration the children's different conceptual abilities at different ages, their past and present experiences, and their home and surrounding environments. Particular emphasis should be placed on developing programs in relation to children's ability to conceptualize and grasp environmental concepts.

The preceding discussion of research needs relates generally to all environmental education efforts. The special circumstances that confront environmental educators in urban areas—lack of opportunity to experience nature, lack of incentive to do so, etc.—require that some research be conducted specifically within urban areas. Even though the modern city masks and dominates nature it still offers many opportunities for environmental education. Research can help to identify these opportunities. We often try to transpose urban children from their home environments to the country, hoping that the exposure to nature will change their attitudes when they return home. This practice is

based on the assumption that if we can get children to the country, they will somehow assimilate all of the values of nature. Urban children spend most of their lives in the city, and most will remain there for their entire lives. Therefore, the city is the best place to teach them environmental concepts. For example, what better place is there than the city to study water and air pollution? Research can help to identify and catalog opportunities for environmental education in urban settings. Where appropriate teaching materials cannot be found, reasonable substitutes can be located. Research can help to identify materials in urban areas that could be used to teach the environmental processes that are now taught only in rural settings.

A critique of research needs in environmental education would not be complete without mention of the difficulties involved. Existing research tools will have to be adapted and new tools developed. New experimental designs will have to be invented and tested. Research techniques for studying children's attitudes will have to be refined. The administrative problems often encountered in conducting research in highly structured institutions such as the public schools will have to be overcome. The cooperation and support of school administrators is absolutely necessary for success of an environmental education research effort.

I have outlined just a few of the major research needs that were suggested during the

environmental education sessions at this symposium-fair. The list is far from complete. But if research attention can be devoted to at least a few of the problem areas defined here, environmental education will be much closer to accomplishing the goals set forth by Caldwell (1970):

"To improve the human environment, both men and politics must be improved. Men make politics; political institutions influence human behavior; but behavior is also influenced by attitudes, beliefs, and values. Purposeful shaping of the environment involves the purposeful shaping of outlooks on life. The quality of the future environment depends, therefore, upon the shaping of attitudes, beliefs, and values through present education".

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