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## ENVIRONMENTAL EDUCATION: NO PASSING FAD

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Environmental education has received increased attention during the past four years. Most of the fifty states have formulated or are in the process of formulating a state plan for environmental education. Elementary and secondary school curricula continue to reflect increased concern and activity in environmental education. Higher education has responded with modification of traditional courses, design and implementation of new courses, and at some institutions, new degree programs in environmental studies. Interest has not been restricted to the physical and biological sciences; people in social sciences and humanities on all levels have participated and in many instances have been at the forefront of activity.

Despite these apparent gains there are many skeptics--perhaps a majority--who are reluctant to contribute to environmental education because they perceive it to be a passing fad, something that bloomed in 1970 and is now or soon will be passing away. They appear to be saying, "Why divert efforts away from traditional and comfortable activities to get on a bandwagon that will be short lived?" Along with this view goes the belief that most environmental issues are charged with 98 percent emotion and 2 percent knowledge. Another barrier, most common on the level of higher education, is the inability to view environmental education as a combination of horizontal and vertical integration of disciplines. Evidently the traditional, vertical articulation of courses and degrees make it difficult for one to see value in courses and degree programs that cut across established disciplines. These skeptics have based their position on the small grain of truth that supports all status quos, and have failed to give adequate attention to the examination of current data and views on environmental issues.

For example, a friend of mine in the biological sciences recently commented that physicists were the real activists in environmental issues. I asked how he came to that conclusion since it appeared that people in the biological sciences were the most action oriented. He replied that physicists, once they take the time to examine current data, tend to become activists because they, better than any other

group, have the capacity to really understand the data and relationships within the framework of the potential and limitations of science and technology.

Of course, understanding is not limited to physicists. Environmental issues cut across the spectrum of disciplines and understanding can be developed by different people working on different levels and from different view points; e. g., teachers, elementary pupils, professors, college students and laymen. The important point of the above example is that an attempt to understand must be made. It is not the lack of capacity to understand, it is the failure to examine the issues that retards the development of environmental education.

An examination of environmental issues is very time consuming, for much has been written on the subject. There is, however, one book that helps, more than any other, to place environmental issues in the proper context of a global framework and to explain why we have environmental problems and why they will be with us in the future. The book is, The Limits to Growth.<sup>(1)</sup> It is a nontechnical report of the findings, made by an international team of researchers at the Massachusetts Institute of Technology, concerning the interaction of five basic factors--nonrenewable resource depletion, agricultural production, population increase, industrial output and pollution generation. The concepts and findings are interesting and somewhat earthshaking. For example: 1) Growth and decay of the five basic factors tend to approximate exponential curves, 2) Interaction and limitations of the five basic factors ultimately limit growth on earth, 3) Present rates of growth can not continue indefinitely, and unless man curbs growth, nature will check it in drastic ways, 4) Solutions to the problem must rely heavily on understanding, awareness, attitude and a change in the way man behaves, 5) Man's tendency to ignore early warnings and to act only in time of crises will result in a disaster before adequate changes are implemented.

The book has been criticized concerning some programing procedures, manipulation of the data and the details of how the variables were assumed to interact. The researchers recognized the subjectivity of many of their decisions and readily admit that much refinement of their work lies ahead. The basic ideas of limits to growth and the consequences of unchecked growth, however, are generally accepted in the science community. The accuracy of details will only act to shorten or lengthen the time required to arrive at the limits to growth.



Exponential growth curves are very important in understanding environmental issues. Most of mankind's current activities are closely approximated by exponential growth curves. Such growth curves are characterized by very low growth rates in the early A-stage, moderate growth rates in the middle B-stage, and very high growth rates during C-stage. The following example is helpful in attempting to conceptualize the changing rates of growth associated with exponential curves.

Suppose you own a pond on which a water lily is growing. The lily plant doubles in size each day. If the lily were allowed to grow unchecked, it would completely cover the pond in 30 days, choking off the other forms of life in the water. For a long time the lily plant seems small, and so you decide not to worry about cutting it back until it covers half the pond. On what day will that be? On the twenty-ninth day, of course. You have one day to save your pond. (2)

The above example also helps to explain why environmental issues have intensified during the past four years. Although many complex variables are involved, it appears that B-stage population growth in the United States and the rest of the world has increased stresses by placing increased demands on resources, agricultural production and industrial output, and by increasing pollution. The problems have been growing in this country since the arrival of the first white settlers, very slow during the early years and much more rapidly during the last twenty years. Many individuals tried to warn us during the early stages of the problem, but the majority did not understand the trends and had to be convinced by deterioration of the environment to more visible levels before concern was voiced and action taken.

Concern for environmental issues is not a passing fad because the pressures that intensified concern and precipitated action during the past four years are still active and growing at an increasing rate. Current corrective action will have only a slight moderating effect because the action is too little, but mainly because population and its concomitant pressures will continue to grow for 65 years even if a natality of 2.13 children per woman could be achieved and maintained in the United States. That is, at that natality rate, it would take 65 years before population stopped increasing. The problem is compounded by the

high birth rates in many foreign countries. Thus, concern for environmental issues should increase, not decrease as many skeptics would have us believe.

The subtle way in which exponential growth produces crises is a most serious matter. People have a tendency to avoid early warnings (a few lily pads on a pond) until an obvious crisis engulfs them. If present rates of growth are not checked by man, the natural limits of the global system will act to limit growth--perhaps in a drastic manner. Wise use of present technology and the development of new technology will continue to play an important role. Many problems, however, are nontechnological in nature; they are political, social and economic, and their solutions require readjustment of attitudes, habits, and behavior. These are slow acting, long range solutions that require one or more generations to pass before significant results are produced. Education of the masses will certainly play a major role in bringing about new understandings, awareness, attitudes and behavior necessary to plan and adapt to the new realities of global living. The challenge is to act now, on all educational levels, and not wait for the development of the obvious extreme.

John Platt responded to the question concerning the implications of current environmental issues for science and science teaching. He stated:

It means that we must teach ecology, global ecology, interdependence, man as an organism, the seamless web of life, the far-ranging and long-lasting consequences of every act of pollution or disturbance of the web.  
 . . . this Great Transformation means that we scientists and teachers must put our scientific talents into public education, as well as into the research and development needed for survival. (3)

Postscript: Nicholas Wade, in his article, "World Food Situation: Pessimism Comes Back Into Vogue," in Science, 17 August, 1973, calls attention to the critical balance that now exists between world population and world food supplies. World grain stocks are down to their lowest level in 20 years. The margin of safety is so small that adequate amounts of food for all must depend on a continuation of "good years" for crops. Flooding, droughts, and crop diseases could lead to a bad year or a series of bad years resulting in food shortages and famines. The optimist's view of the current situation is that it is merely a short term effect which will



disappear in a few years as food production increases. The pessimist's view is that the current situation is an early warning of long term food shortages and limits to growth.

#### References -

Meadows, Donella H. et al. The Limits to Growth. New York: Universe Books, 1972.

Ibid, p. 29.

Platt, John. "Science for Human Survival," The Science Teacher, Vol. 40, No. 1, 1973, p. 13.

Wade, Nicholas. World Food Situation: Pessimism Comes Back into Vogue," Science, Vol. 181, 1973, p. 634.

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#### STUDENT PROGRAMS

The Iowa Junior Academy of Science sponsored by the Iowa Academy of Science with additional support in terms of funds and personnel provided by Project ASSIST and the University of Iowa are sponsoring and coordinating a variety of elementary and secondary programs this fall. The program schedule is as follows:

September 14-15 -  
Viking Lake Environmental Study  
September 21-22 -  
Chicago Trip (NW/SW Iowa High Schools)  
September 21-22 -  
Greater Ottumwa Park Science Survey  
September 29 -  
Okoboji Science Survey  
October 5-6 -  
Chicago Trip (NE/SE Iowa High Schools)  
October 6-7 -  
Desoto Bend Environmental Field Study  
October 6-7 -  
Junior High Springbrook Science Survey  
October 6 -  
Paper Drive (Hempstead High School)  
October 13 -  
Survey of Fall Seed Plants  
October 13 -  
Mississippi River Science Survey  
October 20-21 -  
Upper Iowa River Excursion  
October 27-28 -  
Elementary Springbrook Science Survey  
November 1-2 -  
University of Northern Iowa Research Symposium  
November 17 -  
Student and Teacher Research Workshop in Region XIII (Council Bluffs)  
November 17 -  
Look To The Sky

November 24 -  
Student and Teacher Reserach Workshop in Region XV (Ottumwa  
March 21-23 -  
Iowa Junior Science, Engineering, and Humanities Symposium, University of Iowa

For a copy of the IJAS Student Programs, Fall, 1973, please write to: Director of IJAS, 459 Physics Building, University of Iowa, Iowa City, Iowa 52242.

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#### AN OPPORTUNITY TO SERVE THE BIOLOGICAL SCIENCES THROUGH SUPPORT OF THE UNITED NATIONS ENVIRONMENTAL PROGRAM

An intriguing chance for personal distinction is offered by a novel approach to improved world understanding and environmental preservation. Drawing on intensive briefing in Africa, a select group of naturalists, scientists, educators and exceptional laymen will serve as intermediaries between Africans and Americans cooperating to insure survival of the world's greatest wildlife treasure.

The seventeen volunteers, designated "Cameraides" to stress the visual aspect of their endeavor, will be coached on helping Americans understand their critical role in international environmental responsibility. This will include instruction in production of a soundslide documentary to professional standards, using slides and recordings made expressly for the AV aid. Cameraides will appear before service clubs and other community groups to enlist understanding of the importance of American help in saving the game, and support of a specific conservation project their group has chosen for aid. They will send a promising student to Africa, during his vacation, to monitor the assistance project inaugurated by them, and will encourage his entry into an environmental career. Those who are educators will also use their newly-acquired expertise in classroom and school assemblies.

The private diplomatic mission will leave for East Africa December 22, 1973, following a sendoff at the UN Plaza. Reporting first to the United Nations Environmental Secretariat in Nairobi, members will then meet with world leaders in government and out, engage in cultural exchange sessions at universities and intensively field study problems of concern to Africans and Americans. To help make these particularly vivid to audiences, Cameraides will be given special instruction in photojournalism and recording.