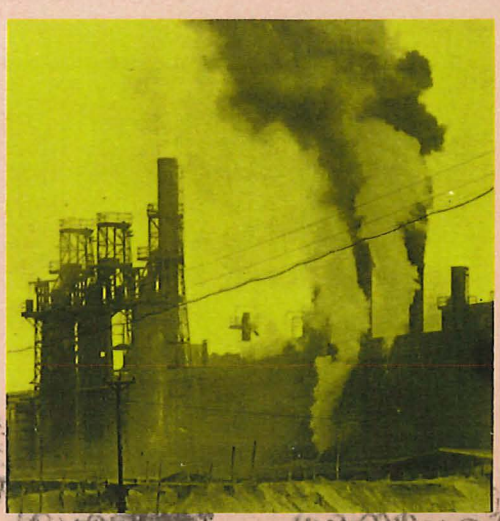
Trends in environmental education



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Preface

Since its inception over thirty years ago, Unesco, under its first Director-General, the late Julian Huxley, biologist, naturalist and humanist, has been deeply concerned about the environment and education for its safeguarding and improvement.

More recently, in response to Recommendation 96 of the historic United Nations Conference on the Human Environment, Stockholm, Sweden, 1972, Unesco in co-operation with the United Nations Environment Programme (UNEP) and other international bodies constructed a framework and mapped the direction of a co-operative programme to promote environmental education internationally. A special section of the Organization's education sector is devoted specifically to the conduct of this programme.

The general plan for developing the co-operative programme was conceived as occurring in the following stages: first, preparation of documents for an international workshop on environmental education to be held in Belgrade, 13–22 October 1975; second, initiation and evaluation of environmental education projects based on the Belgrade International Workshop recommendations; third, regional meetings on environmental education in Africa, the Arab States, Asia, Europe, Latin America and North America; and fourth, a world-wide intergovernmental conference in 1977 devoted to recommendation of national policies to be adopted concerning environmental education.

This book is based on trend papers which served as working documents for the Belgrade International Workshop. They described the state-of-the-art in environmental education in all parts of the world, covering many of its aspects and all of its age levels. Authors came from thirteen countries representing a wide variety of regions—Argentina, Canada, Czechoslovakia, Egypt, Italy, Japan, the Netherlands, Sierra Leone, Sri Lanka, Sweden, the United Kingdom, the United States of America and Venezuela. A primary objective was the identification of relevant writings from every corner of the earth published during the previous four or five years. Older materials of enduring significance were added by the hundreds of individuals solicited by letter because of their special professional interest in environmental education.

Each of the multinational working groups at the Belgrade Workshop extensively discussed the transferability of the concepts—and the accuracy of the information of the trend papers—in terms of their particular countries and regions. They also contributed case histories. In the light of these comments and contributions, the authors completely revised their preliminary papers, which are now appearing as *Trends in Environmental Education.* In three or four years, the entire process will be repeated in order to produce a second edition, to be entitled *New World Trends in Environmental Education.*

The current edition of *Trends in Environmental Education* has been conceived by Unesco as addressed to all those concerned in—or about—environmental education in every corner of the world, from government planners to environmental educators and individuals of an increasingly concerned general public. Environmental education, in the view of Unesco and in the words of the Belgrade Charter, 'Considers the environment in its totality—natural and man-made, ecological, political, economic, technological, social, legislative, cultural and esthetic'. Such a view clearly concerns all.

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Introduction

The aim of education is to make individuals aware of their own responsibility for protecting and improving the environment, so that they will make their own behaviour and actions conform to the norms which ensure a healthy environment, so that they will initiate and participate in actions to protect the environment and will promote efforts by society to solve these problems at the local, national and international levels.—*Concept and Nature of Environmental Education: Goals and Objectives,* Branimir M. Jankovic.

The need for a sufficiently sophisticated understanding of the functioning of the environment must be one of the requisites for coping with both those environmental problems generated by industrialization and technological development on the one hand and those created by underdevelopment on the other.—*Environmental Education Programmes for Adults,* Lars Emmelin.

As our understanding of the interrelationships between human activities and environmental problems progresses, the core of environmental education, when properly developed, may well become the pivot around which the future strategies of general education will turn; it should provide the citizens of the world with a new outlook and attitude, better suited to the needs of Man and nature.—*Some Thoughts on the Philosophy of Environmental Education,* Adriano Buzzati-Traverso.

. . . for meaningful co-operation at the international and regional level to be realised, a great deal of soul-searching must take place. The various organizations must weigh their allegiances and re-examine their loyalties in the light of the total system that they seek to affect. More importantly, each nation will have to create a climate conducive to co-operation.—*International and Regional Co-operation,* Hubert M. Dyasi.

The goal of environmental education is: To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones.—*The Belgrade Charter: A Global Framework for Environmental Education.*

In order to resolve our environmental problems we must learn to think and act in new ways. We must approach economic development with greater awareness and understanding of the environmental implications of our actions. The word 'we' does not refer to some exclusive category of 'decision-makers or environmental professionals', it includes each and every one of us. Without broad public understanding of the issues and alternative courses of action, we will be unable to move from crisis-oriented remedial efforts to the positive directions that support quality of life and environment.

There are wide differences of opinion about the nature and extent of our environmental problems and the role of education in solving them. What these problems are, who caused them and how they can be resolved are points subject to a variety of interpretations. Existing decision-making processes, whether they be industrial, governmental, or personal, are largely inadequate for dealing effectively with the environmental situation. In the past, actions could be taken with little concern for environmental impact because of the apparently amazing recuperative powers of the biosphere. Nature seemed prepared to serve forever as our servant, dedicated to assisting human 'progress' regardless of the terms of service. Increasingly, however, the assimilative powers of the natural systems have begun to break down under the sheer weight of numbers, the effects of misguided technological tampering with natural systems, and a demand for more and more material comforts in excess of those that meet reasonable needs.

In our growing awareness of environmental problems, we have begun to consider what sort of educational programmes are needed. As in most complex social issues we tend to look to education for solutions to the situation at hand. Often we disregard the extent to which education may be a cause of our problem. Like the rest of society, our educational systems have been caught off guard by the decline in environmental quality. It is clear that in the face of the environmental challenge education must embrace new perceptions and practices with respect to environmental education.

Environmental education is the rallying ground for many diverse groups, each with its special educational interest and needs. Many groups have sought to understand the growing influence of environmental considerations in their fields of specialization. But environmental problem-solving does not fit snugly into the limits of any one discipline or subject.

Gradually, some of the unique dimensions of the emerging field of environmental education have become recognizable: (a) because of the transdisciplinary nature of environmental problems and opportunities, single-discipline approaches are inadequate; (b) educators—both in the formal and non-formal areas—are forced to deal with an approach that is radically different from their own educational experience; (c) available materials usually deal with environmental concerns in such broad terms that they provide little connexion with recognized local realities and thus are less relevant to the learner; (d) the instructor must be willing to embark on an uncharted, joint learning experience with the learner, replete with all the shortcomings and frustrations such a situation can produce.

These concerns are not limited solely to education about environmental matters, but they are magnified when dealing with environmental issues because of the complexity of the problems and the almost inevitable confrontation with conflicting values.

There is no magic formula for introducing and using environmental education. The starting point may occur in any subject; it may be the result of discussion introduced by the learner; or it may be generated by issues covered in the local news media. The environmental problems that we seek to confront are, by virtue of their own controversial nature, subject to a wide range of views. All of these different interpretations have validity in their proper frame of reference. There is no set of facts, no orderly, prescribed path to follow that will lead to unfettered understanding and resolution of the environmental crisis.

Simplistic answers, based on narrow views of national or personal self-interest, are simply no longer viable. Now education must structure learning situations in which creativity and co-operation—and not competition—become the guidelines, thus fostering situations in which the implications and effects of alternative actions are examined before decisions are made. The materials and experiences available to the learner must relate to the world in which he or she lives; they need to assist each one of us in making sense out of conflicting evidence and statements, so that decisions can be reached about dilemmas that we can hardly conceive of at this point. The day may come, as some have suggested, when decisions about resource development, resource allocation, economic specialization, pollution control and abatement, will have to be made by a supranational environmental agency. But regardless of whether some multinational, globally impacting environmental project is being contemplated or one individual is evaluating his or her own lifestyle, each critical decision made at each critical point is a value judgement. There is no escape from the fact that the future quality of life is a human responsibility.

We are standing on the threshold of a remarkable opportunity to engage in nothing less than conscious participation in determining the future of our own species. Fantastic potential lies in a technology that can transplant organs in humans and explore outer space; but that capability must contribute to achieving human potential first and technological accomplishments second. In the future, decisions must be tempered by an unprecedented awareness of ourselves and of the environment that nurtures and is nurtured by us.

How does education face questions which challenge the economic principles, religious beliefs, social goals, political strategies, personal ethics and aspirations which have guided our societies? As one effort to cope with these questions, an international programme, under the leadership of Unesco and UNEP, has been initiated to further the development and implementation of environmental education. The programme has been designed to: facilitate the co-ordination, joint planning and pre-programming activities essential to the development of locally focused environmental education; promote the exchange of ideas and information pertaining to relevant topics; co-ordinate research for a better understanding of the various phenomena involved

in teaching and learning; design and evaluate new methods, materials and programmes; train and retrain personnel to staff environmental education programmes adequately; and provide advisory services to member States of the United Nations.

The programme has included the organization of the 1975 Belgrade Workshop on Environmental Education, support for a number of regional meetings to consider the national and regional implications of the programme, an intergovernmental conference on environmental education projected for 1977 and the implementation of pilot environmental education projects.

Education that confronts the environmental challenge is not an 'easy' task. It is fraught with ambiguity, differences of opinion and precious few 'right' answers. But with all these impediments, it is also imbued with tremendous potential for developing new directions and initiating new courses of action. In speaking of the need for a 'new global ethic', the Belgrade Charter (one result of the Belgrade Workshop) states:

> The reform of educational processes and systems is central to the building of this new development ethic and world economic order. Governments and policy-makers can order changes, and new development approaches can begin to improve the world's condition—but all of these are no more than short-term solutions, unless the youth of the world receives a new kind of education. This will require new and productive relationships between students and teachers, between schools and communities, and between the education system and society at large.

The Belgrade Charter is the product of a process which involved all the participants at the International Workshop on Environmental Education. In an exciting display of concern about, and commitment to, environmental, developmental and educational issues, the 120 participants from 65 nations collaborated in the preparation of 'A Global Framework for Environmental Education' that was unanimously adopted by all those present. That statement provides a context within which the papers in this volume and the performance of environmental education programmes in general can be viewed.

The papers which follow were prepared as working documents for the Belgrade Workshop on Environmental Education and have been revised for publication on the basis of the discussions at that meeting. The authors, selected for their interest and involvement in environmental education, were recruited from a dozen countries and a wide range of professional backgrounds.

The purpose of each paper is to present a comprehensive, balanced and scholarly analysis of the subject area in question—what activities are under way, what results have been obtained, what are the major problems, and what needs to be done in the future. Every reasonable effort has been made to include significant activities from all around the world. The papers provided important documentation for the Workshop and now serve as a baseline for assessing future trends in environmental education. They contain a wealth of information that will be useful in the establishment of environmental education programmes in nations everywhere.

The title of each chapter is a clear indication of the scope of the material covered. The reader, however, should appreciate the tremendous overlap between topics and, assuming an ecological frame of reference, recognize that 'everything is related to everything else'. Any system of subdividing a subject as complex and interrelated as environmental education must be viewed as somewhat arbitrary. While the book was not designed to be read sequentially from cover to cover, therefore, it warrants reading in its entirety whatever the readers' particular point of interest may be.

The authors who worked so diligently to prepare the material that follows agree on many points in general about environmental and educational issues, but they hold varying perspectives with regard to many specific aspects of strategies and priorities for developing and implementing environmental education. Constrained by the time available and restrictions on the length of manuscripts, they have pioneered in an area with poorly defined boundaries and insufficient data. An extensive annotated bibliography and a world survey on environmental education needs, resources and priorities were prepared to aid the authors and the Unesco-UNEP programme to chart the course. In an effort such as this, it was recognized that many relevant, exemplary activities were being, or had been,

conducted that did not necessarily carry an environmental education title. Rather than limit the coverage to programmes and projects that were catalogued as 'environmental', each author reviewed materials which espoused education objectives such as the following, agreed upon at the Belgrade Workshop:

Awareness: to help individuals and social groups acquire an awareness of, and sensitivity to, the total environment and its allied problems.

Knowledge: to help individuals and social groups acquire basic understanding of the total environment, its associated problems and humanity's critically responsible presence and role in it.

Attitude: to help individuals and social groups acquire social values, strong feelings of concern for the environment and the motivation for actively participating in its protection and improvement.

Skills: to help individuals and social groups acquire the skills for solving environmental problems.

Evaluation ability: to help individuals and social groups evaluate environmental measures and education programmes in terms of ecological, political, economic, social, esthetic and educational factors.

Participation: to help individuals and social groups develop a sense of responsibility and urgency regarding environmental problems so as to ensure appropriate action to solve those problems.

Given such objectives it was possible for the authors to draw on a wide range of educational experience and thus enrich the overall effort.

The material contained in this book furthers the development of the scholarship necessary for the focusing and implementation of effective environmental education programmes. It has been a privilege for the editors to work with the team of authors, many of them old friends, and with the many individuals who have participated in the Unesco-UNEP Programme. The success of this venture is due, to a considerable extent, to their efforts. The editors' role has been to guide the process and help bring things together; to the extent that they have succeeded in doing so, the credit must go to the authors because of the quality of the material they provided.

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Some thoughts on the philosophy of environmental education

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The magnitude, ubiquity and urgency of global, regional and local environmental problems are now widely recognized: they have become a major concern of the international community. A deep understanding of the complexity of environmental problems, and, even more important, of how to manage them in the global context is extremely difficult. Effective management of large-scale environmental problems will require a new type of education: 'new professionals', as they were termed at UNEP's conference in Aspen, Colorado (United States), on 'outer limits', must be educated. As our understanding of the interrelationships between human activities and environmental problems progresses, the core of environmental education, when properly developed, may well become the pivot around which future strategies of general education will turn; it should provide citizens of the world with a new outlook and a new attitude, better suited to the needs of man and nature.

It is against this general background of the need for a thorough transformation of educational philosophies in general, and of the international role that the Unesco-UNEP Environmental Education Programme may play in such a process, that I wish to examine how the desired and probably unavoidable change might occur. The field under discussion is vast and multifaceted; it should be approached with a holistic attitude in that man and the innumerable components of his physical and cultural environment should be examined together in order to identify the complex and often hidden interactions which determine the pattern of human concerns. The knowledge and experience of scientists and technologists as well as social scientists, humanists and educators should be called upon for the formulation of a philosophy and programme of environmental education. As this is a modest and single-handed attempt to encompass such a multiplicity of issues and concerns, it is bound to be superficial and probably biased.

As a former student of biological evolution, I think we should begin by pointing out that our species is the outcome of two distinct but interacting evolutionary processes: biological evolution and cultural evolution. The former is common to all living organisms, the latter is peculiar to the human species. As has been pointed out on many occasions, the rate of cultural and social evolution can be very fast, compared to the tempo of man's biological evolution. As Cavalli-Sforza and Bodmer[1] have observed, biological tempo can be gauged by the average time taken for a nucleotide substitution in man's genome, which is of the order of once every 1,000 million years. For organisms whose chromosome set contains some 5,000 million nucleotide pairs, as does ours, differences accumulate at the rate of five substitutions per year. This is a high absolute, but low relative, frequency. Thus, for a time separation between man and gorillas or chimpanzees of at least 10 million years, the total number of expected nucleotide differences is of the order of 50 million (in absolute terms), but only one in every hundred

1. L. L. Cavalli-Sforza and W. F. Bodmer, *The Genetics of Human Populations*, San Francisco, Calif., Freeman, 1971.

nucleotides will be changed. We can thus see now how we can be so different and yet so similar to the more human-like apes.

With cultural or social evolution, matters are entirely different. An increasing rate is characteristic of this type of change. From the history of man it is clear that the tempo of social and cultural evolution is continuously increasing at a rate that might be even faster than an exponential. Agriculture, for example, was 'invented' about 10,000 years ago and has taken initially all that time to spread across the whole globe. There are even today a few groups in highly isolated areas, such as the Pygmies in Africa, which have not changed their modes of life. Other inventions have taken progressively less time to spread. The democratic and parliamentary form of government has taken two centuries to extend over the five continents, even if today we are witnessing some abnormal types of the form. Other examples will certainly occur to any educated person. The main cause of the increasing rate of cultural evolution is the increase in the speed and the quantity of communication, of which education is an institutional instance.

The thesis I wish to support is that education is primarily a mechanism for fostering cultural and social evolution, or involution in some cases. At any one time, the educational system—whether based on religious dogmas and practices or on rational thought—has tried to divulge, sustain and perpetuate sets of social values. The process has occurred sometimes openly, at other times through devious channels. If you consider the world today and examine the diverse educational systems, you can clearly identify competing ideologies: those which are attempting to hold on to recognized and almost undisputed values, and those which have launched a major strategy for conquering the world and men's minds.

In other terms, behind any educational process lies a philosophy, a moral philosophy, for the people who exert power and are in charge of educational institutions share certain values, which they wish to disseminate in order to ensure the prolongation, if not the indefinite survival, of the system they are devoted to.

In this view, any educational system or programme finds its justification in a certain philosophy of values, that is, any educational activity subsumes a well defined technical outlook. Innumerable definitions of ethics, ethical values and criteria have been offered over the centuries, and I shall limit myself to an extensive quotation from one of the earliest earth humanists, Unesco's first Director-General, Julian Huxley. In 1947 he wrote:[2]

> Like every other human characteristic, our ethics, and its concrete manifestation in the shape of our morality, has its inner and outer components. The first main internal component is the capacity to experience acts or ideas as right or wrong, good or evil—to feel the sense of rightness or wrongness. And the second is the craving for certitude in respect of such feelings. These are given from within, by the nature of the human mind. But even so, they are not completely determined by genetics, like the colour of our hair. In particular, the development of an adequately intense capacity to feel rightness and wrongness—what is traditionally called a healthy conscience—seems to depend on the existence in the child, during a critical period of its early years, of an intimate and profound ambivalent emotion towards its mother or some other human being. Without this primordial conflict between love and hate, the feeling of guilt which is at the basis of the moral sense will not reach the threshold-value needed for the formation of the crude forerunner of the adult conscience the proto-ethical mechanism, any more than a plant can form chlorophyll in the absence of light.
>
> In addition to this general capacity to produce a primitive moral sense, the internal components help to confer variability upon human ethics. This is because inherited mental and emotional predispositions differ from one individual to another. Some human beings are extroverted, concerned primarily with concrete actions and relations with other human beings; others introverted, obsessed by the need to construct a coherent inner system of thought and feeling. Some are prone to pile up an excessive charge of infantile guilt, while in others the load tends to be inadequate to activate the moral machinery properly. And different external conditions will give greater scope for one or other of these different moral types.
>
> Equally important are the external components of morality and ethics. Certain of these are given in the facts of nature, such as storm and earthquake, famine and disease, birth, sex and death. The effects of these upon morality, however, will vary with the stage and type of human civilization. Thus epidemics and other diseases and disorders are today considered as preventable accidents. But in prescientific ages they were looked on as a divine scourge for

2. T. H. and Julian Huxley, *Evolution and Ethics, 1893–1943*, p. 177–8, London, The Pilot Press, 1947.

human wickedness. In regard to them ethics has shifted its focus from an emphasis on the general moral duty of righteous living to the specific moral duty of seeing that they do not occur. Again, sexual morality cannot but be affected by such external factors as the knowledge of effective birth-control or the existence of widespread venereal disease.

Another external component of ethics is provided by the current moral standards and practice of the society into which the individual is born. Indeed, many writers assert or imply that these are the essentials of ethics. In thus neglecting the share of the internal components, they rob ethics of its specific character—the emotive force of felt rightness and wrongness—which springs directly from the nature of that main internal factor, the psychological organ developed in the early life of each human being, in the shape of the proto-ethical mechanism.

What is more, they deny, either explicitly or by implication, the possibility of finding any more comprehensive external component for ethics than that of a particular society, and therefore any universal or general ethical standards.

How can we identify such universal—or one might say—planetary ethical standards on which to erect the structures of environmental education? I am afraid that we still have unclear ideas and this view is shared by many, including Allen A. Schmieder. In his paper, which follows my own, on the nature and philosophy of environmental education, after discussing several definitions of the field, he concludes: 'environmental education is still in the process of becoming.'

In 1933 Aldo Leopold[3] outlined his concept of conservation ethics and pointed out that acceptance and formulation of ethical principles is actually 'a process in ecological evolution'. Leopold wrote:

> Its sequences may be described in biological as well as philosophical terms. An ethic, biologically, is a limitation on freedom of action in the struggle for existence. An ethic, philosophically, is a differentiation of social from antisocial conduct. These are two definitions of one thing. The thing has its origins in the tendency of interdependent individuals or societies to evolve modes of co-operation. The biologist calls these symbioses. Man elaborated certain advanced symbioses called politics and economics. Like their simpler biological antecedents, they enable individuals or groups to exploit each other in an orderly way. Their first yardstick was expediency.
>
> The complexity of co-operative mechanisms increased with population density, and with the efficiency of tools. It was simpler, for example, to define the antisocial uses of sticks and stones in the days of the mastodons than of bullets and billboards in the age of motors.
>
> At a certain stage of complexity, the human community found expediency yardsticks no longer sufficient. One by one it has evolved and superimposed upon them a set of ethical yardsticks. The first ethics dealt with the relationship between individuals. The Mosaic Decalogue is an example. Later accretions dealt with the relationship between the individual and society, Christianity tries to integrate the individual to society, democracy to integrate social organizations to the individual.
>
> There is as yet no ethic dealing with man's relationship to land and to the non-human animals and plants which grow upon it. Land, like Odysseus' slave-girls, is still property. The land relations is still strictly economic, entailing privileges but not obligations.
>
> The extension of ethics to this third element in human environment is, if we read evolution correctly, an ecological possibility. It is the third step in a sequence. The first two have already been taken. Civilized man exhibits in his own mind evidence that the third is needed. For example, his sense of right and wrong may be aroused quite as strongly by the desecration of a nearby woodlot as by a famine in China, a near-pogrom in Germany, or the murder of the slave-girl in ancient Greece. Individual thinkers since the days of Ezekiel and Isaiah have asserted that the despoliation of land is not only inexpedient but wrong. Society, however, has not yet affirmed their belief. I regard the present conservation movement as the embryo of such an affirmation.

Aldo Leopold understood the problem more than forty years ago; many later writers have elaborated on the subject, pointing out that all the talk and the good intentions which have been expressed, particularly during the last five years or so, will get nowhere unless ecological values are integrated with all technological, scientific, economic and political activities. What we do not have yet is a well elaborated code of behaviour for individuals and societies based on the criteria of a new planetary ethics.

It is not surprising that such is the present situation, for the task is tremendous, consisting of nothing less than changing the ideologies, the motivations and therefore the way of living of 4,000 million human beings. The task is of gigantic proportions not only in quantitative terms, but in qualitative ones, because of the intricacy of interactions between the complexities of man, his environment and his products.

Our generation has performed phenomenal

3. A. Leopold, 'The Conservation Ethic', *Journal of Forestry*, October 1933. Reprinted in R. Disch (ed.), *The Ecological Conscience*, New York, Prentice Hall Inc., 1970.

deeds, humanity's empire has extended well beyond the limits of the earth's orbit and faith in our powers has reached ominous proportions. But our ways of thinking have remained confined, our institutions and governmental procedures obsolete, our conception of national power brutal, our understanding of societal relationships rigid, our ability to forecast events primitive. To quote Aurelio Peccei:[4]

> The bulk of mankind feels estranged from much of what it has created, and is frustrated by unaccustomed realities which escape its control or comprehension. The more this situation develops, the greater the danger for it to end in anger or in collapse.

To reach a better understanding of the human conditions and prospects one must consider them in a global context. The concept of globality has many dimensions, since the object of all our interest and concern is man himself, with his complex personality and growing needs, wants, aspirations and manifestations which constitute his very essence. It is erroneous and misleading therefore to confine our analyses, as often happens primarily to the material aspects of his existence, however important they may be.

Although one may already find in the writings of many enlightened authors the seeds of tomorrow's ethics, it will take a relatively long time to develop its fundamentals and the normative rules according to which our lives should be moulded. One should not forget that it took a long time for our predecessors faced with comparable tasks. Many of the greatest minds which have appeared on earth have devoted themselves exclusively to the study of ethics, an ethics consonant with their times: it is sufficient to mention the names of Socrates, Plato and Kant. And it took centuries before the thorough analysis of Christian ethics was formulated by Thomas Aquinas. As we noted before, however, cultural and social evolution seem to proceed at an accelerating tempo; it may, therefore, take a much shorter time to clearly express in words and rules the new global ethics. The task is certainly difficult, but it is urgently needed.

I can easily foresee that many of our cherished idols and beliefs will have to disappear. Well entrenched notions such as national sovereignty, *raison d'état*, national pride, the sacred interests of the nation, secrecy in governmental affairs and many more such obsolete and obnoxious concepts will have to be replaced with new planetary ideals in which tomorrow's people will put their trust and faith. Our entire way of living will have to change, replacing competition with cooperation, eliminating commercial publicity, rescuing science from its present prostitution to war and discovering new motivations to replace individual profit.

Progress and development have been the idols of industrialized society, but the time has come to realize that progress measured in terms of increase in the gross national product, or of technological innovations, is not enough. A new meaning, a more human meaning, must be attributed to the word 'progress'. Lewis S. Feuer pointed out in 1963:[5]

> The ethics of the scientific revolution was that of an optimistic, expansive view of human life. It was filled with the conviction that science would enhance human happiness. It had confidence in the human estate and in the aims and possibilities of human knowledge. It proposed to alleviate drudgery, and to transform work from an eternal curse to a human joy. It aspired, in its reading of the book of nature, to abrogate the tired dictum of Ecclesiastes 'Knowledge increaseth sorrow'.

That ethic proved correct: superstitions were superseded by rational explanation; physical pain could be demonstrably diminished and even abolished; working hours were shortened and labour became less strenuous and severe; death rates were diminished and life spans were extended; living standards of Western societies improved and social security offered a certain serenity to the workers; slavery was abolished and the longing for social justice found satisfaction over vast regions; individual liberty of choice and action became greater for men and women; personal movement, sexual freedom and access to culture became easier and responsible parenthood could be planned; and the frontiers of human knowledge rapidly expanded.

4. A. Peccei, 'The Humanistic Revolution', *Successo*, January 1975, p. 155–62 (internal edition).
5. L. S. Feuer, *The Scientific Intellectual*, New York, N.Y., Basic Books, 1963.

But the extraordinary success obtained by science has made us lose a balanced perspective on life. Modern man has put an equation sign between technological advance and progress and thus his primary concern is no longer with the human race. If we accept the definition of progress as 'the end point, temporary or permanent, of any social action that leads from a less to a more satisfactory solution of the problem of man in society',[6] we must admit that the institutionalization of science can hardly be identified with progress, particularly in recent times. The question to be asked now is not 'if not reason, what?'—as some commentators on the present predicament have done—but rather, 'Is it valid to identify reason with science and scientific advance with progress?'

The answer is obviously 'no', for science represents only one approach to knowledge of the world; scientific advance may contribute to man's progress, but, again, scientific progress must be considered only as a component of a more complex total situation.

The idea of progress is peculiar to the modern world (as has often been pointed out), a world that is the product of the scientific revolution and of the Enlightenment. In 1750 Anne Robert Jacques Turgot[7] could state at the Sorbonne:

> Manners are gradually softened, the human mind is enlightened, separate nations draw nearer to each other, commerce and policy connect at last every part of the globe, and the total mass of the human race, by alternating between calm and agitation, good and bad, marches always, however slowly, towards greater perfection.

And in 1793, Marie Jean Antoine Nicolas de Caritat, Marquis de Condorcet,[8] in his *Sketch for a Historical Picture of the Progress of the Human Mind*, showed

> that nature has assigned no limit to the perfecting of the human faculties, that the perfectibility of man is truly indefinite; that the progress of this perfectibility, henceforth independent of any power that might wish to arrest it, has no other limit than the duration of the globe on which nature has placed us.

Such faith in the perfectibility of the human condition is still inherent in the prevailing attitude of man, two hundred years later; but we begin to realize that science is not enough to guarantee the progress of man and that there is a fallacy in the technocratic argument which confuses material and moral progress.

Within the scientific community one can note an increasing awareness that modern societies face a number of problems—such as nuclear war, population explosion and environmental decay—which represent major obstacles to the progress of the human race and for which science and technology provide no solutions.

Our options today are limited in number: we might abjure our faith in reason and follow the 'Old Gnosis', which would give us visionary powers, primordial energies, organic awareness, adventures of spiritual regeneration, organic wholeness and similar sombre evasions;[9] we might continue to believe that science is the only source of salvation and that more science and technology can cure the ills of today's society, hiding from ourselves the ominous signs of impending catastrophes; or we might humbly recognize that the problems at hand are greater than our ability to understand them, that we must widen the limits of our concern far beyond strictly scientific issues, and that, in co-operation with sociologists, philosophers and other thinkers, we must attempt to find a new meaning for progress. Obviously, I consider only the latter option as viable, for it reaffirms the hope of progress and opens wide horizons for new adventures of the intellect.

In his book, *The Sociology of Progress*, Leslie Sklair (1970) made a distinction between 'innovational' and 'non-innovational' progress: the former, he terms 'progress by means of the

6. L. Sklair, *The Sociology of Progress*, London, Routledge & Kegan Paul, 1970.
7. Anne Robert Jacques Turgot, 'Second Discours sur les Progrès successifs de l'Esprit Humain', in J. P. Migne (ed.), *Démonstrations Évangéliques*, Vol. X, 1843, p. 467, Petit-Montrouge, J. P. Migne.
8. Marie Jean Antoine Nicolas de Caritat, Marquis de Condorcet, *Esquisse d'un Tableau Historique des Progrès de l'Esprit Humaine*, Vol. I, p. 19, Paris, Bibliothèque Nationale, 1864.
9. T. Roszak, *Where the Wasteland Ends*, New York, N.Y., Doubleday & Co., 1972.

production of new things, ideas and processes, with maximum *impact* on society' (through the institutionalization of invention and discovery); the latter is 'progress by means of the maintenance and diffusion of familiar things, ideas and processes with minimal *impact* on society', the term 'impact' being used in a special sense to signify the effect that the different types of progress have on social structures.

It may be that, after many decades of frantic innovative progress, reason will advise us to enter a period of non-innovative progress or of profound social rather than technological innovations. At this time, to be sure, none of us seems to know which course we should take. For this reason I think that the moment has come for launching a far-reaching programme of research on our own nature, on our authentic needs—probably quite different from the fictitious ones that have led us astray in recent times—and to identify the basic components of the human design.

Historically, over the last three centuries, man has chosen to venture upon the untrodden paths of science, first entering those which seemed easy to scout. Thus, with the support of mathematics, physics developed, then chemistry, biology and the earth sciences. Man remained isolated, as it were, from nature. Through separation of the observing subject from the studied object, and of facts from values, science has scored its triumphs but lost its own control, for scientists have become bureaucrats. Edgar Morin[10] comments:

> Atomic physics has been manipulated by the very blind and uncertain forces which command and dispute our historical societies. Biology in its turn will be manipulated and even anthropology, when it becomes a real science; it will be corrupted in even more dangerous ways.

The vision of the advent of a *scienza nuova*, of a science of man and for man, as the one so recently outlined by Edgar Morin, is probably the harbinger of a turning point in the thoughts and attitudes of modern man. As the *philosophes* of the eighteenth century took it upon themselves to criticize the conditions of society in preceding times and laid the intellectual foundations of the new civilization that transformed the world, similarly we must engage in a drastic re-examination and reorientation of our ways of thinking, of our priorities, our scientific, social, economic, ethical and political structures—putting aside those our predecessors elaborated, which have now proved obsolete.

The 'philosophes' were not philosophers in the traditional sense of the word, but rather a group of assorted intellects, ranging in their prevailing interests from mathematics to politics, from biology to moral sociology, recruited from the aristocracy and the humble classes alike. If the complexity of the problems of that time required the convergence of so wide a range of intellectual skills, the supercomplexity of today's world calls for the concentration of the efforts of a vast variety of specialists to cope with the whole gamut of the innumerable, intertwined problems of today. To my mind, interesting and worthwhile as they are, current attempts to develop a critical science[11] or to develop methodologies for technological assessment are much too limited in scope, for they seem to aim at minimizing the untoward effects of the scientific enterprise as we know it today, rather than examining it from a novel perspective, leading perhaps to a radical criticism of its structures and function.

There is, I think, a real and desperate need for a major and daring advance in pure thought. Up to now, diagnoses of the predicament of modern man and his societies have been sporadic and individualistic, leading too often to irrational despair. The time has come to take a fresh approach towards the establishment of an unprecedented community of scholars—a novel and, as it were, outward-looking ivory tower. Both our courage and our confidence in reason can warrant its success.

The task of such a community will be primarily that of developing the discipline of human ecology. We use the term to indicate a three-pronged study: first, analysis of the complex interactions occurring within human populations and communities, as well as those occurring

10. E. Morin, *Le Paradigme Perdu: La Nature Humaine,* Paris, Ed. de Seuil, 1973.
11. J. R. Ravetz, *Scientific Knowledge and its Social Problems,* Oxford, Clarendon Press, 1971.

between human populations and communities and the physical biological components of their own total environment; second, study of the mechanisms of adaptation of human populations and communities to the changing environment; third, identification of the parameters and of the ensuing rules for the harmonious development of human ecosystems.

Such long-range endeavour might constitute the course for tomorrow's environmental education. This, in fact, will be the third step in the sequence of ethical evolution, as envisaged by Aldo Leopold.

Part I

Concepts, goals, methodologies and materials

1. The nature and philosophy of environmental education: goals and objectives

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Introduction

Recommendation 96 of the Stockholm Conference on the Human Environment called for the development of environmental education as one of the most critical elements of an all-out attack on the world's environmental crisis. This new environmental education must be broad based and strongly related to the basic principles outlined in the United Nations Declaration on the New International Economic Order.[1]

Although its intellectual roots are ancient, environmental education as referred to at Stockholm is a relatively new concept, having come into prominence during the late 1960s. And as is the case with pioneering in any area of scholarship, the first environmental education advocates came from a great variety of fields of interest and scholarship. Because of these two factors, and the unevenness of the growth of the movement across the world, there is no massive, easily obtainable source of information about the world-wide status of environmental education. Although some problems are widely apparent, some general goals clear, there is still little consensus as to what the domain of environmental education is, what an environmental educator should know and do, and even more basic, how humanity can best cope with the complex and ever-changing environment in which it now finds itself.

Inherent within all environmental education, however, is the philosophic belief that we must seek nothing less than a basic reform in the way our society looks at problems and makes decisions. While this is a responsibility of society at large, educational systems could have a key role to play in bringing about this reform. On the one hand we must train professionals who can deal with pollution abatement, land planning, and all the other technical requirements for preserving a high-quality environment. At the same time, it is vital that our entire society develop a new understanding and an acute awareness of humanity's relation to its environment. This will require the development and teaching of the environmental philosophy and related concepts at every point in the formal and non-formal educational process.

The complexities and problems of attempting to develop an international environmental education programme cannot be minimized—but we must also recognize and consider that there are strengths which each nation can contribute. When we seek to communicate and cooperate on an international basis, the different

1. From 'Environmental Situation', *The Belgrade Charter: A Global Framework for Environmental Education*, produced and adopted at the International Environmental Education Workshop at Belgrade, Yugoslavia, 13–22 October 1975.

cultural settings, educational systems and professional views should not be seen as constraints. The 'alien practices' of others may provide corrective insights into our own culture-bound views of the world. No one group, nation, culture, or 'school of thought' has the answers to the issues surrounding the blending of economic development and the environmental good life. The welfare of humankind is to be found in optimizing the potentials of technology and humanity in an atmosphere of increasing environmental sensitivity.

> It is absolutely vital that the world's citizens insist upon measures that will support the kind of economic growth which will not have harmful repercussions on people; that will not in any way diminish their environment and their living conditions. It is necessary to find ways to ensure that no nation should grow or develop at the expense of another nation and that the consumption of no individual should be increased at the expense of other individuals. The resources of the world should be developed in ways which will benefit all of humanity and provide the potential for raising the quality of life for everyone.[2]

Environmental education must promote and sustain a world-wide dialogue—stressing the ecological principles that go far beyond ideological and political boundaries. At the same time, it must seek to instil in all individuals a sense of the importance of themselves as agents of change, who must seek evidence, think critically, and challenge the way things have always been.

The interactive processes between humanity and nature are so complex and multi-dimensional that the goal of understanding and improving this relationship will require support from practically all disciplines of knowledge, and any action directed at solving significant environmental problems will depend upon the active participation of a large array of people and institutions. Environmental educators may be the first educational specialty group in history who are concerned with the education of all.

This paper will essentially reflect what is currently happening in the formal disciplines and literature of environmental education. It was not possible to document important related activities which are occurring under other labels. There are places in the world, for example, where people have never heard of environmental education, but where many of its prime goals are already widely practised as a result of certain long-held religious and cultural beliefs that place high value on the wise custodianship of the natural world. Environmental education leaders are deeply concerned with finding ways to build upon all such related foundations.

Whatever the approximation or state of development, environmental education will have no impact unless it has a clear focus and meaning. The problem was well summarized in a recent statement by a leader in the field:[3]

> Ultimately, we believe, EE must focus on the Spaceship Earth concept. It must deal with man-man and man-society relationships only as they affect, or are affected by, man-earth relationships. Other endeavors, worthwhile though they may be, are not EE. To be useful, a concept must be both inclusive *and* exclusive. This is as true of the concept EE as it is of the concepts 'tree', 'elephant', or 'man'.

This comprehensive, all encompassing nature of environmental education does not lend itself to easy definition. And although a great deal of usable substance has been developed by the many disciplines involved in related studies down through the years, there is as yet no clear body of knowledge that is exclusively by, of and for environmental education. Environmental educators are, therefore, faced with the unenviable task of defining and developing the substance of their field, while at the same time working out the best means of communicating that information to the world.

Reflecting on environmental education, one practitioner recently stated:

> We have collectively begun to engage in a kind of discovery of ourselves—who we are, where we belong, and where we are going.[4]

2. ibid.
3. Thomas R. Tanner, 'Conceptual and Instructional Issues in Environmental Education Today', *The Journal of Environmental Education*, Vol. 5, No. 4, 1974.
4. René Dubos, *A Theology of the Earth*, p. 2, Washington, D.C., Smithsonian Institute, 1970.

In an equally exciting and universal vein, Alfred North Whitehead, in a discussion on the aims of education many years ago, concluded:[5]

> But for all your stimulation and guidance the creative impulse toward growth comes from within, and is intensely characteristic of the individual. Education is the guidance of the individual towards a comprehension of the art of life; and by the art of life I mean the most complete achievement of varied activity expressing the potentialities of that living creature in the face of its actual environment.

These statements, made nearly a half century apart, seem aptly to summarize the goals of both environmental education and general education. And the comparison surely accentuates the ecstasy and agony of environmental educators as they begin to close in on a clearer definition of their discipline. The main objectives of environmental education are consonant with the highest hopes of the whole educational process. There is much to build upon, and much potential support to be gained from everyone concerned with education. But it is also possible in such a situation to reach for everything and come away empty-handed. So it is absolutely essential that leaders in environmental education make clear what part of this universe they intend to deal with—they must be as specific as possible about what environmental education is and is not.

Some widely supported definitions

The following definitions have been arrived at by significant groups engaged in environmental education; they are presented as a rough approximation of what various parts of the world currently think environmental education is all about:

Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulation of a code of behaviour about issues concerning environmental quality.[6] (This definition was accepted and recommended for wide use by all participants in the International Working Meeting on Environmental Education in the School Curriculum, organized by the IUCN Commission of Education under the sponsorship of Unesco, 1970. It has been endorsed by the National Association for Environmental Education (NAEE) and the Society for Environmental Education (SEE) in the United Kingdom.)

Environmental education is a way of implementing the goals of environmental protection. Environmental education is not a separate branch of science or subject of study. It should be carried out according to the principle of lifelong integral education.[7] (Proposed by the Seminar on Environmental Education, organized by the Finnish National Commission for Unesco at Jammi, 1974.)

Environmental education involves teaching about value judgements and the ability to think clearly about complex problems—about the environment—which are as political, economical, and philosophical as they are technical.[8] (Proceedings of the Organization of American States Conference on Education and the Environment in the Americas, 1971.)

Constructive attitudes toward the environment, in both the philosophical and programmatical senses, have not yet become an ingredient in everybody's thinking and acting. This remains the basic objective of environmental education.[9] (Final Report: Intergovernmental Conference of Experts on the Scientific Basis for the Rational Use and Conservation of the Resources of the Biosphere, 1968.)

5. Alfred North Whitehead, *The Aims of Education and Other Essays*, p. 50, New York, N.Y., MacMillan, 1929.
6. IUCN Commission of Education, *International Working Meeting on Environmental Education in the School Curriculum*, Paris, Unesco, 1970.
7. Finnish National Commission for Unesco, *Report of the Seminar on Environmental Education*, Jammi (Finland), 1974.
8. Organization of American States, *Proceedings of the Organization of American States Conference on Education and the Environment in the Americas*, 1971.
9. *Final Report: Intergovernmental Conference of Experts on the Scientific Basis for the Rational Use and Conservation of the Resources of the Biosphere*, Paris, Unesco, 1968.

The educational process dealing with man's relationship with his natural and man-made surroundings, and including the relation of population, pollution, resources allocation and depletion, conservation, transportation, technology, and urban and rural planning to the total human environment.[10] (In United States Public Law 91–516, The Environmental Education Act.)

In order to enable people to enjoy good health and a high quality of life, it is vital to prevent harmful effects to human health or damage to the environment caused by pollution of air, water and soil, noise, vibration, noxious smells, etc., caused by firms and individuals. The environment includes animals and plants and their ecological systems which are closely bound to the livelihood of people.[11] (National Anti-Pollution Law, Japan, 1969.)

One more item highlights the fact that not everything relevant to considerations of EE has been done in the name of EE:

To create an awareness and an understanding of the evolving social and physical environment as a whole, its natural, man-made, cultural spiritual resources, together with the rational use and conservation of these resources for development.[12] (One of the aims of social studies as stated in the Report of a Conference of African Educators, EDC and CREDO, held at Mombasa, Kenya, in 1968.)

The several examples show that there is considerable agreement among important groups around the world regarding the general nature of environmental education. The common ground of these and other statements is best summarized in the *Principles of Environmental Education* set forth by the Seminar on Environmental Education, Jammi, 1974.[13]

1. Environmental education is included in all thinking and activity, in culture in the broadest sense of the term, and its principle is the strategy of the survival of humanity and other forms of nature.
2. The strategy of survival is a global approach which requires knowledge of natural science, technology, history and society; intellectual means for analysing and synthesizing this knowledge for creating new modes of operation.
3. In addition to the strategy of survival, the quality of life must also be considered; the goals set for it, and the means humanity has at its disposal for maintaining the target quality.
4. Environmental education aims at taking into consideration the principles of ecology in social planning, in various activities and in the economy, at both the national and international levels.

In summary, environmental education is for everyone. It is an action process, it relates to, and builds upon, the work of almost all other subject areas; it is concerned with the dynamic inter-action between humanity and nature; and it is directed at the improvement of the quality of existence for all living things; but, what is probably most important, environmental education is still in the process of becoming. Although some of its roots are ancient it is essentially a very new field and it will therefore only be possible to develop a series of successive approximations or estimations of the field as it evolves over the next decade.

Goals and objectives of environmental education

Environmental action seeks to improve all ecological relationships, including those between humanity and nature, and between peoples. It is important, therefore, for each nation, according to its culture, to clarify the meaning of such basic concepts as 'quality of life' and 'human happiness' in the context of the total environment, and with an appreciation of other cultures lying beyond national boundaries. The next step is for each nation to identify the actions which will ensure the preservation and improvement of humanity's potentials, developing social and individual well-being in harmony with the biophysical and man-made environment.

10. United States Public Law 91–516, *The Environmental Education Act*, Washington, D.C., 1970.
11. National Anti-Pollution Law, Japan, 1969.
12. *Report of a Conference of African Educators, EDC and CREDO*, Nairobi, African Social Studies Programme, 1968.
13. *Report of the Seminar on Environmental Education*, op. cit.

In turn, it becomes the goal of environmental education to develop a world population that is aware of and concerned about the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively towards the solution of current problems and the prevention of new ones.

In order to meet this goal, environmental education must convey the following basic concepts:

The earth's environment is made up of physical components—air, water and solid materials—which constitute a complex and totally interrelated life support system called the 'ecosphere'. The ecosphere is composed of interacting systems called 'ecosystems' in which organisms, living things, interact with physical components. All living things are interdependent with one another, and with their physical environment.

Materials are continuously cycling and recycling in and among ecosystems. Energy, on the other hand, moves through ecosystems—some available energy is dissipated with each conversion, until all available energy is gone. These two factors illustrate why pollution control (preventing pollutants from entering natural cycles) and energy conservation are of fundamental importance in environmental education.

Each ecosystem has an ability, called 'carrying capacity', to support given numbers of each species within it. Population figures fluctuate from time to time, depending on variations in the components of the system, but remain relatively stable unless the system is altered in some significant way.

Humans are an integral part of earth's ecosystems, and are dependent on these systems for their life support. Humans are more capable of altering ecosystems—changing the way they operate—than any other species. The pollution that humans can produce may harm human health and reduce the ability of ecosystems to support life. Human settlements and their development of resources can destroy habitats of other species. Humans are unique in the rapidity and magnitude of the changes they can make in their environment. These changes can be global, are often immediate, and may be irreversible. Human technology can be used either to the detriment or the enhancement of earth's ecosystems.

The unique human intellectual capacity to reason, experiment, understand, remember and communicate, produces a moral and ethical responsibility to bring human activities into balance with ecosystem processes. Human survival requires harmonizing man's activities with global ecosystems. Unless man can mould his policies and actions to conform with ecosystem processes, he may sacrifice his existence as a species.

Although world-wide environmental education can build upon these basic concepts, the objectives of individual national environmental education programmes will vary according to the number, type and severity of environmental challenges facing individual nations, and the different localities within these nations. The number of possible objectives for environmental education is nearly infinite; however, some are especially stressed in the relevant literature:

Basic objectives regarding society as a whole

To develop a public and national environmental ethic regarding ecological balance and the quality of life.

To develop a citizenry that has a basic understanding of humanity's relation and interaction with the total environment, understands the need for maintaining ecological balance, is aware, concerned and motivated to work on solutions to environmental problems, and is individually committed to improving the environment.

To provide accurate, up-to-date information about the environment and its associated problems to the citizens so they can make the best possible decisions regarding its utilization.

To provide the motivation and training that enable citizens to acquire and spread the knowledge and skills that will help society

solve interrelated environmental problems and prevent their recurrence.

To seek a balance between short-range needs and possible long-range implications when making environmental decisions.

To make the public aware that every citizen is an environmental decision-maker—on one scale or another.

Basic objectives regarding the teaching of individuals

To develop a set of basic values regarding human-nature interactions that will guide one through life.

To develop a lifelong commitment to the improvement of the human environment and the quality of life.

To understand the relationship between the needs of society and its interaction with the environment.

To be knowledgeable and informed about the possible future consequences of environmental problems and decisions.

To understand the interdependence of living things.

To think critically, seek evidence, and to challenge the way things are.

The objectives of environmental education were well summarized in *The Belgrade Charter*[14] as follows:

1. Awareness: to help individuals and social groups acquire an awareness of and sensitivity to the total environment and its allied problems.
2. Knowledge: to help individuals and social groups acquire basic understanding of the total environment, its associated problems and humanity's critically responsible presence and role in it.
3. Attitude: to help individuals and social groups acquire social values, strong feelings of concern for the environment and the motivation for actively participating in its protection and improvement.
4. Skills: to help individuals and social groups acquire the skills for solving environmental problems.
5. Evaluation ability: to help individuals and social groups evaluate environmental measures and education programmes in terms of ecological, political, economic, social, aesthetic and educational factors.
6. Participation: to help individuals and social groups develop a sense of responsibility and urgency regarding environmental problems so as to ensure appropriate action to solve those problems.

Developing a comprehensive environmental education strategy

In order to move towards the ambitious goals and objectives of international environmental education, there is a need for nations to develop interim, short-range programme strategies which will allow some good environmental education to take place, at the same time that long-range alternative programmes are being developed. It is important that early programmes make clear their objectives and limitations so as to avoid confusion as to the state of the art, and possibly cause resistance to a full and systematic building of environmental education. It is generally agreed that environmental education should not be an appendage to current curricula but instead be incorporated into programmes for learners of all ages. Such an infusion, if it is possible to accomplish at all, takes many years.

The Unesco-UNEP Environmental Education Programme should involve as many people as possible at the 'grass roots' level in the environmental education planning process—through the use of questionnaires, local conferences, etc.—so that they feel a sense of direct participation, provide additional insights, bring added political support to the effort, and begin to experience the kind of action-oriented process that is the essence of environmental education.

To encourage this broad-based participation, environmental education leaders need to develop and to disseminate a balanced view of human interaction with the environment: (a) one that objectively presents both successes and failures in this interaction; (b) one that makes clear that people can improve as well as despoil the environment.

A mainstream approach to environmental education should be emphasized, where the environmental educator is viewed as a co-ordinator of resources and a consultant at the disposal of other disciplines rather than one who conducts face-to-face teaching of environmental education.

14. *The Belgrade Charter* . . ., op. cit.

These educators should work from a list of goals and objectives which transcend cultural and geographical differences. They should make it clear that environmental education is a lifelong process, not confined to schools and colleges. It should be made clear that environmental education can take place anywhere: that the world is the classroom—cities, towns, farms, museums, parks, zoos, factories, homes, etc., as well as the natural world.

Evaluation should be made of closely related resources, which can supplement information gathered by the needs assessment already made. For example, although the social sciences have not been as central to the environmental education movement as the natural sciences, they have made a considerable contribution to the teaching of values, modes of inquiry, understanding political change processes, etc. Many of these new areas of development have great import for environmental education; but no systematic analysis of them as potential resources has been made as yet.

A matrix can be developed which shows a large array of environmental education curriculum possibilities. Then a communications network can be set up among all interested disciplines—possibly in relation to a certain set of problems, or basic concepts. Now that science teachers are communicating more about environmental education, we need communication between and across a wider range of disciplines about environmental education.

Finally, information should be provided about the implications, utilization and potential of mass media in environmental education. Media can reach large numbers of people, especially young children and adults outside the formal education system. Because of the potential for the media in environmental education, it is important, in addition to listing and making available already prepared materials and programmes, that leaders in the media—who have enormous influence—be educated in the environmental implications inherent in their activities. The media should be used more to educate as well as to inform.

Some guiding principles to consider when establishing an environmental education programme[15]

Environmental education should be a lifelong process. The programme should span all age levels, so that environmental concepts can be presented in a logical sequence and at the time that the learner is most receptive to the material presented.

The programme should provide continuity and progression, so that the understanding developed early can grow and be expanded upon in later years.

The programme should strive to increase the learner's interest in, awareness of, and sensitivity towards the environment.

The programme should link the social and biological sciences, so that both the social and scientific knowledge important in understanding and solving resource problems is properly developed.

The programme should give the learner an opportunity to study the community environment under natural conditions. This provides certain learning experiences that cannot be duplicated within formal, indoor programmes.

The programme should stress attitude formation, value clarification and skill behaviour (critical thinking, problem-solving and social change strategies).

The programme should emphasize local environmental problems so that individuals will have the incentive and tools to cope effectively with our current and future environmental problems. However, the programme should not neglect regional, national, or international environmental problems.

The programme should be handled in such a manner that the learner plays an active role in the learning process. The learner develops attitudes through personal experiences and thinking and not through the presentation of predigested conclusions.

The programme should provide continuing op-

15. Adapted from William Stapp, *A Brief Overview of Environmental Education*, Ann Arbor, Mich., School of Natural Resources, 1967.

portunities for leadership training, directed at helping people continually renew their understandings, interest, awareness and teaching skills in environmental education.

Some major developmental problems of environmental education

This section raises some serious questions regarding the philosophy and general orientation of the field as reflected in the current literature. These questions are especially important in that their answers will have a strong influence on the conceptual and goal priorities which environmental educators will set and will largely determine how the general public will perceive what it is that we are about. The latter is crucial because education—at least in the short run—has little real influence on public and political beliefs or behaviour, but these beliefs and behaviour can have a powerful impact on what happens in education.

These developmental issues are sure to arouse strong feelings. They are about significant matters. Limitations of space make it impossible to do more than introduce the essence of each question or problem. Such questions and problems, however, are at the centre of the nature and orientation of environmental education and need to be directly and thoroughly confronted before any real estimate can be made of the 'state of the art'.

The need for a more balanced viewpoint

Environmental education is faced with a major dilemma. Although having a rich heritage that in some cases reaches into ancient history, its recent re-emergence on the educational scene is primarily the result of widespread public concern about serious problems of over-population, pollution, utilization and availability of resources—especially energy—and the general degradation of certain natural landscapes. Much is owed to the individuals, institutions and organizations who championed the cause and led the public outcry—mostly under the banner of conservation.

The need for action has resulted, however, in the development of a viewpoint towards human interaction with nature that is strongly oriented towards the negative results of this interaction. There are endless examples that could be given to show how humans have improved the environment, increased supplies of resources through technology, and, in general, improved the quality of life of the world's people by lengthening average life spans, freeing increasing numbers from hard labour, increasing leisure time, and generally raising the world's *per-capita* literacy and educational levels. This is not to suggest that environmentalists should be any less fervent in their demands for decreasing abuses of nature and people. It is only to suggest that they must come to the problem of analysing the nature of the interaction between humanity and the environment with as objective, scholarly, and balanced a view as possible. To do this without losing the support of certain radical groups, or even giving those who abuse the environment some reason to call for a 'return to normalcy', will take courage and determination. But there is no choice if environmental educators are going to provide the kind of rational, high-quality leadership that will be needed to lay the groundwork for this vital subject.

Is there a difference between environmental quality and the quality of life?

This is a fundamental philosophical question that must be answered before many of the goals and objectives of environmental education can be effectively deduced and articulated. Some of the current leaders in the field argue that the two are inseparable and that environmental quality must be subsumed under the quality of life. Unfortunately, most of the work in environmental education to date has been directed at the quality of the 'natural environment', sometimes potentially at the expense of the quality of life. Scholars have generally examined the environment as if it were an entity separate from humans and the work of humans. The ultimate purpose of environmental education must be the improvement of the lot of humanity.

Environmental balance—the place of humans and the nature of stability and change

Much of the environmental literature claims that the 'stability' of natural systems is continually threatened by humans—by 'advancing tech-

nology'. It presents the view that nature is static, and that natural systems are despoiled if they are changed. Admittedly we do not know very much (relative to what can be known) about the long-range implications of human-natural interactions. But what we do know and may learn will be of little benefit to an accurate understanding of the nature of things if our analyses are based upon assumptions that are either false or founded upon sparse evidence. Natural systems are not static—they constantly change. In order fully to understand the reality of change and the potential for harmony between humans and nature, certain basic factors must be understood by educators involved in environmental education: (a) change is constant, both in natural and human systems; (b) nature changes constantly with or without human involvement; (c) both humans and nature can accelerate or slow certain 'natural' processes of change; (d) interaction between humanity and nature can be both positive and negative; (e) much of the landscape variety we are seeking to 'preserve' resulted from human 'interference' with natural processes; and (f) the natural elements and systems that exist now have not always existed and are not necessarily the best or most desirable natural elements and systems. In summary, change and balance are not conflicting elements of our human environment.

Some mythologies of the population explosion

There are many causes underlying the negativism that pervades the world today but none has been as consistent and significant as the fear of overpopulation so strongly expressed in the popular media these last two decades. Unfortunately, we have had such a massive overdose of 'the world is going to hell' propaganda that it is almost impossible to convince anyone that it is not. Calm and rational discussion of the validity of some of the 'population explosion' concepts is difficult to find. The ease with which educational leaders—especially ecologists—have accepted the doomsday prophecies offered up during recent years is both impressive and alarming.

Because the basic roots of the population arguments are intertwined with problems of environmental education it is absolutely essential that they be openly and objectively analysed. Four possibly incorrect assumptions are: that the world has reached or passed the total number of people it can support at a high standard of living; that the resource base of the world is diminishing and will continue to diminish if the population continues to increase; that the present world population growth trend will continue indefinitely; that the places in the world with the most severe population problems are the places with the densest populations.

World resource trends: increasing scarcity or abundance?

Environmental literature is filled with statements about the finite nature of resources—about how we are living in a time of increasing scarcity. These statements may be contrasted with data showing that the general *per-capita* GNP of the world is slowly rising. This is not to say that to use more and more resources per person is a good thing—that value judgement must be made by individual consumers and individual institutions and nations—but merely to emphasize that the *per-capita* GNP of the world is slowly increasing and that, if considered desirable, it would be possible to greatly increase the material wealth of most of the world's citizens. If environmentalists misrepresent the nature and availability of resources they not only reinforce mythology and mislead others but, maybe even more importantly, keep world attention focused on the wrong problem, i.e. on how to decrease population growth and slow resource utilization because of allegedly 'diminishing resources' rather than on what is probably a much more crucial question, i.e. if resources are becoming more abundant and the potential of human interaction with the environment can significantly improve the quality of life in some parts of the world, what must be done to bring these advantages—longer life, increased leisure time, better diet, more material wealth, etc.—to other parts of the world that desire them?

The place of humanity in the hierarchy of life

Although every effort should be made to preserve life whenever possible, decisions must sometimes be made (and with increases in the complexity of human-natural interactions they will have to be

made more often) in which it becomes necessary to consider the consequences of an action for a whole array of living species. There are some cultural exceptions but, generally, environmental education is a discipline that works ultimately for human welfare. This is a highly sensitive subject in that humane people desire to protect all life. But both natural and human systems do affect a great variety of living things and as the sensitivity of individuals and nations increases towards the environment and all of its residents, more and more choices and conflicts will arise regarding this issue. Some ethical standards need to be developed to guide these actions.

A definition or a context

One of the dilemmas of the practitioners of any such broad-based concept as environmental education is to decide to what extent the exact nature of the environmental condition and its array of problems and possible solutions should be specified and the extent to which people should be allowed to measure the situation themselves and devise ways of dealing with it. In other words, to what extent will environmental education describe the world 'as it should be', and to what extent will it provide people with sufficient perspective, information and tools of analysis to allow them to determine for themselves 'the way it could be'?

Other important issues central to the nature of environmental education are as follows: (a) environmental education calls for participation in real world activities and for modifications and changes—sometimes radical ones—in the attitudes and behaviour of people, yet neither approach is very usual in education as commonly practised throughout the world; and (b) on the one hand, individuals and societies are generally apathetic and complacent about environmental problems until they reach crisis proportions; on the other hand, because humanity has developed an array of techniques for projecting trends which show possibilities we are unfamiliar with, we often see crises where none may exist.

There are other areas of philosophical disagreement that are not identified here—and some that are surely more important than those listed. The ones included seemed to be most common in the literature and are not presented as a comprehensive listing, but to emphasize the relevance of such issues to any articulation of the nature, philosophy and objectives of environmental education programmes.

Conclusion

There is strong international concern about the earth's serious environmental problems and the need to take appropriate action. Formal and non-formal education is one area for such action. The great majority of the world's people feel that education is the most powerful existing force for bringing about improvement and change. Because many aspects of education are in one way or another environmental education, and because environmental education is for everyone, a great variety of individuals and institutions have rallied to the cause. There is a growing momentum accompanied by the kind of healthy excitement and controversy that occurs with any such reformation. These new and massive resources present a potentially strong foundation for building the kind of educational programmes that will make a difference. But the very scale and complexity of the involvement requires that environmental educators give high priority to the question of how exactly they plan to organize and utilize these resources. They need to be clear about what environmental education is and is not, and what it can and cannot accomplish. In most academic subjects, philosophical discussions about identity focus on the periphery or circumference of the discipline—and many specialties have benefited from centuries of earnest debate. Environmental education needs to keep its eyes on the core of what it is about and it needs to translate its purpose into programmes with all deliberate speed. As a notable environmental educator recently said: 'Time is short and the water rises.'[16]

16. Tanner, op. cit., p. 51.

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2. Methodologies of environmental education

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Introduction

One teacher thinks to herself: 'I want to teach my class what can happen to a river when the adjoining forests are turned into farmland.' She finds some examples in various books, prepares a diagram to put on the blackboard, and writes down some questions to ask the pupils.

Another teacher, working from the same syllabus, thinks: 'I'd like my pupils to experience the many ways in which changing almost anything on this earth produces countless unanticipated changes later.' She plans to start the class off by having them experience change: they shift their seating arrangement in the classroom. After two days of this, they discuss what happened. The teacher then talks about the concept of slow and rapid change and they discuss places to study in the community and its surroundings which might illustrate this concept. Some geography and history books provide additional examples.

Both teachers feel at the end of their lesson unit that they have been successful. Both feel they have selected good methods for teaching about an aspect of ecology and man's impact on the environment. Each teacher takes only a few minutes to select the particular methods that she will be using. Yet if we begin to question the two teachers as to 'Why this?' and 'Why that?' each might end up with long and detailed explanations in support of their different methods for accomplishing the same thing. The explanations, in differing combinations, might touch on the age of the pupils, the amount they already know, their usual style of working together, the availability of particular books and other materials, size of the class, types of parents, the headmaster, government policy, the teachers' previous values and successes, and the over-all educational philosphy of the teacher and school system.

This example of educational divergency in methods and method selection uses only two teachers. The descriptions in the following pages concern all teachers everywhere. Obviously, much selection has been necessary. Broad generalizations and abstract classifications have been deemed necessary to cover the ground. Examples are included wherever possible but, for reasons of space, have had to be kept to a minimum. The focus is on the many issues involved in the selection of teaching methods. The assumption behind this is that the process of selection—who does it, how, and on what basis—is an important influence on how a method is actually used with a class.

What are the choices?

A difficulty in describing the variety of teaching methods used in environmental education is that there is no standardized system of classifying methods. In one sense, there are as many methods

as there are teachers; or, even worse, as many as there are individual lesson days. The classification scheme that will be used here can make no claims to profundity or intellectual rigour. Its defence is that the job of writing a survey paper seems to impose this kind of task upon an author.

What follows is a list of axes or dimensions of variation which underlie choices of instructional methods, irrespective of lesson content.

Active v. *passive*

Passive: Teacher lectures to pupils about the water cycle.

Active: Pupils do an experiment as part of a field study of evaporation and rainfall.

Descriptive v. *analytical*

Descriptive: Pupils learn definitions of relevant terminology and describe what they observed on a field trip.

Analytical: Pupils follow up the descriptive coverage by working with a series of 'why-type' questions on the water cycle—for example, why does temperature influence the level of atmospheric saturation and why does each raindrop contain a dust particle? Why do some cultures have rain gods and why do children love to play in the water?

Informational v. *experiential*

Informational: Pupils watch a film, listen to a tape or read a text and then write a composition describing some aspect of the water cycle.

Experiential: Pupils get wet (while recording a series of timed observations on the development of a storm).

One-way v. *two-way communication*

One-way: Teacher assigns a text on the water cycle and then shows a short film-strip before summarizing the main points on the blackboard.

Two-way: The film-strip is shown with frequent stops for questions and discussion. The class is then divided into five groups, each to read about and discuss a different concept from the film-strip that emerged during the class questions and discussion.

Survey v. *selected in-depth coverage*

Survey: A broad coverage textbook entitled *People and Their Environments* is issued by the teacher as a basis for the organization and sequence of classroom work, taking one chapter each week.

In-depth: Two neighbouring and two distant or foreign locales are selected. The class is divided into four groups. Each spends the year studying, researching and documenting the full range of environmental interaction concepts that emerge from their investigations. About one-quarter of the class time is allotted to 'sharing and comparing' amongst the four groups.

Miscellaneous

Alternative approaches to content: themes; projects; world-wide *v.* local content; geographical types *v.* nations; single *v.* multidisciplinary; the world as one single system *v.* the study of a number of separate systems; values included *v.* values excluded; controversial issues and social conflict orientation; past and present *v.* the future.

Alternative approaches to activities: much *v.* little or no student co-operation in planning selection and evaluation, whole class *v.* small groups; experiences first (to introduce concepts) or second (to illustrate concepts); focus on scientific method (standardized procedures) *v.* encouragement of creativity and subjectivity; skills training, i.e. values clarification and problem-solving: individual *v.* team teaching.

Comment

These dimensions of variation are not meant to constitute an exhaustive list, nor are they exclusively focused on environmental education. What

then does characterize environmental education? The ideal perhaps involves active, experiential and factual elements, in-depth and survey approaches, inter-disciplinary, formal and informal instruction in the framework of lifelong education. The list could be prolonged indefinitely and this illustrates an important point, namely that environmental education is an approach to learning processes and content matter that brings together all methods. This is where its uniqueness lies. The variety of methods used in environmental education activities encourage teachers to widen perspective, to develop learning situations from the complex totality of man-environment processes and relationships. The example below illustrates this.

Unit on land use (for 12-year-olds). The teacher begins with a group co-operation game, a task for small groups that demonstrates conflicts between self-interest and group goals.

The discussion afterwards focuses on individual rights and social responsibilities. A number of questions emerge from the discussion and these are divided up for small groups to work through and report on. The outcome of this period is a list of common situations where an individual's desire to do whatever he/she feels like is in conflict with society's need to regulate behaviour according to community and national interests.

The issue of land use in the neighbourhood is then discussed as a case study of these concepts. A community survey is planned. One part consists of attitude questionnaires and interviews with local residents on their feelings about recent changes in the local area. The other part consists of information obtained from the land registry office and maps of local land use. A final part consists of interviews with present and former local officials about the decision processes underlying the changes in land use which have taken place. All this data is compiled and written up by three groups of pupils.

During this time, one student may begin to wonder about similar decision processes among individual land owners and agricultural co-operatives. On what basis do they decide how to divide up and use their land? Other pupils may feel that it is easier to find out how they and their families have reached decisions about their own homes (or flats) and rooms and yards. Hence, the pupils have discussions with their families and a class discussion follows.

At this point, the teacher decides to introduce an exercise for environmental awareness. The pupils set up a variety of environments within their classroom space and use them for reading, group discussion, listening and art work. In each case, they examine their own feelings concerning the milieux they have created; e.g. candlelight, sunlight, background noise or music, small spaces, corners, middle of the room, lounging on the floor, sitting in a circle, etc. This then leads to a more general discussion on designing and selecting environments on the basis of our own feelings and activities. The pupils begin to think back over the different processes that have actually taken place in their community.

The unit on land use ends with some extended discussion and written work that ties together the three elements covered: (a) community control of individual interests for land use; (b) present land use patterns and trends in the community; and (c) ways in which different land use patterns and man-made environments affect our feelings and activities.

Summary

A single unit or lesson contains decisions about all of these dimensions. For example, a unit on the water cycle may consist of a method that could be described as follows: active and analytical, mostly experiential, with two-way communication processes, in-depth coverage, multi-disciplinary with a focus on applying scientific methods. Similarly, one simulation exercise may be described as having a broad survey approach, and be heavily informational, while another will be more analytical with a narrow in-depth focus and based on a minimum of factual information.

For the teacher, such a classification scheme may be useful in increasing awareness of the choices that are being made. As will be shown in the next section, it is also important to utilize a variety of methods and to see the wide variations possible in applying any single method. The classification scheme may assist in this.

Relationships between methods and objectives, content and skills

Introduction

This section will cover the wide variety of different methods that seem to be used most often for environmentally oriented courses. Rather than providing a simple list, an effort will be made to illustrate how teachers have related their selection of methods to achieving particular objectives or content coverage or skill development. The teacher may begin lesson planning from any one of four starting points: (a) a method; (b) some objectives; (c) a body of content; and (d) a skill or set of skills.

For the specific examples below, bibliographical references are provided where these have been available to the author. In other instances, methods of which the author has personal or second-hand experience will be described.

The methods which seem to be most frequently used are listed first. Each description will include various ways in which the method has been used.

Pollution measurement and monitoring

This technique has been applied to a wide variety of situations. Teachers use it as a lesson in scientific methods: sampling techniques, quantitative measurements and recording of data from which conclusions are derived.[1] Another widespread use has been to base a community participation and action programme upon the data from the pupil's pollution surveys.[2] Here the main interest is in developing a commitment to social responsibility plus skills for social action and community co-operation.[3] In a third application, from a biology syllabus, the teacher may enlarge on the harmful influences of various air- and water-borne pollutants on respiration or reproduction. Continuous monitoring illustrates daily and seasonal changes. This permits students to examine causal relationships amongst a number of variables, e.g. wind direction, traffic flow, and air pollution levels.

Much equipment, from simple to complex, has been developed for pollution surveys.[4] Operation of the more sophisticated equipment is, in itself, a lesson in many principles of physics and chemistry as applied to scientific instrumentation. However, much can be done with such things as fine-pore filters or plexiglass water 'slides' that fit into a simple slide projector. In Japan, morning glory flowers have been used as monitors of air pollution. Seeds were distributed to schoolchildren throughout the country who kept records of the plant growth. Similarly, special metal strips have been distributed to monitor photochemical processes in smog.

Field trips

These are undertaken for an extremely wide variety of purposes and may range from a walk to a local field or empty lot to a wilderness adventure lasting from two to four weeks.[5] The objectives may be one or more of the following: studies of animal behaviour, soil and vegetation, lakes, streams and estuaries, sea shores, glacial moraines, fossils, archaeological remains, watersheds, patterns of land use, and perceptions of and sensitivity to environments.[6]

1. Project Environment, *Learning from Trails*, London, Longman, 1974.
2. ERYE (Greek Society for Study and Control of Water, Land and Air Pollution), *ABC's of Environmental Protection*, Athens, n.d.
3. Thomas W. Offult, 'Students in a Water-testing Program', *The Science Teacher*, Vol. 42, No. 2, 1975.
4. Conservation and Environmental Studies Center, *Water Quality Study Materials*, Browns Mills, N.J.; Ronald B. Childress, *Investigations for a Mobile Environmental Education Laboratory*, Kingsport City Schools, Kingsport, Tenn., 1972.
5. Tom Pritchard, *Environmental Education: its Social Relevance in North-West Europe*, Morges, European Committee for the Conservation of Nature and Natural Resources, 1968.
6. 'Project Environment,' op. cit.; 'Science Education Program for Africa,' *A Guide to the Study of the Environment*, Nairobi, 1971; A. T. Herbert, P. H. Oswald and C. A. Sinker, 'Centres for Field Studies in England and Wales', *Field Studies*, Vol. 3, No. 4, 1972; R. G. B. Morrison, 'Field Studies in Australia', *The Australian Science Teacher*, Parkville, Victoria, August 1974.

Since students generally enjoy field trips, these are often used for their benefits to group interaction and co-operation. As much advance preparation and planning and expense are usually involved in a field trip, they tend to take place rather infrequently. In Kenya, through the Wildlife Clubs, trips are made to agricultural and health centres where special education officers discuss environmental issues. Free transportation for rural schools and an interpretative programme are also provided by the national parks or game reserves. Similarly, in Madagascar, staff from Tsimbazaza Park work on field trips with secondary school students organized into 'Clubs Jeunes Sciences'. Such clubs also operate with out-of-school youth in Upper Volta, organizing field trips concerned with environmental problems.

Physical education and/or sports field trips are becoming more common with such activities as canoeing, hiking and climbing, and skiing being popular. Here the environmental education component may be secondary or hidden, but many educators feel that people who derive much pleasure from the unspoiled and minimally developed environment are more likely to be concerned with its preservation.[7] Field trips to or within the urban environment are becoming more popular. The United Kingdom is one of the leaders in this respect, notably as regards city trails, urban study centres and co-operative arrangements with urban planning agencies.[8]

Mapping

Lessons on mapping are usually approached as training in a skill. Since few adults are ever called upon to make maps, the justification for the inclusion of mapping in a syllabus is that it provides practice in applying mathematics, measurement and geometry and will help in using maps.[9] It is also a fact that students enjoy making them. Environmental education programmes utilize maps and mapping as a graphic illustration of many concepts in ecology and man-environment relationships. One example of this is the overlay method. Using clear plastic sheets, a number of separate maps are made of the same area. Each sheet maps different features of the area, e.g. water, forest, settlements, soil types, land use, contour lines. A wide variety of geographical and ecological concepts can then be illustrated by selecting different combinations of the sheets and laying them over each other.

The use of printed maps—geographical, socio-economic, natural resource, geological and meteorological—is too well known to need a description here.

Outdoor areas

The teaching methods associated with special educational areas vary widely.[10] On the passive-observational side are identification walks and 'point-out and tell' methods. More active programmes have students planting their own gardens and doing animal and plant surveys.

One example of a more comprehensive experience is the Archaeological-Historical Centre outside Copenhagen (Denmark).[11] Examples of Stone Age and Iron Age dwellings have been recreated using the materials and tools of those periods. Agriculture and crafts are similarly represented. Classes spend a week there, living in ancient huts, building more of the same, trying to use an ancient plough, carding and spinning wool, firing hand-thrown pottery in open-pit kilns, etc. The aim is to enable them to acquire a fresh perspective on their relationship with the present technological-industrial environment after experiencing some aspects of a very different environmental relationship.

This is one example of how a more inter-

7. Donald R. Hammerman (comp.) *et al., Research in Outdoor Education*: Washington, D.C.: American Association of Health, Physical Education and Recreation. (Summaries of Doctoral Studies.)
8. Roger Fagin, 'The Space between Walls, (Changing the environment of the school'), *The Times Educational Supplement*, 7 March 1975, p. 22–3; Hilda Symonds (ed.), *The Teacher and the City*, Methuen, Toronto, 1971.
9. 'Science Education Program for Africa', op. cit.
10. 'Project Environment', *The School Outdoor Resource Area*, London, Longman, 1974; Anthony Fyson, 'What happens at an Urban Studies Centre?', *Bulletin of Environmental Education*, London, April 1974.
11. Oldtidsbyen (Village from Old Times), Lejre (Denmark).

disciplinary and wide-ranging approach using a variety of instructional methods may often characterize well-developed environmental education activities in outdoor areas. The Kibaha Education Centre in the United Republic of Tanzania is a good example: here the programme is linked to the problems of rural development. Various forms of practical work and farming are combined with more formal study and related to national development goals in a programme that encompasses all age levels.

In many places, botanical and zoological gardens have placed considerable emphasis on instructional approaches related to environmental issues. A thematic approach is used at the botanical gardens in Bogota and Medellin, Colombia, for educating the general public about the nutritional, industrial and ornamental aspects of man's relationships to the plant world. This educational emphasis also characterizes the zoological gardens at Dehiwela (Sri Lanka).

Instructional methods for outdoor areas benefit from the self-pacing and individualized nature of the visitor's learning experiences. One can learn as much or as little as one is motivated to learn.

Museums

Museums have always been popular places for teachers to bring classes. Recently, the instructional methods in some museums have been changed in line with the increased emphasis on environmental issues in the exhibits themselves.[12] New methods include inquiry-type worksheets for each student that help to structure their use of the exhibits. Multi-media presentations are correlated with the exhibits or presented to classes in museum auditoriums. Many museums have put together special collections for school classes. As a rule, the pupils are allowed to handle the exhibits and obtain a greater feel for the materials and workmanship and the uses to which the items were put.

An example of this is the new approach of the Museo National de Ciencia y Technologia in Venezuela. The goal is mass education on ecological concepts and environmental concerns. A more lively and stimulating variety in the exhibits and more extensive use of audio-visual media are the means employed for achieving this goal.

A different development is taking place at Rabun Gap, Georgia (United States), where 14–15-year-old students are creating their own museum. They publish an internationally known magazine called *Foxfire* based on extensive interviews with the oldest residents of their rural mountainous area.[13] Local customs, crafts, folk medicine, food preparation, farming and community life of former days are thoroughly researched, written up, photographed and illustrated. The students have used the money earned to buy land for a museum. 'Old-style' cabins have been built to house their collection of audio-taped local oral history and examples of crafts and handmade tools. Their close and rewarding contact with a former style of man's relationships with his environment provides a context in which they can evaluate their own personal and community situation. Through their magazine and museum, they are sharing this process with many others. What is the teaching method? Little more than providing an impetus and a framework for putting pupils in contact with their local environment and the people of their past history. Within this context, the learning experiences are of a special sort because of the interpersonal relationships that develop: with the teacher, with the community elders and amongst the students.

Mini-plots and mini-environments

Several 1 x 1 metre squares are marked out on the ground for intensive study and recording of plant and animal life and surface features of the area. Plots are selected so as to illustrate such things as erosion, micro-climates, and the effects of vehicular and/or foot passage. The teacher wanting to develop observational skills will send the pupils out with instructions to come back in 30 minutes with as much information and as many ques-

12. Colin and Anthony Fyson Ward, *Streetwork: The Exploding School*, London, Routledge & Kegan Paul, 1974; Symonds (ed.), op. cit.
13. *Foxfire Magazine*, Rabun Gap, Georgia (United States).

tions as possible from their own plot. This can be followed by a second run with pupils switching plots to see how much more they can add to the original observations.

For a unit on land use, the mini-plot comparisons might be amongst a planted single-crop plot and an untouched one, a dry and a marshy area, a flat and a sloped one, sandy and loam soils or high and pH soils, sunny and shaded, windy and sheltered areas. The simplicity of mini-plots as a method may hide the complexity of interpretations needed to understand the observational data.

Another teacher, interested in plant growth experiments, may use the mini-plot exercise as a first step to provide background information for setting the same plants and seeds in the different plots.

Mini-environments are especially selected spots, small enough to be seen at a glance: for example, a river bend, a tree stump, a wall, a rock formation.[14] Their small scale may help to bring out a number of discrete environmental phenomena that are easily lost in a large unbounded area. The teaching methods with mini-environments may include the use of photography and sketching to improve observational skills. Influence of wind, rain, and the use of crevices and cracks by animal life may be studied.

Experiencing the environment

There is a wide range of issues that motivate explorations into the way we shape and are ourselves shaped by different environments.[15] Many instructional methods are being used.[16] For instance, one class made up a long list of common annoyances for each pupil to rate in order of importance. They compared their own emotional reactions with those from several classes in other countries and other environments. The Blind Trust exercise, in which pairs of pupils walk around, one with eyes closed and the other leading, illustrates how much the sounds and smells of our surroundings are missed due to our strong visual orientation.[17] City school pupils have investigated walking streets (vehicle free), small urban neighbourhoods, park and recreational needs, large high-rise apartment complexes, etc.

Many people grow up with little awareness of the environment's impact on them and even less concern for the reasons behind their emotional reactions to different environments. Since we are never without an environment, the teacher has a constant potential situation for developing these themes. Some have pupils design houses and buildings; other encourage studying and changing the classroom, school and school grounds. Pupils may help organize a clean-up paint-up action campaign in an old run-down area of the city. Emphasis is placed on examining one's own and others' emotional reactions to the surroundings. Since such feelings are often very subtle and half-unknown, pupils need practice and time. Some teachers have found it helpful to begin with simple perception experiments. These may use simple visual illusions or the Necker cube drawing which keeps changing its perspective.[18] In conjunction with language arts, pupils may look at the words they and other language groups use to describe the environment.[19] Pupils are intrigued by the implications of their three or four words to describe snow compared to the Eskimo's eighteen to twenty words.

Another theme is sensitivity to people as environments for each other. Teachers experiment with different class seating arrangements or the influence of background music and noise on reading or problem solving. The essential concept in this is the way an individual's behaviour changes in interaction with different people and situations. Role-playing is one method which brings this out. For example, pupils can role-play the way they would explain arriving late: to their teacher, their parents, and their friends.

14. Brian Barret and June Chatfield, *Mini-Environments* (a series of filmstrips and explanatory booklets), Waterlooville, Hants., Focal Point Filmstrips, 1974.
15. Roger M. Downs and Davis Stea (eds.), *Image and Environment: Cognitive Mapping and Spatial Behaviour*, Chicago, Ill., Aldine, 1973.
16. Ward, op. cit.
17. David Wolsk, *An Experience-Centered Curriculum: Exercises in Perception, Communication and Action*, Paris, Unesco, 1975 (Educational Studies and Documents No. 17.)
18. ibid.
19. Unesco, *Seminar on the Training of Teachers by the Interdisciplinary System, to Use this System in Schools*, Paris, Unesco, 1972.

Simulations, role-playing and game methods

A basic interest in simulation and game methods is that of linking learning with decision-making processes. An assumption is that the purpose of knowledge is to improve our decisions. In contradiction to memorizing new information, this tie-up of learning with decision processes is felt to increase the retention of information and better suit those pupils who learn poorly from textbooks and lectures. Another benefit is that it includes an important dimension lacking in most school learning: the application of knowledge already learned. Class discussions after a simulation or game can focus on the information base for decisions and the additional information that may have improved one's choices.

Teachers now have available a very large number of published simulations and games as well as instructions for teachers interested in creating their own.[20] This latter is important as most of the available simulations are in a North American or British context.

A notable exception is the simulation games designed as one segment of an adult education programme in Ecuador.[21] These are based on native village social and economic situations as part of an over-all approach which focuses on the environmental needs of both people and nature. Practical marketing and agricultural skills are a major outcome.

The simulations related to environmental education deal with socio-economic issues in pollution control, resource preservation, population growth, city planning,[22] land use, exploitation of developing countries, village markets, etc.[23]

Games and game-exercises are more often concerned with individual and small-group phenomena. Environmental aspects involve such things as values clarification, choice of living styles, perceptions of the environment, individual differences, group reactions to stress, social communication and creativity.

Role-playing is used as a technique by itself as well as in simulations and games. Teachers who make the effort to develop role-playing with their classes always have it available and use it frequently to illustrate any real-life situation of human communication and action.

Much of the value of role-playing, games and simulation lies in the discussions they provoke afterwards. As classes become acquainted with these methods, the teacher becomes less active in provoking a discussion and keeping it alive. As the pupils have themselves to talk about—their own reactions, feelings and decisions—they slowly develop their own skills as a class for full participation in a well-organized discussion. Central to this process is their learning to 'step back' from their own immediate experience and decision processes—to generalize from this to other situations and other people. The teacher's role in this will often be to integrate these discussions with the syllabus and reading assignments.[24]

Conscientization

This methodology, developed by Paulo Freire for literacy training in Brazil, is closely related to the philosophy and goals of many environmental education programmes. The teacher abandons his/her own language, descriptions, categories and concepts in order to analyse the reality of the learner's situation and develops a dialogical process from which the learners begin to articulate their own lives—their social, economic and political relations.[25] The Marondu Project developed by Professor Sardi, colleagues and students at

20. Wolsk, op. cit.; R. Walford (ed.), *Geography Games*, London, Longman, 1974; Barbara Steinwachs, *A Selected List of Urban and Environmental Gaming/Simulations*, Ann Arbor, Mich., Michigan University, Environmental Simulation Laboratory, 1972.
21. Ministerio de Educación y Cultura Programa de Educación de Adultos, Quito (Ecuador).
22. Anthony Fyson, 'Eurocity: A Planning Committee Game', *Bulletin of Environmental Education*, London, February 1975; Ward, op. cit.
23. Ward, op. cit.; African Social Studies Programme, Nairobi (Kenya).
24. Michael P. Maloney and Michael P. Ward, 'Ecology: Let's Hear from the People (An Objective Scale for the Measurement of Ecological Attitudes and Knowledge)', *American Psychologist*, Washington, D.C., July 1973.
25. Paulo Freire, *Pedagogy of the Oppressed*, New York, N.Y., Herder & Herder, 1971; 'Cultural Action for Freedom', *Harvard's Educational Review*, 1970.

the Universitad Catholica de Asuncion, Paraguay, is an example. To achieve their goal of helping rural native communities—educationally, politically, economically—they are emphasizing the communication processes of 'conscientization'. The basic premise of conscientization is applicable to learners of all ages and in all educational situations: an increased sense of control over one's own life develops with the increased social understanding associated with 'finding' and sharing one's existential language and then applying it to an analysis of social change possibilities.

Summing-up

In an article as short as this, much must be left out. Considering the totality of available instructional methods, it is obvious that today's teachers are utilizing a vast array of them in their environmental education programmes. In describing only a small portion of this array, there has been little space for emphasis on the most important question: what are the students learning? This question is rather critical as environmental education is often attempting something rather broader than much of the traditional subject matter of schools.[26] As many of the other articles point out, the objectives in environmental education go far beyond the learning of traditional content.

To all these additional goals—attitude changing, social participation, commitment and skills, value clarification—can be attributed the wide variety of methods.[27] Teachers have almost no effective means of measuring the ways in which pupils apply classroom learning to their activities out of school. What is one to say, then, about the advantages and disadvantages of one method compared to another? The published literature is mostly written by teachers enthusiastic over perceived success, as they see it. The evaluation research literature, taken as a whole, does little to clarify the situation.[28]

Despite such limitations on our knowledge, certain comments about selecting methods do seem reasonable. The use of a variety of different methods is widely recommended. Pupils' enthusiasm for simulations, for example, can quickly turn to boredom with overly frequent use. Similarly, there is little uniformity in the reactions of pupils to different instructional techniques. Thus, the teacher who utilizes a wide variety of approaches is more likely to reach all the pupils with their different learning styles.

There is also a tendency with many 'activity' methods to over-emphasize the activity itself. Pupils are often moved from one activity to another with little time for a leisurely follow-up on issues, concepts and unanswered questions. What typically seems to be lost during the rapid pace of new activities is the shift from descriptive to analytical considerations. In discussions following on activites, the focus at first is generally descriptive: i.e. What happened? How did you feel? What did you decide? What did you see and do? etc. Often these questions seem to exhaust the available time. The complex interrelationships involved in man-environment issues and ecology need an analytical approach: i.e. all those never-ending 'Why?' questions. Projects, field trips, games, role-playing, experiments, surveys—these are useful in getting pupils personally involved in asking and seeking answers to the often difficult 'Why?' questions.[29] Many of these same methods provide the basic information to help answer the 'Why?' questions. The dilemma for the teacher is that there is often a lack of flexibility enabling pupils to follow an activity along the several paths that may interest them. The present syllabus and weekly lesson plans and class examinations have a high priority. Thus, a frequent instructional pattern is the use of lecture periods and assigned textbook readings to 'cover the material'. The field

26. Unesco, *Seminar on the Training of Teachers . . .*, op. cit.
27. Science Education Program for Africa, op. cit.; Institute for World Order, 'Teaching About Global Hunger', *Ways and Means*, New York, N.Y., June 1975 (No. 18); Maloney, op. cit.
28. Eugene Ralph Brady, *The Effectiveness of Field Trips Compared to Media in Teaching Selected Environmental Concepts*, Iowa State University, Ann Arbor, Mich., 1972 (Ph.D. dissertation); Margaret Warne Monroe, *Games as Teaching Tools, An Examination of the Community Land Use Game.* (Papers on Gaming Simulation, No. 1.) Ithaca, N.Y., Cornell University Center for Urban Development Research, 1968.
29. David Wolsk, 'The Child's Environment is the School', *IUCN, European Working Conference in Environmental Conservation Education, Ruschlikon, Switzerland, 1972.*

trips and other activities then become supplements—to relieve boredom, put some real life into the course, etc.[30]

The variety of ways in which these different methods are being used may seem to bear little relation to the simplified scheme of choices presented under the section 'What are the choices?' The leap from theoretical schemes to the activities of learners is larger in environmental education than elsewhere. And it is perhaps this which characterizes its methods. However, with such complexity, the more simplified model of that section may be useful in orienting teachers and organizing the material.

Variations for primary, secondary, post-secondary and out-of-school pupils

A frequent comment from teachers at conferences is: 'That sounds very good, but I feel my pupils are too young (or too old, or not ready).' Similarly, the statement, 'I tried something like it and it really didn't work' is often heard. The selection of an instructional approach is complex, quite different from selecting a textbook. It is more like selecting the proper tool for a job. The teacher's skill comes in applying the method to the job (the instruction goal).

There are several general considerations that teachers must take into account in this process. First is the developmental 'stage' of the pupils. For environmental education, the teacher considers what elements make up the environment of the 8 or 15 year-old and the feelings and ideas the pupils already have about their environment. Beyond obvious generalizations, there is very little guidance for the teacher on this. One possibility, then, is for the teacher to set as an initial objective the determination of just where the class stands in its relationships to the environment. Field trips and the methods described earlier under 'Experiencing the Environment' are useful for this.

Generally, teachers feel that the younger pupils can best relate to the immediate environment and that a complete web of complex ecological interrelationships is beyond their comprehension or interest.[31] One may ask, however, whether it is not the schools themselves which initially impel children to divide up their world and to think in separate categories as a result of all the separate lessons in mathematics, spelling, reading, history, geography, three distinct sciences, art, etc. In our own times, many of the United Kingdom's primary schools and the Danish 'Little Schools' (amongst others) have emphasized a more holistic approach in which each individual child integrates within her/his own learning processes. This does seem to make it easier for young pupils to broaden their project and theme work so that it is not limited by artificial barriers of traditional subject-matter categories. This has important implications for environmental studies with their emphasis on interdisciplinary approaches.[32]

One aspect of pupil age that is unaffected by pedagogical approaches is the more personal viewpoint of the primary pupil in contrast to the secondary. Their fears of lightning and thunder storms and their fantasies of forest elves and seaside sand castles predominate. At about 10–11 years of age, the child begins more readily to separate him/herself from the environment and see it from other points of view and with a more abstract type of thinking. This results in more extended possibilities for class discussions following the activities used in many of the different methods. By mid-adolescence, the pupil's orientation towards society and the world of work increases. The broad range of socio-economic issues connected to environmental education can now be included as part of almost all the instructional

30. C. R. Meyer and S. N. Poslethwait, 'Australian High Schools Use Audio-Tutorials in Field Biology', *American Biology Teacher*, Vol. 43, No. 2, 1970.
31. Owen Reid, 'The Science Curriculum in the Primary School in Tasmania', *Education News*, Vol. 11, No. 2, 1967.
32. Fagin, op. cit.; Peter Shostak and Donald Daugs, *Outdoor Education: Handbook, K-7*, Schoell, Victoria, B.C., 1973; Charlotta B. Mary, *Adventures in Ecological Reading, Language Arts (Experimental); 5365.02*, Miami, Fla, Dade County Public Schools, 1972; David Rappaport, 'Environmental Mathematics', *School Science Math*, Vol. 70, No. 6, 1970.

methods used.[33] Pupil participation in community development projects is feasible. However, the adolescent period is also marked by the student's self-interest and concern for his/her relationships—especially with the opposite sex. For some adolescents, this is almost the whole extent of the environment. Environmental education programmes which ignore this, expecting a full measurement of student involvement in community development and environmental protection, are likely to achieve limited success. By the end of secondary school and at the university, students keep adding more background data and broader theoretical analyses to their understanding. As they become more independent and make more decisions for themselves, opportunities increase for applying what they learn to their own lives. A discussion about natural resource preservation and air pollution from automobiles is quite different when it involves young people who drive cars than when 'other people' are doing these things.

Of increasing importance in out-of-school environmental education programmes is the use of radio and television. In many cases, the methodology consists of organizing community study and discussion groups, supplying them with supplementary printed and audio materials, and a trained leader. In Chile, a combined television, radio and textbook environmental course was designed at five levels: illiterates, fourth grade, secondary school, university and specialists. The 1974 enrolment of 14,000 is impressive evidence of the potential benefits to be derived from these methods.[34]

The process of selecting methods

Introduction

Teachers do not select and use instructional methods in isolation. The way in which the selection process takes place is an important influence upon the method itself. This section will examine relationships between educational systems as a whole and the teacher's eventual use of a method in the class. This may demonstrate that a method is often only as good as the process by which it was selected.

Who determines the selection?

Not too long ago, it was said that a French education inspector could tell you exactly what was happening in every classroom throughout France, minute by minute on any day. Conversely, within many free schools or open educational programmes, neither the teachers nor the pupils can always predict what will be happening in their own classroom from minute to minute.

It is within this broad range of centralized to decentralized education systems that decisions about teaching methods are made. In one sense, centralized education systems are challenged by environmental education programmes. The more the content of education shifts from uniformity to local variations, the greater the need for local development of this content. In those countries at present implementing or developing environmental education programmes, the shift is regarded as a new direction.[35] As a result it generally means that it becomes a policy matter for education ministries.[36] They, in turn, usually turn the job of curriculum development over to university and education institute personnel.[37] In terms of a choice of methods, this procedure has resulted in two types of outcomes: (a) a broadly specified syllabus that offers alternative methods

33. Fyson, op. cit.; Jonathan M. Wert, *Environmental Education Study Projects for High School Students*, Knoxville, Tenn., Energy Education/Conservation Section, Tennessee Valley Authority, 1974; Edward Weidner, 'Problem-Focused Education with an Environmental Emphasis', *Educational Record*, Fall, 1971.
34. Hernan Contveras Manfred, Facultad de Ciencias Forestales, Casilla 9206, Santiago (Chile).
35. James A. Swan and William B. Stapp (eds.), *Environmental Education: Strategies Toward a More Livable Future*, New York, N.Y., Wiley, 1974.
36. Department of Education, State of Alaska Environmental Education Community Workshop. Juneau (Alaska), 1973.
37. Center for Research and Education, *Colorado Interim Master Plan for Environmental Education*, Denver, Colo., 1972.

and leaves many choices to the teacher; or (b) a curriculum package complete with audio-visual and written materials to support a specific sequence of activities.[38]

Within local schools, much variation exists in decision processes about methods. Many teachers and headmasters feel that an environmental education programme should involve the whole staff.[39] This enhances its interdisciplinary aspects. It also makes it easier to handle flexible scheduling for projects and field trips when more than one teacher is involved. In other schools, especially at the secondary level, environmental education may exist only as an additional focus of a geography,[40] science[41] or biology course.[42] Then the single teacher will probably choose the instructional methods, independently, or as determined by the course textbook and/or syllabus.

What is the basis for selection of methods?

This section is intended to raise the issue rather than provide answers. Though curriculum developers often justify the selection of instructional methods by quoting research literature, most do so in the knowledge that there is other literature in opposition.[43] At present we have no documentation on the actual informational and experiential basis for the decision processes that curriculum developers, ministry committees and teachers employ in selecting methods. However, that there is extensive general literature from which they can select information is indicated by the bibliographies in this publication.

Educators are also exposed to the frequent coverage of environmental issues by the mass media plus their occasional coverage of environmental education. As more and more teachers and educators gain personal classroom experience with environmental education, this also becomes a major factor in their decisions.

Are the final decisions on class activities to some extent a rational summation of all this information and experience? Or are there a number of other factors more subtle, indirect and emotional that enter into the decisions? For example, what are the effects of environmental pressure groups? And of parental pressures—both pro and con? In many communities, parents are concerned that their children are not learning the basics—reading, grammar, spelling, mathematics—well enough. They tend to look on environmental education as a 'frill' only justifiable after the basics have been mastered and when there is enough money available in the budget. How often are teachers eliminating such activities as simulations and games in an attempt to produce more academically respectable programmes?

There are also a number of institutional and bureaucratic factors from within education systems that bear on the process of selecting methods. Within each school, individual teachers will rarely continue to develop new approaches when the majority of the staff are dubious or opposed. The staff room remark, 'Your class activity was so noisy it was disturbing my class,' is a powerful deterrent. In many schools, the teacher's competence is rated on the basis of the examination scores of her/his pupils. Since teachers and schools are more used to the traditional content-type examination questions, this becomes a constraining factor for teachers interested in emphasizing methods that deal with such things as attitudes, skills in community development and value-analysis.

Another factor which is influential within some school systems is the pressure on administrators to achieve recognition by starting something new and modern. When a whole new set of methods in an environmental education curriculum

38. Ontario Institute for Studies in Education, *The Guide to the Ecology Box*, Toronto, 1972.
39. University of Florida, College of Education, *Values, Beliefs and Goals: Underlying the Program of the P.K. Yonge Laboratory School*, Gainesville, Fla, 1973.
40. *The Role of Geography in Environmental Education*, London, The Geographical Association, The Standing Committee for Environmental Education, 1974.
41. 'Science Education Program for Africa', op. cit.; G. Filinov, 'Notes on Laboratory Work in Nature Study Classes—4th Form', *Nacalno Obrazovanije*, Vol. 9, No. 2, 1969; Njala University College, 'Our Environment', *A Science Handbook for Teacher Training Colleges*, Freetown, University of Sierra Leone, 1974.
42. M. Sawicki, 'Integration of Science in Nature Study', *Nowa Szkola*, Vol. 19, No. 1, 1970.
43. Robert E. Roth and Stanley L. Helgeson, *A Review of Research Related to Environmental Education*, ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, Columbus, Ohio, 1972.

is pushed on to teachers for the sake of an administrator looking for a promotion, one may question the usefulness of the classroom outcomes. In situations such as these, there are frequent reports of a dropping of the new methods as soon as the administrator receives her/his promotion or transfer.

What are the effects of differing selection processes?

Teacher involvement

Should we focus our attention on the methods themselves? Does it really make a difference to the learner how and by whom the methods were selected? The answers may come from an example of some curriculum development projects of ten years ago. Disturbed by what teachers were doing to 'beautiful' lesson units, the emphasis was put on a 'teacher proof curriculum', one that even poorly trained teachers could not spoil. The failure of these curriculum projects emphasizes a critical point: the learner benefits from teacher involvement in curriculum development.[44] As is now being clearly demonstrated in the United Kingdom as teacher centres develop, with planning, encouragement and proper facilities, many teachers do an excellent job of local curriculum development.[45] Although solid statistical data is lacking, no one disputes that the quality of teaching improves significantly as a result of this kind of teacher involvement.

Examinations

In school systems with a rigid, centralized examination structure, the choice of teaching methods tends to be determined by these examinations rather than directly by pedagogical criteria. Individual subject examinations at the secondary level also inhibit the selection of methods that stress interdisciplinary approaches. Two approaches used in this situation seem helpful: (a) procedures that permit the submission of a locally developed syllabus and examination for approval by the education ministry; and (b) development of continuous evaluation procedures that focus on the learning process. This latter is especially useful to both teacher and pupils using some of the newer activity and experimental methods. Information is provided on the methods themselves that is useful for making improvements.

Timetable, scheduling

Like examinations, the weekly school timetable is often another example of the tail wagging the dog. This occurs in two ways. Curriculum developers generally work within the constraint of the fifty-minute class period, adjusting a group experiment, for example, so that it can be completed in one or two class periods. Similarly, the teacher deciding what method to use will take into consideration the timetable. It is worth noting that the problem is not an easy one to solve and, at the secondary level, its solution is often critical for a broad ranging environmental education programme that utilizes a wide variety of in-school and out-of-school methods.[46]

Conclusions

Environmental education programmes seek to encourage pupils to look at their surroundings and their own place within them with a more practised eye, a more involved heart, and a more responsible mind. We have seen that there is a wide variety of teaching methods that show promise in this respect. And, as this and the other papers demonstrate, many schools can already look back on solid achievements in environmental education. However, just as we want the pupil to look outward, so it is apparent that teachers and others in the education system need to look inward—to the system itself. Rather than deci-

44. Wolsk, op. cit.; Canadian Urban Dynamics Project, *Project Canada West*, Western Curriculum Project on Canada Studies, Edmonton (Alberta), 1972.
45. Harry Wals, *Report on the Northwest European Training Course for Teachers of Environmental Education Methodology, 1972*, The Hague, School of Children's Garden Service.
46. United States National Commission for Unesco, *STEP News/International—A Periodical Review of Students Towards Environmental Participation*, Washington, D.C.; Dean R. Bennett and Richard H. MacGowan, *Guidelines for Planning and Implementing a Comprehensive Community Environmental Inventory*, Yarmouth, Maine Environmental Education Project, 1972.

sions based on principles of child development and learning and group processes, it is often the politics of education which predominate. Teachers are given professional training and then told to implement decisions made at administrative levels without their participation. Desirable teaching methods are not used because they disrupt scheduling or are an extra bother. There is much to be concerned about; but the fact that this work is being prepared is, in itself, an indication of the progress taking place.

It is hoped that this article has indicated the application of 'ecological thinking' to educational methods. Methods do not exist in isolation but as part of an open-ended complex system. In this case, the system includes: (a) selection from alternative methods; (b) application of the method to different objectives, different ages, different learning sequences; (c) relationships with the rest of the school programme; (d) feedback and evaluation of learning outcomes; (e) action programmes in community development; (f) integration of subjects.

It has been very tempting for educators to deal with a complex system of this type through the power of a large centralized education ministry. Unfortunately, this eliminates the important advantages that result when the teachers who will be using new methods are themselves involved in the selection and implementation of those methods. The present paper began by discussing decision-making by teachers and may well conclude by emphasizing the same point.

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3. Learning environments for environmental education

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Introduction

The typical learning environments for traditional disciplines consist of classroom or laboratories in schools or universities where selected elements relating to increasingly complex topics are introduced, discussed or memorized and hopefully understood. Through the learning process, the learner develops means to function more effectively in the man-made world. Except for art, music and other pursuits where self-expression is the goal, there is a psychological separation between the learner and traditional subjects. The learner studies, methodically fashioning his individual 'intellectual tools': language in order to communicate; mathematics, to deal with measurement and finance; and sciences, to cope with the processes by which the life around him occurs.

It is here that the distinction between environmental education and traditional education emerges. As environmental education builds the problem-solving skills needed to clarify the relationships between natural and man-made systems and encourages values and behaviours sensitive to these relationships, it strips away the barrier between learner and subject—viewing each as integral and active parts of the other, and both as parts of the processes being studied.

In the past, a frequently used setting for environmental education was the natural area to which children were brought on field trips. Such activities, in which the basics of biology and ecology can be observed free from human influence, are important—especially for children raised in urban/suburban settings. But they do not meet the broader goals of environmental education, for they exclude the interfaces between natural systems and human activity. It is here, at these interfaces, that the effects of human activity—both good and bad—can be observed, and the decisions and policies which govern such activity can be analysed. Paulo Freire says: 'education . . . is a critical approach to reality.' The first step in this approach is the confrontation between humans and reality. This process of confrontation should bring humans to realize that they and their environment are each the mirror of the other and that they create their environment as much as the environment creates them and their life. Hence, being a part of the environment humans should be critical about it as well as about themselves, and should be able to identify the causes of environmental problems and to plan strategies for solving them. This kind of approach can only be made in close contact with reality.

Thus, in optimum learning conditions for environmental education, the school building and grounds, the community, the region, the world, all become extensions of the classroom—representing successively broader aspects of the total environment or the 'real world'. During an examination of the full interaction of natural and man-made systems, the more contact there is with the world of reality, the richer the environmental education experience will be. There is also a greater chance that students will shed the intellectual anonymity fostered in traditional education and come to recognize themselves as responsible agents of change in human-natural systems interactions.

Conceptual framework

Before considering the contribution of specific learning environments to the environmental education process, it is necessary to establish a conceptual framework for such an overview. What is a learning environment? How will teachers and other environmental educators know when they have found one? It is possible they might create some of their own, transforming 'ordinary environments' into those where active learning, exploration and discovery take place? How will they know if they have been successful?

Answers to these questions can be sought through a clarifications of criteria. What, in fact, constitutes a 'learning environment'?

Certainly potential learning environments abound; they surround schools and communities all over the world. They are city alleyways, urban rivers, backyards, grocery stores, nature centres, factories, parks, environmental study areas and the living rooms of individual homes. The environmental learning *resource*, the raw material, is everywhere. What are the variables which determine whether the environmental learning *process* actually takes place?

The cognitive aspect of environmental education has a role to play in creating learning environments. The opportunities for cognitive education in living, dynamic environmental situations are rich indeed. In the classroom, students can read of predator/prey relations or the chemical composition of factory waste, perhaps remembering facts digested long enough to be repeated in an examination. The information has little meaning, however, to a young mind thirsty for direct experience. Witnessing the capture of a mouse by a hungry hawk or the death of a waterway through careless technology, students receive vivid impressions of the push-pull, win-lose dichotomies which characterize environmental relationships and controversies. There is no substitute for these 'teachable moments', fraught with the kind of first-hand information which can serve as catalyst and springboard for the eager acquisition of additional facts after the experience.

The criterion that learning environments provide stimulation for factual knowledge is easily met; cognitive learning opportunities abound in every environment. A critical requirement is that students encounter them in a situation where they can feel free to explore and internalize the meaning of what they see and hear in relation to their own lives. Dr Howard Kirschenbaum, Director of the National Humanistic Education Center in rural New York State, expresses this viewpoint when he says: 'When placed in an environment rich in educational resources and with an accepting, encouraging atmosphere, people (be they youngsters or adults), tend to thrive and grow and pursue self-actualizing learning goals.' Students and adult citizens learn naturally in an atmosphere where exploration and discovery are fostered by their leaders. Learning environments, then, must offer opportunities for affective education; students must be given the opportunity to relate the things they know to the things they feel.

Finally, learning environments should offer the kind of open structure that takes advantage of the ceaseless and unpredictable happenings in natural, dynamic ecosystems. Where structure dominates instruction, learning is inhibited. Students evaluating the relative 'greenness' of a collection of leaves on the ground should be allowed to follow the ant which pilfers one of their specimens to see what then happens. In an ideal environmental education setting, one way leads to another; spontaneous, open-ended exploration leads to the development of natural conclusions about environmental phenomena and man's relation to them.

Summarizing this conceptual framework, it can be said that potential learning environments are everywhere. The actualization of their capabilities for fostering environmental education goals depends upon the offering of an open teaching situation in which affective techniques and approaches mesh with cognitive learning opportunities in a way that encourages students to sense, feel and identify with their environment and motivates them to acquire further factual knowledge as a natural consequence.

Certain constraints affect the use of learning environments; recognizing and dealing with them

will enhance the effectiveness of this environmental education resource. Because of its difference from traditional learning, environmental education faces challenges other studies can avoid. The first is that teachers, trained and experienced in dealing with their specialties, comfortable with the historic and theoretical positions that can be maintained in the classroom, may be intimidated by the extended classroom, feeling inadequate to deal with the way their specialty has been applied in real life.

Secondly, environmental education is bound to raise difficult questions as students confront one problem area after another: is it possible to promote respect for trees in areas where trees are being cut down every day for the sake of progress? Is it possible, in that environmental context, to foster conditions for security and success based on values other than those of accumulation and consumerism? Is it possible to educate the population against pollution when they see that one of the most important sources of contamination is big enterprises that are tolerated and seldom sufficiently penalized by the authorities?

Even where teachers eagerly seek environmental education opportunities, it is difficult for them to teach about natural and social relations through an ecological approach when school systems are bound by rigid divisions and timetables that put each discipline in an isolated box, with little communication between them? How can educators put learners into contact with their environment if they are obliged to work only with the materials available within the school buildings? How can relations with the community be encouraged if educators are bound to an encyclopaedic curriculum which permits little experimentation or new ideas?

Multi-discipline and team teaching approaches

Multi-discipline approaches and team teaching can alleviate some of these problems and can help teachers develop their ability to teach environmental education. Environmental themes can be studied through the disciplines that are currently taught in most schools; the educational potential of an environmental experience will be vastly enhanced by a multi-disciplinary approach. Different subjects can be the source of individual activities which, in total, will emphasize the complex interrelationships among all the elements that support the world. For example, water-related activities studied through different disciplines can help explain how people transform and sometimes damage the environment by acting shortsightedly. If a field trip is taken by students with several teachers, each from a different discipline, it is possible to avoid the time constraint, which gives rise to complaints from other teachers when one teacher from a given discipline wishes to take students on a trip, while simultaneously expanding the learning experience.

A trip, taken to several points in a local watershed, could be used to observe water and land uses in the upper and lower reaches. Recreation, industry, municipalities, agriculture and forestry operations may all be observed within relatively close proximity to many schools. Students can observe how the river provides for many human and natural needs as it flows along. During the trip, water samples can be collected along with organisms from different stretches of the watersheds, with students noting the uses of water at each site where a sample is collected. On returning to the school, the different disciplines can carry out their discrete studies, with the whole group sharing in the products of each specialty.

Geographical aspect. Students can create a map, or a three-dimensional clay model of the watershed, locating communities, and enumerating ways in which the communities make use of the river. Investigation of books, magazines, films and photographs about watersheds in general, and theirs in particular, could broaden the understanding of how a watershed functions: its sources, movement and influence on human life. Interdependency of water resources, pollution control, and other human needs such as flood protection can be further extensions of this discussion. The students can compare the geo-

graphic divisions of the area with the political subdivisions; and can discuss whether problem-solving would be easier if natural and political boundaries coincided.

Biological aspect. Water collected on the trip could be analysed for (a) the level of dissolved gases and nutrients; (b) varieties of living organisms (benthos, plankton, necton, etc.); (c) types of vegetation. The class might discuss what the results showed regarding the quality of the water and its correlation with water uses along the stretches of the river from which the samples were taken. Techniques for improving the quality of the water in the watershed, in order to enhance its usefulness to man and indigenous plant and animal species, might also be a topic for discussion.

Chemical aspect. Students could visit a water supply treatment plant and a waste water treatment plant so as to obtain a broader understanding of how water is treated and tested before and after use by communities. Each plant manager might explain the use of chemicals in the water and waste water treatment processes. They might be asked to explain the routine tests made, and to describe the major health considerations involved. Similar tests could be run again, following the return of the group to the school, thereby demonstrating the practical application of chemistry while improving the skills of the students.

Health education. Students could investigate the water brought from a polluted portion of the watershed for pathogens. Kits are at present available for such tests; they require the use of a microscope. Results could be compared with those for water taken from the drinking fountain at the school. Students might try to purify the polluted water by filtering, boiling, airing, etc. The various diseases produced by pathogens could be studied and discussed.

Historical aspect. A story or play could be read illustrating the relationships between water and human settlements. The history of floods, human plagues, shipping and navigation, and trade could all be subtopics which emphasize such historic interrelationships.

Social science aspect. Students could survey communities along the river to determine which have adopted zoning ordinances. Is the aim of those which have done so to protect recreation? Agriculture? Forestry? Industry? Residential housing? Or is the concern for municipal uses? Is there good public access to the waterway for recreation? What conflicting water uses exist in the different communities (does one community contribute pollutants from an industry, while the next one downstream has to draw on the water for supplies? Is waterfront development changing the natural habitat, killing off desirable species of fish, and hence harming the interests of local fishermen?). Which communities depend on the river for water supply? How does each community treat its waste water? What are the major water problems facing the communities in the near future: water supply, water quality, flooding, etc.?

Multiple school participation. Multi-disciplinary, team-taught studies of a watershed can even be conducted at several schools within the same geographic region, but in vastly different local settings, combining, for example, a rural school with one from a suburban area and another from the inner city.

Study camps combining recreational and educational activities may also be used to bring students from different areas together. One example is the camps organized by the Youth Department of the Ministry of Social Affairs of Kuwait University, the Kuwait Institute of Scientific Research and the Ministry of Public Works to study the desert and marine environment in that country. In these camps, students have an opportunity to exchange information and to compare impressions about the environments where they usually live and the site of the camps.

Close contact of learners with reality—their environment—will have two immediate effects. First, it will allow them to make the utmost use of sensorial perception, with no interference or distortion. Second, it will sensitize them to the problems they perceive directly. The environmental education learning process does not

only aim at a mere accumulation of information but also attempts to show ways of acting on and enhancing one's environment. The problem-solving method supposes that the learner does not follow an abstract path, but one which leads him to certain conclusions which he can then put into practise.

In the case of primary education, where only one teacher is responsible for a class, proper training in multi-disciplinary approaches will enable the curriculum to be oriented towards environmental concerns. In secondary schools, where many teachers are imposing various disciplines and there is a rigid timetable that separates one from the other, the problem of arranging multi-disciplinary problem study is more complicated. At this level, teamwork should be encouraged. Teachers from several disciplines could discuss the planning and implementation of multiple activities, then assign to each a link in the chain leading towards identified common goals. This teamwork will help to improve methodology and the quality of the pedagogical approach since all psychological attitudes, the effectiveness of the methods, interest in the themes, etc., will be discussed while the curriculum is being developed. Learners should also take part in the meetings, either when they show interest or as a way of encouraging their involvement. Discussion with learners should be a regular activity in all the sequences of the process.

When possible, the community should also participate. As already noted, the community is a learning resource, not only because of the varied environments in which activities can be conducted, but also because of the many people who can provide or communicate their knowledge, skills and experiences.

Numerous exemplary programmes illustrate the effective use of learning environments by environmental educators in formal school situations around the world. Many of these efforts take place in or incorporate the learning environments discussed later under non-formal activities; those cited below are primarily school-centred in their implementation.

The classroom and school grounds are the most accessible learning environments; the creative use of teaching aids and near-at-hand materials can measurably enhance their environmental education potential.

One of the most popular means of using schools as learning environments is through the development of 'school sites'. These schoolground nature laboratories provide an opportunity for frequent short field trips, as well as for the initiation of long-term student projects which can be readily followed and developed over time.

A fine example of school-site development is found in California, at Huntington Beach High School. The staff members of this project considered four aspects of particular importance in developing their environmental site: sources of funds, labour and materials; complete physical site development, from raw acreage to completed facility; the creation or enhancement of the centre's ecological community; and the development of a full range of curriculum possibilities related to the site. Upon completion of their work, the staff produced a complete practical manual of 115 pages telling how their efforts could be replicated by other environmental educators.

Several other guides have been published on this same topic, under such titles as *Environmental Education and Your School Site* and *Ten-Minute Field Trips: Using the School Grounds for Environmental Studies*. Their consistent purpose is to enhance the value of the classroom itself which is the teacher's most readily available resource as a learning environment.

Among the most exemplary school-based programmes is one in the Netherlands. Under the direction of environmental educator Harry Wals, school farms and gardens enable children to gain first-hand experience with animals and plants.

In Peru, an interesting experiment was developed by using a vacant lot near an urban school to grow vegetables for the community. Students from the school sold their produce without intermediaries and hence at a lower price. This activity was used as a learning experience by several disciplines (biology, geography, social sciences, etc.) and also provided some needed funds for the school. Similar activities are undertaken on a major scale in the Panamian *escuelas de producción* and the *escuela secundaria en el campo* in Cuba, where agricultural develop-

ment is integrated into the educational process.

Inside the school, there are ways of maximizing the potential of classrooms to act as environmental learning centres. While indoor study is less desirable than experiences in true-to-life environmental situations, certain resources can round out textbook studies with 'armchair excursions' into the natural world or discussion of environmental issues close to home.

Representative of the first option are films and other audio-visual aids. Many are on specific topics, such as the life cycle of the sea otter or the ecological relationships in a salt marsh, while others portray the need for a world-wide environmental ethic to develop students' general awareness with spectacular photography and quotes from famous conservationists.

In addition to these adjuncts to traditional educational experiences, some innovative ways are being found to make the school a learning environment. A nine-member professional acting troupe in the United States called Endangered Species Productions tours schools with a multimedia revue combining sketches, songs, dances and slides in a format that slips factual information between the lines. The actors follow their performances with classroom team-teaching and leave complementary materials behind for further study. Other children's theatre companies offer similar programmes, fostering students' enthusiasm for environmental protection with productions like *Our World* and the *Fantastic Fish Rebellion.* For efforts like these, the school is not a 'second-best' learning environment; it is a proper and logical site for such creative twists in the environmental education process.

Some schools act as travelling learning environments; students follow a year-long itinerary under the direction of certified teachers.

An example of this can be found in Bulgaria where students from universities and secondary schools undertake a field course to study Bulgarian natural history. During this, they discuss conservation problems and management and exchange opinions about youth activities related to conservation in that country.

Some schools, primarily at the tertiary level, are designated as full-time environmental study centres; their chief aim is to train environmentalists, and all courses and facilities are designed with this goal in mind. These institutions serve exceedingly well as learning environments. Examples may be found in many developed countries.

Clearly the adequacy of traditional schools as learning environments will be enhanced if teachers are trained to maximize their potential. Pre-service and in-service programmes which offer educators the opportunity to gain sound practical experience through work in ongoing environmental education programmes are contributing to this end.

Through teacher training, special programmes, travelling courses and the creative use of classroom materials, schools can be transformed into learning environments. Further advantages lie in augmenting classroom activities with experiences in non-formal learning environments, as discussed below.

Non-formal environmental education activities

Because environmental education is oriented towards community action, there are many targets for environmental education that fall outside the formal school system: local elected officials, government personnel, citizens' groups, industrial and commercial leaders and members of the media. Each of these represents an important target group for environmental education because action or lack of action by each group will have much to do with local environmental quality.

Several examples should help to identify non-formal environmental education activities utilizing various learning environments and illustrate their comparative goals.

Guided tours, planned and led by interested citizens, or one local government agency, can focus upon certain local conditions. They are an excellent means of furthering the education of newly elected officials or heads of other government agencies. On a walking tour of a community, local officials can be brought in contact with the realities implied by a particular

planning, zoning or public works decision. Such a technique also affords an opportunity for interaction with the residents of the affected locality, who may hesitate to come before the local authority with their opinions.

Persons requested or requesting to participate in a community planning effort could also be prepared for that responsibility by being taken on a fact-finding trip. By visiting the area, seeing how business, housing and other activities are distributed, and how supporting services are working, trip members can identify critical areas, and basic problems. The developed plan can then be based on the actual situation, and can more clearly reflect the needs of those that are planned for.

The 'town trails' concept, begun in the United Kingdom and enthusiastically adopted by several European countries, has done much to further informal environmental education efforts. These trails have been used with equal success by local school systems. They are laid out to emphasize certain characteristics of the neighbourhood: architectural, historic, industrial and aesthetic. The trails concept has the further benefit of providing multiple educational opportunities, differing in this respect from a one-time guided tour.

One such learning environment is Cheltenham Trail One, designed for youngsters aged 9–12 by students at the Gloucestershire College of Art and Design in the United Kingdom. The trail, which takes about three hours to travel, focuses children's attention on the organization and problems associated with traffic, shopping, the design and use of buildings, urban wildlife and pollution. Other areas in the United Kingdom experimenting with the urban trail approach include Leicester and Hampstead Garden Suburb.

The philosophy reflected in all these efforts is that the city itself is an invaluable learning environment.

In less densely populated areas, bus tours can be used to achieve the same purposes, focusing the attention of local decision-makers, local government officials, civic, industrial and community leaders upon particular problems. Tours could take in, for example, a valley due to be inundated by a proposed reservoir, or stream sections polluted by uncontrolled industrial wastes or storm water runoff. They might cover several stream valleys, comparing conditions in an undisturbed or adequately protected area with conditions where eroding construction sites have left stream beds filled with sediment deposits. When seeking funding for prevention programmes, such a tour can be used to illustrate positive examples of inventive techniques which have been successful on an experimental basis.

A concentrated effort should be made to involve the members of the media in these non-formal environmentally educational experiences. The heightened concern of reporters may result in news coverage that will help achieve goals of the sponsoring groups. And by helping the members of the media become more knowledgeable, the likelihood of more responsible reporting is increased, thereby improving the quality of the information to which the general public is exposed.

Where target populations are extremely scattered or located in inaccessible areas, special radio and/or television programmes may be developed, such as the one broadcast in the Dominican Republic by Radio Santa Maria. The creators of this programme published a booklet with many drawings and diagrams, as well as texts explaining different topics. They announced the dates on which programmes dealing with particular issues would be broadcast. Different disciplines were integrated into the programme, which were closely linked to farmers' needs and interests.

Many countries both in the developed and developing worlds employ mass-media for environmental education purposes. Television has been used as an educational tool through programmes on wildlife and nature conservation, population, pollution, housing and urban problems in countries such as the Ivory Coast, Zaire, Brazil and Mexico.

Non-formal environmental education courses can also be provided for youth in out-of-school programmes. Just as the subject of 'water' provided for multi-focused classroom study, so a leader in a non-formal situation can structure interesting and useful water-related studies and activities, centring around the question 'Can we

live without water?' and utilizing a local river as the learning environment.

Ask the learners to illustrate the different uses of water that they know of. Ask if water is always good for our health. With the aid of a microscope, show the learners the micro-organisms contained in a drop. Study the differences in the quality of water taken from a river, a well and a polluted source. Compare the effects of polluted water upon fish and plant life. Discuss the implications for human health. Explain how water can be purified. Carry out simple demonstrations in the homes of the learners on the process of filtration, boiling, aeration.

From direct observations in the environment, and from pictures in magazines and books, explain the water cycle. How is water taken by plants? What is the role played by trees? How does the water flow to rivers? Explain that some water is absorbed by the land. Explain underground waters, their movement and their relationship to surface springs. Study how water is used locally in agriculture. If water is lacking, discuss ways of solving the problem. Study how a channel is built; examine how water can be collected from rooftops. Build a pipe to gather roof water. Visit a local authority who can explain ways to supplement water supply for agriculture. Determine what technical and financial aid is available to help with the process.

Examine the question of clean drinking water. Look at the kinds of containers that can be used, and the kinds that should not be used. Discuss how to prepare foods with water. Encourage the washing of fruits and vegetables before eating. Discuss the sanitary services that are needed in the home and the community to ensure clean water. Put learners in touch with agencies which can help them eliminate pollution in their community.

Students can undertake their own extra-curricular explorations, as well. The United States book *Nature Hikes* presents children with a means for setting out on their own. It gives hikes that can be conducted each season of the year along streams, in fields and woods and beside marshes, offering a framework which makes any geographical area a learning environment for children.

Unlimited resources for environmental education

Thus we see that the need for environmental education is shared by everyone; learning environments in which environmental education can take place are virtually limitless. It is not so much a question of which sites and resources are used, but of how they are used and towards what goals. One vital task for anyone planning environmental education activities and choosing learning environments in which to stage them is to avoid random, fragmented experiences. These dissipate the energies of both teacher and learner.

One approach is to select a general environmental topic such as water, which, as explained in previous examples, lends itself to multi-disciplinary interpretation and study. Another approach, which is also applicable to both formal and non-formal environmental education efforts, is to focus upon a local problem or planning process and tap the teaching resources relating to that particular issue.

For example, a teacher wishing to introduce the concept of 'recycling as related to limited resources' might approach it by examining whether recycling centres should be considered by the local community. Films, articles from the press, etc., could initiate the exercise. Simple experiments could broaden an understanding of the production of waste and conservation alternatives by carrying out and comparing practices in the classroom which increased and decreased the production of waste paper, containers, etc. The janitor would become the most closely related resource person, with successive levels reaching out to the waste collector, landfill operator, the local government agency responsible for waste disposal, representatives of recycling companies, industries in the locality which make use of recycled materials, etc. In one easy and interesting outside project, students could inventory and compare attitudes in their homes and neighbourhoods regarding waste production and disposal. Those students expressing the most diverse attitudes could serve as resource persons for a class discussion. The optimal goals of such an activity

would be: (a) to increase student understanding of renewable and non-renewable resources; (b) to develop students' understanding of concerns associated with the disposal of wastes; (c) to increase students' awareness of themselves as consumers of resources and producers of waste; (d) to stimulate non-wasteful behaviour in the classroom and at home; (e) to create a well-formed opinion regarding the desirability and feasibility of local recycling centres.

This kind of approach can lead to problem-solving activities such as participation in the gathering of materials for recycling. In Cuba, for example, children gather all kinds of containers and paper for recycling as a part of the out-of-school activities of the Pineros organization. These same students also visit neighbours' houses to encourage them to turn off unnecessary lights in order to save energy.

Other problem-solving examples can be found in the activities of the Pharmaceutical and Bio-chemistry Faculty of Buenos Aires (Argentina) during 1973–74. Realizing that the wide variety of different brands of health products on the market were sold at such high prices as to be inaccessible to most of the population, the students of this faculty decided to create their own chemical drug plant which could offer the same products at lower prices. The laboratory had several problem-solving objectives: research into new ways and means of producing drugs at a legal price; laboratory experiences related to the real problems of the community; the development of simpler chemical drugs; and relations with the community in general by providing these drugs to the faculty hospital, neighbouring clinics and health centres.

In another activity, plants in the classroom, school plantings, landscape gardens, botanical gardens and farms and forestry operations become successively more complex environments within which children can study the varying needs of different types of plant materials affecting food, clothing, paper and wood products, climate modification and wildlife habitat. In school gardens, 'allotments' (common garden plots for neighbourhood residents), and home gardens, students can carry out experiments based upon their preliminary information, discovering for themselves optimum growing conditions and studying signs of stress in the vegetation, due to poor soil, lack of water, and/or air pollution. National or local tree, shrub and flower planting days can then be established by the proper authorities. Through these, students could experience real satisfaction at participating in an activity whose significance they have come to understand better.

Likewise, animals brought into the classroom, children's farms and regular farms can stimulate the student's consciousness of our dependence upon domestic animals for dairy products, meat, leather, clothing and, in some parts of the world, for farm labour. The needs of these domestic animals can be examined, followed by a trip to the zoo to compare the needs of wild animals. Discussion can be initiated about the unique roles (predator/prey, vegetation and water resources control activities) played by many of these wild animals. These discussions can lead into the related topics of overcrowding, 'carrying capacities', overgrazing, controlled hunting, fishing and trapping, and the increasing conflict between land for human use and for wild animals, as well as the competition for land in respect of different human uses (agriculture, forestry and mining, which are often in conflict with urbanization).

A marine park in Ohio (United States) uses dolphins and other ocean creatures to widen the horizons of children who live far from the sea. Project Interworlds emphasizes the behaviour and adaptations of animals to their environment in a programme with segments designed for various age levels throughout the public school system. Through this programme a park becomes the learning environment in which children explore an ecosystem vastly different from their own but to which they are inextricably linked through life processes.

Libraries and museums become additional resources through which local situations can be compared with conditions and philosophies in other regions of the world. In addition, art and craft centres can be appreciated as reflectors of the comparative perceptions and expressions of other cultures.

Some localities are fortunate enough to have

large natural areas nearby. These include nature reserves and national or local parks, which can be used to enhance environmental education activities. The international Man and the Biosphere programme (MAB) has recommended that.[1]

> Biosphere reserves should be used as resources for scientific training and for developing environmental awareness. The expert panels on Education Activities under MAB and on Project 8 have both recommended that stations and sites associated with MAB research should become permanent places for demonstration and popularization of environmental subjects. The expert panel on Project 8 also suggested the development of environmental study areas in reserves. These study areas would be especially for the use of educational groups.

National and local parks likewise offer opportunities for field trips to observe relatively undisturbed ecosystems. Specifically designated environmental study areas offer extra opportunities through curriculum guides and special programmes geared to the use of those sites.

A programme is under way in Nepal to enhance the value of the country's national parks as learning environments. A team of seven environmental educators and ecologists interprets the park resource to school and community groups through photographic exhibits and film showings. In Africa, publications, field trips and special projects for young people are helping to fulfil the great educational potential of that continent's vast and valuable wildlife reserves and game parks.

When no large natural area is available, schools and communities can work together to provide a learning environment for formal and non-formal environmental education, by setting up a biological centre, a biological station, a nature interpretive centre or a town interpretive centre.

A biological centre is composed of a classroom and several other rooms. The latter include a room for teachers, a library and a laboratory. Lessons are given in the centre on domestic animals and indoor plants, for example. They then expand to a discussion of such things as the importance of trees in towns and go on to the natural environment in a broader sense. The main objective of the lessons, in which living plants and animals usually form the focal point, is to give pupils an opportunity to observe, experience and work on their own as they develop an increased understanding of nature and its relationships to their community.

A particular course may be completed annually at such a centre. Students from several schools can register for the course. The role of the biologist in charge is extremely important. It is his job to ensure that students learn biology in a clear and practical way. Use can be made of gardens, demonstrations, excursions, etc., to achieve the aims of the centre.

Biological stations are field posts exclusively equipped to accommodate students and help them conduct biological research out-of-doors. These centres are usually run by universities, but they could be made available on certain days for students at the primary or secondary level.

Nature interpretive centres exist in most countries of the world. If their traditional concern with nature conservation were expanded to include the interpretation of local ecological, resource and pollution problems, these centres could become valuable learning environments for environmental education. Jean Tweedy Milmine says:

> The nature center already has a site where many environmental understandings can be taught, and (it is equipped) with personnel with training and experience in interpretation. Further, the community nature center's location allows it to come in frequent contact with local residents. The adoption of a strong environmental education approach would entail more than a slight variation in emphasis in the nature center's existing program. Rather, it should involve a *redefinition* of the nature center's role, not as an end in itself, but as a fundamental arm in environmental education. This redefinition would require the formulation of goals and the creation of a program designed for their implementation.

Town interpretive centres are places where, instead of teaching the history of the area, methods to explain the everyday functioning of the city are emphasized. Up-to-date information on population, housing, recreation for all ages, pollution, urbanization, transportation, water and health services and many other items linked with the environmental concerns of the town or city can be studied.

1. See MAB Report Series, No. 22, Paris, Unesco, 1974.

Such a centre is proposed and described by Jean Tweedy Milmine in the above-mentioned thesis, as follows:

> The program of the downtown interpretive center might be patterned along the lines of the nature center, in that the interpreters should think through their goals, and then formulate a program design which can most effectively reach the goals. It should be evident that the downtown interpretive centre would have a markedly different kind of staff than the nature center, although interpretative methods and media might be quite similar. The interpretive 'urbanist' should have background in regional planning, economics, politics and sociology as well as communications. However, many of the details of a community's functioning [as well as its social and political subtleties] cannot be gained through course work; rather, they can only be gleaned over time through observation of and participation in community affairs.
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> The interpretive site would largely be the community itself, and its surrounding areas. Programs would be set up for a scheduled group much on the same basis as with the nature center, only trips into the 'field' would be into different parts of the community. The interpretative staff could board the group's bus with a public address system, and the field trip would move through the community, with stops where field trip participants would get off the bus for an in-depth look at particular interest points related to the field trip's particular subject or theme. . . . Learning gained through the trip could be related meaningfully to the learner's home environment and daily life. . . . Every center should have a three-dimensional model of the city. . . . Extremely effective use can be made of aerial photographs, photograph stories, and models. Massive air photos or drawings on walls can illustrate traffic flow and water conduits, etc.
>
> This kind of center could constitute a meeting point for youth and adults of the community where plans of action for enhancing the life of a community could be elaborated and co-ordinated. For example, when a city cleanup campaign is decided upon, the action groups could meet at the center and work out ways of motivating the citizenry, organizing 'paper-gathering' groups of children, preparing posters, etc. The centre could also work with other institutions on community environmental problems, for example: with hospitals or the Health Department in vaccination campaigns, and with social workers, social sciences, research institutions or the Water Department in a campaign for teaching how to use new sanitary services.

A town interpretive centre would obviously be an excellent point from which to initiate town trails, referred to at a previous point in this chapter.

In areas where the need for environmental education is spread over a large geographic area, a mobile unit may be the most effective supplemental learning environment. A mobile unit should contain basic equipment designed to increase environmental perception and understanding (monitoring kits, weather kits, samples of soil, water, mineral resources, plants from different kinds of environments, literature on environmental problems and environmental protection programmes, and guides to the regions through which the unit travels). Some may also carry small animals. The environmental educator accompanying the unit is obviously a very important factor in its effectiveness. In working with schools, it will be his role to encourage discussion, inquiry and enjoyment of the student's natural surroundings, and relate these to local environmental concerns. Mobile units can also be used for non-formal environmental education for farmers, foresters, residents of scattered communities and out-of-school youth.

In Ontario (Canada) an 'Envirovan' brings environmental education resources to provincial schools. The vehicle contains field studies equipment, an environmental library and audio-visual aids. In the summer, the vehicle operates in parks and children's summer camps; it also acts as a 'mobile workshop' for environmental education liaison teachers scattered throughout Ontario. Mobile units are valuable, as they provide a portable means of enhancing the worth of numerous stationary facilities as learning environments.

Other means for increasing the environmental teaching value of schools and other institutions are travelling exhibits. One example of such resources is the 'Documerica' exhibit sponsored by the United States Environmental Protection Agency. Each year photographers are commissioned to contribute their work to this compilation of large colour pictures depicting the Amer-environment. The exhibit travels throughout the country.

Each of these traditional environmental education facilities, natural reserves, national or local parks, biological centres, biological stations, nature interpretive centres, town interpretive centres and mobile units can serve as a site for teacher training and re-training, as well as for a variety of non-formal environmental education activities. Each of these operations can also use young people from the nearby areas as supplementary staff. By training in conservation

measures and interpretive techniques, young people can gain insight into potential career fields while assisting in the various programmes. The approach might be patterned after natural conservation work camps, where students are trained to work under expert guidance in nature reserves and national parks.

Finally, one very valuable learning environment exists in the form of summer camps and resident outdoor school programmes. In a quiet, rural setting where classroom and home structures are left behind, children become more open to themselves and their discoveries. Such experiences offer unique opportunities for sensory appreciation of the environment and foster the development of a spirit of *camaraderie* among campers co-operating in a rustic living situation. This combination is one of the most powerful for instilling a lifelong sense of identification with the environment and a determined commitment to work for its protection.

One such programme is found in Australia, where school camps in Victoria and Queensland provide opportunities for adventure activities and integrated environmental studies. Geelong Grammar School in Victoria conducts one of the more elaborate programmes at its Timbertop School, where 16-year-old students spend twelve months in a bush environment. Overall, approximately sixty camps with a variety of programmes are run by Victoria's public elementary, secondary and technical schools.

Conclusion

In summary, in planning for learning environments for formal environmental education, a continual dialogue and interaction between education institutions and their environment is sought. Each potential learning facility (schools, libraries, museums, zoos, farms, etc.) then becomes a place where one can analyse, synthesize and share real experiences through a variety of learning activities and human interactions. Where traditional education may suffer from resource limitations, environmental education can open out to mobilize all resources that facilitate learning. Decisions regarding where and how to use these resources are no longer the province solely of educational planners, education specialists or teachers. Selecting the resources becomes part of the activities of learners themselves, as they decide on the type of project or inquiry they want to carry out, the methods they are going to follow and the resources they are going to use. There is no longer a rigid design which the educator must abide by, but a more unstructured and flexible process that can change when new ways or resources appear that may more effectively achieve defined objectives. This process moves in a field of action which embraces the total community in all its aspects. In this context, the teacher becomes an individual who facilitates learning as well as one who learns in the same process and at the same time as the learner. All this means that for formal environmental education to occur, the school must not be a boundary enclosing the educational process, but a starting point for understanding the community and working with it.

Non-formal environmental education likewise seeks a constant dialogue between learners of all types and the environment they affect and are constantly affected by. Thus both formal and non-formal environmental educators search for and construct learning environments which will involve all aspects of the learner (skills, knowledge, values and attitudes) in a process which will not end in the mind of the individual, but will be verified in social practice.

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4. Instructional resources for environmental education

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Introduction

The purpose of this article is to examine the rather broad topic of 'instructional resources for environmental education'. Given the limitations of space, a world review can, of course, consist only of an outline of general trends illustrated by some selected case histories. Thus, no claim is made to present an exhaustive list and analysis of all existing resources. The author has not had an opportunity to collect and study all available material but was able to acquire much information during several years as voluntary Vice-Chairman, and subsequently as Executive Officer of the Commission on Education of the IUCN (International Union for Conservation of Nature and Natural Resources). Since returning to his home country some time ago, he has benefited from the help of many organizations and individuals throughout the world, who have kindly continued to keep him up to date by supplying information and materials and to whom are due his sincere thanks. The author wishes particularly to express his appreciation to those participants in the Unesco-UNEP Belgrade Workshop on Environmental Education 1975, who contributed invaluable comments and suggested various ways of improving the initial draft of this article.

Definition and needs

An effective process of environmental education cannot be accomplished successfully without material of various kinds designed to attract attention, to explain facts, problems, approaches and solutions, and to indicate directions for activities and involvement. The leadership of inspired and inspiring men and women able to advise and guide is likewise essential. All these can be considered under the general term of instructional resources for environmental education. Inanimate resources, i.e. materials, include, in particular, various publications and aids. Human resources consist of practising educators, educationalists and environmental specialists (mainly as consultants) in both professional and volunteer capacities. In addition, politicians and religious and other leaders can play an important part while the learners themselves must also be considered an environmental education resource.

The 1968 Unesco Biosphere Conference postulated and outlined an 'integrated as well as continuous and sustained programme of education and information about the environment'.[1]

It is not too difficult, especially with children and young people, to awaken interest in the environment, with its different components and functions, its importance for man, its interrelations and problems. If this interest is not developed and cultivated, however, it may well decline and eventually disappear. This means that any interest in environmental matters must be developed into a programme-system fed by a constant flow of instructional resources.

1. *Final Report. Intergovernmental Conference of Experts on the Scientific Basis for the Rational Use and Conservation of the Biosphere*, Paris, Unesco, 1969.

Within the environmental education programme, the key component may be identified as the human resource, the practising educator.[2] It is not of great importance whether the educators are professionals or volunteers; both are involved. Out-of-school children's and young people's organizations which, it should be noted, quite often preceded formal education in the field of environmental studies and conservation (the Boy Scouts and Girl Guides in the Western world, or the Young Pioneers in socialist countries) soon recognized that their members must be provided not only with environmental codes of behaviour and guidebooks, but also, and even more importantly, with environmentally trained, able and dedicated leaders. The ministries and departments of education and school boards all over the world, after having declared environmental education an important task of the schools, were immediately confronted with the urgent need for teacher training in the environmental field. Once trained, youth leaders and teachers, as well as the young people for whom they are responsible, should be provided with as rich and varied a choice of instructional materials as possible.

When discussing instructional resources for environmental education, the basic concept of environmental education itself must be made absolutely clear. It must be regarded as a distinctly special trend in education, broadly pervading general education by way of co-ordination and integration, but by no means identical with it. Apparently, and especially in some languages other than English, the concept of 'environment' presents a linguistic problem: 'In the context of day-to-day vocabulary, the word takes on too generalized a meaning to have any value; it is no more than "all the experience of a human being" . . .'[3] At the same time, the narrow concept of environmental education which considers the environment as simply a good place for learning must be rejected.

Basic requirements

Five groups of basic requirements concerning the nature and quality of instructional resources for environmental education will be considered. These are: scientific soundness; 'beyond science'; educational quality; critical thinking; high effectiveness at low cost.

Scientific soundness

The principal rule in this connexion may be formulated as follows: instructional resources should accord with the latest scientific knowledge in the applied, interdisciplinary sciences of environmental conservation, as well as in all the disciplines used as auxiliary components of environmental education programmes.

In this respect, it is the natural environment and attendant ecological aspects which should come first. This is logical, because: (a) the biophysical environment is the natural basis of man's existence; and (b) natural laws governing the biosphere and its processes function independently of human will, whether we like it or not.[4]

In designating materials and supplying explanations, every care must be taken to avoid mistakes in terminology and false identification of species and other features of the environment. It is better for the educator to confess his or her unfamiliarity with some environmental feature than to give the wrong facts. Protected areas, territories, species, etc., must be presented not as something unique, virginal or untouchable but as an integrated, living part of the natural and cultural heritage of the country.[5] In relation to the natural environment, 'we must categorically deny the concept of "two natures"—a small one which is protected, and the "other" which is exploited and does not appeal to the

2. Karel Patocka, *Učitel–Rozhodující Činitel v Ochraně Přírody* [Teacher as Key Element in Conservation], Prague, 1964 (Přírodní vědy ve škole, 14/5).
3. D. G. Watts, *Environmental Studies*, London, Routledge & Kegan Paul, 1969 (The Students Library of Education).
4. Jan Čeřovský, *Comprehensive Programmes of Environmental Education*, 1971 (IUCN European Working Conference on Environmental Conservation Education, Keynote Paper No. 2).
5. Jan Čeřovský, 'Problems of Interpretative and Information Services', *World National Parks, Progress and Opportunities*, p. 241-9, Brussels, Hayes, 1972.

"conservationist" at all'.[6] The nature of existing interrelationships must be correctly presented, not excluding antagonistic ones with all their consequences.

'Beyond science'

The principal rule in this respect is: aside from scientific information, instructional resources should always include inputs which relate to social, economic, aesthetic, ethical and other elements of significance in environmental considerations and decision-making.

Teaching about the environment does not mean simply conveying ecological concepts. It is also necessary to treat the 'affective' aspect of students' development, helping them clarify and express their feelings and values regarding the environment. It is from this emotional foundation that enduring dedication and commitment arise, complementing factual knowledge in the individual's quest for a high quality of existence.

Affective learning is a vital component in the environmental education formula. It provides the means by which students perceive themselves and their surroundings more clearly and offers both a vehicle for understanding the motivations and concerns of other people and a framework for communicating effectively in the solution of environmental problems.

The humanistic education movement in the United States has aided in the development and synthesis of materials, theories and techniques which have important applications as regards the effective side of environmental education programmes. These include values clarification exercises, which help students perceive and locate the source of their priorities in life; acclimatization techniques, which foster students' awareness of, and sense of 'relatedness' to, the natural environment; and communication skills, such as the active listening technique developed by the American psychologist, Thomas Gordon, which facilitate the exchange and understanding of viewpoints among individuals.

To be effective, environmental education programmes must encompass the cognitive, affective and psychomotor domains of learning. Man-made environments, cultural and social elements and their economical and political applications must be integrated. Labelling a programme with the fashionable tag of 'environment' will not suffice. Pure nature study or narrow, old-fashioned and conservative nature protection cannot be accepted as the only or even the main objective of environmental education.

Environmental situations involving human beings are never simply scientific. Many of the problems now confronting us have arisen because scientific discoveries and technology have been applied without due consideration to the social consequences. This predominance of the scientific aspect has led to a strong anti-science reaction among some of those who are newly concerned about the environment. What is required is action consistent with the views of social scientists, poets, artists, 'wise men' and spiritual leaders best equipped to understand human reponse and needs.

Educational quality

The principal rule in this connexion is: instructional resources should be adapted to the mental (and physical) background of the learner and conform to all other pedagogical principles, particularly the specific principles of environmental education. They should promote 'learning by doing' but be innovative in recognizing the importance and role of the learner's own initiative and feelings.

Any really comprehensive programme of environmental education involves three major approaches or, more exactly, three stages: teaching *from* the environment; teaching *about* the environment; and teaching *for* the environment.[7]

6. N. A. Glàdkov, 'Some Thoughts on the Scientific Basis for Environmental Education', *IUCN Commission on Education Newsletter*, No. 10, Autumn 1972.
7. Peter Herlihy *et al.* (ed.), *Final Report, International Course for Teacher Training in Environmental Conservation and Education*, IUCN Field Studies Council, The Nature Conservancy, 1972; Jan Čeřovský, 'Environmental Education as an Integrating Concept in Science Teaching', *New Trends in Integrated Science Teaching*, p. 127–42, Paris, Unesco, 1973.

Programmes should also endeavour to awaken interest, to provide information, to teach problem-solving skills, to give practice in decision-making, to formulate a code of behaviour and to involve in action.[8] It is likewise important to pay attention to age levels which need a different approach in the development and presentation of instructional resources.

Environmental education is constantly in danger of being subsumed under traditional educational models. To avoid this, learners embarking on radical investigations of their environments should be given scope to initiate and determine the direction and emphasis of their own learning. The resources that such groups of learners require are often quite different in character from those used in already established patterns. It is not simply materials which promote learning by doing. A prior question is who determines what is done, and the two answers to this question from teacher and learners lead to rather different approaches.

Critical thinking

The principal rule here is: all instructional resources for environmental education will reflect a certain bias; in making this explicit, critical thinking, as an essential ingredient of the environmental education process, can be fostered. Instructional resources are never to be used to serve false vested interests.

Environmental education is the struggle against man's ignorance and negligence, and also the struggle against his selfishness. From a positive standpoint, it is humankind's collective striving for a high quality of existence, a life in harmony with the earth. Responsibility for the quality of the environment is a shared responsibility of the group and is directed at a collective goal. It is a social responsibility. This principle has to be promoted through instructional resources for environmental education.

Instructional resources intended for broader public use and produced by certain industrial and commercial companies include many films on environmental issues; environmentally oriented kits for children and youth; games; and, of course, numerous publications, many of them reflecting high standards and serving the environmental cause, although they may advertise the products of the sponsoring companies. Conversely, there are materials aimed at diverting public attention from environmental blunders caused by the sponsor of the material. Corporate and government authorities must have enough honesty and candour to face environmental problems in the light of their social responsibility and not misuse instructional materials in order to protect themselves from blame for environmentally disastrous developments.

Another important concept is related to the scope of instructional resources. There must be a global pattern resulting from the unity of the biosphere, as well as another concerned with local situations, local environments and local problems. Every environmentally conscious citizen should have his 'home environment' to which he feels attached and which he is anxious to explore, understand and improve and, if necessary, defend against any threat of deterioration.

High effectiveness at low cost

The principal rule in this connexion is: instructional resources should be produced as cheaply as possible, be broadly available and be used intensively.

Rational use of the resources of the environment—to which instructional resources, after all, belong—is one of the basic commandments of environmental conservation. The economically rational production and use of instructional resources for environmental education is a vital prerequisite for efficiency.

This can be illustrated with three actual cases.

First, an environmental authority wishes to reach the general public with some important appeal—to dispose of garbage, or to plant trees and shrubs, for example. A special publication would cost a lot while the distribution would

8. Čeřovský, *Comprehensive Programmes . . .*, op. cit.

present a further problem. People do not usually trust printed materials issued free of charge; they see them as cheap commercial publicity. The publisher of a widely circulated popular magazine may well agree to insert a leaflet on the subject concerned in his magazine at the expense of the responsible environmental agency. The appropriate distribution is virtually ensured, readers trust material appearing as a supplement to their favourite journal, the environmental agency saves money and effort, and the publisher may be glad to add to the content of his paper. Readers may react and write to the editor. The editorial staff may obtain a good story from some community where there has been a particularly satisfactory response to the appeal. The organizers of the campaign learn the reaction of the public. Everyone has benefited, and a positive effort for the environment has been accomplished.

Second, an exhibition may also serve as an instructional resource, a number of factors determining its effectiveness. Let us assume that an environmental agency decides, on the occasion of some anniversary, to present in a capital city an exhibition showing its activities and aims. The venture will be very expensive: a hall must be hired, artists engaged to design the display and advanced technology used to make the presentation attractive. Despite this elaborate planning, the exhibit may be a complete failure. A venture with a budget amounting to hundreds of thousands might be visited only by a few thousand people, some of whom will not like it, while others will not understand it. The responsible organization might have used its funds more rationally and efficiently had it acquired and furnished a visitors' centre in an environmentally attractive and frequently visited place. Such a centre would be used by hundreds of thousands of people who, in that particular environment, would be much more receptive to the process of education and the theme of the exhibition.

Third, there are many developing rural areas in the world where elaborate instructional resources are almost non-existent. The solution to this depends on the educator's ability to adapt very simple, free and readily available materials for collecting samples, making investigations and conducting experiments related to the local environment and its components. As experience from some African countries has clearly shown, solutions can be found. Empty tins, bottles, boxes, scraps of plastic and other materials can all prove suitable for the purposes indicated above.

Instructional resources central to environmental education

Under 'Definition and Needs', earlier, the following basic classification of instructional resources was suggested: (a) inanimate resources, i.e. materials, among which publications and aids apparently occupy a predominant place; (b) human resources, including theoretical, conceptual and advisory specialists, as well as practising educators, both professional and volunteer, with due consideration of the learner himself as a resource. Some instructional resources are intended for use in formal education; others, frequently less conventional and more innovative, for out-of-school education and activities. Many can be used in both fields.

Textbooks and teacher guides

There are still only a few materials having a sound ecological background and showing actual environmental problems, pinpointing their social and economic causes and giving guidance in the development of environmental strategy. Many 'environmental' textbooks and other learning materials are, in fact, standard natural history or geography books with new titles.

Moreover, in a number of so-called developing countries, textbooks are often imported from developed countries (mostly in Western Europe and North America) so that the examples and vocabulary are quite alien.

In the production of textbooks and teacher guides, two basic approaches exist which are in line with trends in environmental teaching. The first, more desirable but more difficult, is to ensure

that the environmental theme pervades all textbooks, with the various subjects treated in the right proportions and with due weight being given to subjects of key environmental importance, such as biology or geography. This approach carries, of course, a danger of repetition, overlapping, omissions and fragmentation. It requires a good deal of work to ensure intersubject co-ordination.

The production of such new textbooks must logically be preceded by a total curricular revision and innovation. The first step may be to compile teacher guides to fill in the gaps. Such a programme has been started recently in the member countries of the Council of Mutual Economic Assistance, within the CMEA-integrated project devoted to the 'Socio-Economic, Organizational, Legal and Pedagogical Aspects of Environmental Conservation'.[9] In respect to the 'pervading theme' approach, the most advanced country is Sweden. A remarkable programme of environmental education launched in 1968[10] produced textbooks and teacher guides designed not only for 'normal' class lessons, but also for laboratory work, field studies, community action, etc.

The second approach consists of producing integrated, environmentally focused textbooks complemented by teacher guides to be used where appropriate in teaching separate subjects or in teaching special, integrated environmental courses where these exist.

A unique, highly important and instructive example is the series of eight teachers' guides, *People and Their Environment*,[11] which was developed and is now used widely in the United States. These include a series of over 400 lessons relating science, social science, home economics and outdoor activities to the environment.

At the tertiary level, textbooks reflect the main trends in teaching and training. Many have been produced in the United States and some of these are particularly outstanding and widely appreciated.[12] Several nature-oriented textbooks on environmental conservation have also been published in the U.S.S.R.[13] and the German Democratic Republic.[14] In Poland, specialists seem to be rather inclined to produce volumes compiled by whole teams, as demonstrated by two bulky books published in 1965[15] and 1973.[16]

The 'environmental wave' of the past few years has brought environmentally motivated and oriented chapters in textbooks on various scientific and other disciplines and has sometimes led to the production of special books, such as the Soviet textbooks on environment for lawyers.[17] Environmental technology, such as the conservation of water, air purification, recycling of waste materials, energy, economizing, etc., is being given increasing attention in textbooks for specialists. There are not many books, however, for the training of environmental generalists, although some materials come close, for example the book designed for the 'Environment' course for the Open University, in the United Kingdom.[18]

In addition to official texts, supplementary materials play an important role in environmental learning. Some teachers or school systems may not have a specific textbook for environ-

9. Jośef Říha (ed.), *Životní Prostředí a Výchova* (Environment and Education), Prague, Czech University of Technology, 1974 (Conference Proceedings).
10. Sten Forselius, 'Environmental Education in the School Curricula: the Swedish Example', *Prospects*, Vol. II, No. 4, 1972, p. 477–84.
11. Matthew J. Brennan, 'Environmental Conservation Education in the United States of America', *Prospects*, Vol. II, No. 4, 1972, p. 472–6.
12. Raymond F. Dasmann, *Environmental Conservation*, 3rd ed., 473 p. New York, John Wiley & Sons Inc., 1972.
13. K. N. Blagosklonov, A. A. Inozemtsev and V. N. Tikhomirov, *Okhrana Prirody* [Conservation of Nature], Moscow, 1967, 442 p. (in Russian); I. P. Lapryev, *Nautchnye Osnovy Okhrany Prirody* [Scientific Basis for Nature Conservation], Tomsk, 1970, 488 p. (in Russian); A. I. Voroncov and N. Z. Kharitonova, Okrana Prirody [Conservation of Nature], Moscow, 1971, 360 p. (in Russian); L. K. Shaposhnikov, *Voprosy Okhrany Prirody* [Problems of Nature Conservation], Moscow, 1971, 174 p. (in Russian).
14. L. Bauer and H. Weinitschke, *Landschaftspflege und Naturschutz. 3. Auflage.* Jena, 1973, 382 p.
15. W. Szafer (ed.), *Ochrana przyrody i jej zasobow—problemy i metody*, Krakow, 1965.
16. Wlodzimierz Mikhailov (ed.), *Protection of Man's Natural Environment*, Warsaw, 1973, 664 p. (in Polish, also a special English edition).
17. N. D. Kazantsev, *Programma po Kursu 'pravovaya Okhrana Prirody'* [Nature Conservation Legislation Course], Moscow State University Press, 1961 (in Russian); E. N. Kolotinskaya, *Pravovaya Okhrana Prirody v SSSR* [Conservation Legislation in the U.S.S.R.], Moscow State University Press, 1962 (in Russian).
18. *The Open University: Environment*, Walton Hall, Bletchley, Bucks, The Open University Press, 1972. (Prepared by the Course Team.)

mental education at their disposal or, where texts are available, the content will eventually be outdated. In other cases, it is desirable to augment textbooks with special materials on local environmental problems.

Supplementary materials may take the form of case studies on particular environmental topics, such as water quality, air pollution or sewage treatment. Students review a problem confronting citizens in another community, analyse the concerns of different interest groups affected and establish the degree to which effective compromises and solutions have been reached. Various techniques, including role playing, simulation and even science fiction scenarios, can be used in the implementation of case studies. All serve as a framework for students in assessing and solving similar environmental issues in their own communities.

Other examples of supplementary materials are community inventory guides, film and slide projections, and periodical inserts in environmental magazines which are suitable for classroom use.

Other instructional publications

Every week sees the publication of dozens of titles for the general public which deal, wholly or partly, with the environment. These may be serious works or rather ephemeral writings or books which are poor in both content and style. The last category is probably inevitable since the environmental movement is 'fashionable' and hence encourages both publishers and writers to seek an easy and quick profit.

Many books on the environment are intended for children. These tend towards a realistic portrayal of threats to wildlife and other environmental problems, departing somewhat from the anthropomorphic fantasies which have characterized many nature books in the past. Special importance, in relation to environmental education, must be ascribed to children's encyclopedias. Such books, environmental in scope and lavishly designed, are issued in the more developed countries in both non-socialist[19] and socialist countries.[20] The developing nations should be encouraged to produce such illustrated works since young people in those countries consider an attractive book as an invaluable treasure which, unfortunately, is still too often an unrealizable dream. Much can be achieved even by simple, inexpensive comic strips and books. These materials should be based on native cultures and customs, with elements drawn from the local environment.

The sixties introduced popular scientific books on vital environmental issues to the public at large. The best of them became best-sellers, an indicator of their social relevance. The famous *Silent Spring*[21] by Rachel Carson, first published in 1962, published in millions of copies and in ten languages, alerted the man in the street to a difficult and critical problem and pushed dilatory governments to initiate action against the impending threat of environmental contamination. Its impact was such that, after the death of its author, an attempt was made in another book to recount the progress of the pesticide controversy.[22] Miss Carson found a Polish ally in Mrs Lenkowa, who alerted both the population and the authorities with *The Scalped Earth,* a comprehensive work on environmental deterioration and the consequent dangers first published (in Polish) in 1961.[23] A similarly complex approach was also adopted by the prominent British environmentalist writing under the pen-name of Robert Arvill in the Pelican publication *Man and Environment*[24] of 1967. Two serious titles, *Planet in Peril?* by Ray Dasmann[25] and *Only One Earth* by Barbara Ward and Rene Dubos[26] were published in 1972 in connexion with two major international ventures: the Unesco 'Man and Biosphere' Programme, and the United Nations Conference on the

19. Hamlyn, *The Children's Wonderful World Encyclopedia.*
20. Reimar Gilsenbach, *Rund um die Erde,* Berlin, Kinderbuchverlag, 1970.
21. Rachel Garson, *Silent Spring,* Penguin Books, 1965.
22. Frank Graham, Jr, *Since Silent Spring,* Faucett Publications, 1970.
23. A. Lenkowa, *Oskalpowana ziemia,* Krakow, 1961.
24. Robert Arville, *Man and Environment,* Penguin Books, 1967.
25. R. F. Dasmann, *Planet in Peril?,* Paris and Harmondsworth, Unesco and Penguin Books, 1972.
26. Barbara Ward and Rene Dubos, *Only One Earth,* New York, N.Y., W. W. Norton, 1972.

Environment, in Stockholm. None of the 'post-Carson' books has made such a broad and deep impact on the world public as has *Nature in Danger* by Jean Dorst, first published in 1965[27] and now considered a 'bible' for contemporary environmentally oriented conservationists.

Some authors have tried not only to identify and explain the problems and to propose solutions, but also to draw up detailed plans for active responsibility on behalf of the immediate environment. In this regard, two remarkable British titles should be mentioned: *The Environmental Handbook* edited by J. Barr[28] and the *Consumer's Guide to Protection of the Environment* by Jonathan Holliman.[29]

Other instructional publications which deserve mention are certain journals. Many pedagogical journals more or less regularly publish articles and communications on the subject of environmental education. A special journal, *Environmental Education*, was started in the United States in the late sixties. Low-cost newsletters can likewise be extremely helpful as a source of information on instructional resources: an example at the international level is the *IUCN Commission on Education Newsletter* issued by the International Union for the Conservation of Nature and Natural Resources at Morges (Switzerland), during the period 1969–72; at national level, the Unesco-UNEP environmental education newsletter *Connect*, published by Unesco four times a year; and the excellent *BEE* (*Bulletin of Environmental Education*) published by the Education Unit of the Town and Country Planning Association, London which, by February 1975, had issued forty-six numbers.

Publications which serve as 'sources of sources' for environmental education information include *Environmental Education Report* (United States) which summarizes trends, projects and new materials on a monthly basis; as well as *Connect*, the multi-lingual publication established in 1976 as a two-way network linking environmental educators world-wide with Unesco's Environmental Education Section in Paris.

An extensive exchange of environmental education information is conducted through the clearinghouse at Ohio State University in the United States. Known as the Educational Resources Information Center (ERIC), this computerized facility summarizes and catalogues descriptions of environmental education projects throughout the United States and makes the information available in local libraries for teachers who wish to duplicate the programmes in their own classrooms. The ERIC system makes it possible for teachers who live thousands of miles apart to 'co-operate' in the furtherance of environmental learning.

Brief information on certain problems is available from booklets and leaflets comprising a short text with figures and pictures or instructions for certain environmental operations. Posters may be used either for arousing interest and a sense of commitment or for employing pictures and slogans to present environmental processes, components and issues and even to propose solutions for environmental problems. The latter functions are more strongly emphasized and developed by wallcharts, intermediate in size and complexity between a poster and a display.

To complete the survey, mention should be made of various occasional printed materials which are helpful in publicizing specific environmental issues and efforts. These materials include calendars and diaries, greeting cards, etc. Interesting publicity and even actual instructional material can also be produced through collaboration with companies offering space on retail packages for an environmental message.

In many instances, particularly when working with children and youth, printed materials other than recognized instructional resources have proved to be excellent teaching aids. Postage stamps are an example. With the rise of the 'environmental wave', many post offices are now issuing attractive and informative stamps on environmental conservation subjects.

27. Jean Dorst, *Avant que Nature Meure*, Neuchatel, Delachaux et Niestle, 1965.
28. J. Barr (ed.), *The Environmental Handbook, Action Guide for the U.K.*, Pan/Ballantine, 1971.
29. Jonathan Holliman, *Consumer's Guide to the Protection of the Environment*, Pan/Ballantine, 1974 (rev. ed.).

Teaching aids

Conventional teaching aids are produced on a broad scale for educators, including those with environmental interests. They include wall pictures, films, film-strips, slides and tapes, equipment for laboratory work and field observation, models, etc. They are frequently used in schools, but can also be applied with success in out-of-school education for youth and adults. In Nepal, for example, two super-8 films promoting environmental awareness, environmental slide-tape presentations and display exhibits have been produced by the National Parks and Wildlife Conservation Office. Once again, it is worth noting that free and readily available materials, such as discarded crates, boxes, etc., can be used by teachers to produce teaching aids. The ILCE-Unesco Instituto Latino Americano de Communicacion Educativa in Mexico has produced various types of instructional materials for utilization by teachers. Within the general items on agriculture, geography and hygiene, there are some materials of potential use in environmental education programmes at different levels. While these peripheral materials are helpful, it is most desirable that aids be developed from the earliest stages of planning and production for the express purpose of environmental education.

Visual and audio-visual aids are particularly efficient instructional resources for use in the developing countries, where the number of illiterate people is still high. Film showings are very popular among the rural population of India, for example, and can be used for environmental education programmes. Probably even more efficient are 'village theatres', village singers, minstrels, etc., making use of folk media.

The national parks of Kenya achieved good results with a mobile unit showing films (mostly of commercial origin) at irregular intervals in all parts of the country.[30] The Comision Nacional del Episcopado in Bolivia has mobile units equipped with medical instruments, medicines, agricultural tools, seeds and fertilizers, instructional aids and materials. These units comprise an educator, a sociologist, a sanitarist and sometimes a specialist in agriculture. They travel into the most remote regions of the country, which are inhabited by small communities of people. They devote all the time that is necessary to training leaders and the community in general on sanitary and agricultural matters, including practical health and agriculture skills involving environmental issues (such as conservation of animal and vegetable specimens, correct use of land, etc.).

Television is a good teaching aid for those countries and institutions that can afford it. The department responsible for primary education and educational television in the Ivory Coast organizes different programmes on environmental problems. A whole televised learning system can be developed around films, such as the modularized environmental course produced in Florida (United States), in connexion with Miami-Dade Junior College.[31] The course includes two twenty-minute telecasts per week, a study guide, an instructional communication and feedback system, an open-phone radio programme, mid-term and final examinations and a textbook designed to support the programme. By its advanced techniques, structured components, and conceptual and material complexity, this combined aid relates strongly to the non-conventional instructional aids, described below.

Non-conventional instructional resources

Environmental education, with its complex approach (education from, about and for the total environment) and social relevance, bringing education closer to real life and its needs, introduces new innovative trends into general education, and may be considered an ideal integrating concept.[32]

30. Walter Hartmund, 'Conservation Education and National Parks in East Africa', *IUCN Commission on Education Newsletter*, No. 6, 1970, p. 12–19.
31. Terrence J. Kelly and Robert H. McCabe, *An Overview of the Scope and a Description of the Components of Man and Environment Television Learning System*, Florida, Miami-Dade Junior College, 1972.
32. Jan Čeřovský, *Environmental Education—A Step Towards Solution of Environmental Problems by Changing People's Attitudes*, New York, N.Y., 1971, p. 231–4 (ECE Symposium on Problems Relating to Environment, United Nations).

New trends require new instructional resources, more complex and more participatory; kits, games and, particularly, simulations correspond to this demand.

Environmental kits are organized and structured multi-media collections on given subjects which can be used sequentially by a group or by individuals. The main types are study kits, experiment kits and project kits. If designed for a group of students, a teachers' handbook may be enclosed. The Coca-Cola Company developed and produced the study kit, *Man in His Environment,* designed for class discussion on the merits and drawbacks of development. It contains a magnetized board showing a community with characteristic landscape features, project features (airport, hydroelectric installations, amusement park, wild life reserve, etc.) to be stuck on the board; extra features required as a result of development (such as sewage disposal plant); identification cards representing various interests in the community; and a pad of voting sheets. The 'Clean Water' pollution study kit was used during the British national 1971 water pollution survey organized by the Advisory Centre for Education (ACE) and the *Sunday Times.* It contains specimen tubes, a magnifying glass, an indicator and detector paper, identification cards for indicator animals, stream survey sheet, experiment instructions and background information. The project kit, *Nature in Your Town,* produced by the British Crusade Against All Cruelty to Animals, gives instructions for practical projects to be carried out in towns, making use of various overlooked habitats within the urban environment. It contains booklets for pupils and teachers and a wallchart.[33]

Environmental games are spreading rapidly both in use and number, especially in the Western countries. They can be used in the classroom, in out-of-school and leisure activities and in homes to further environmental awareness. Those games which call on participants to adopt certain attitudes involve the learner as a resource.

Again, several types of games can be distinguished.[34] The first group resembles ordinary board games with success depending on skill and/or chance, rather than understanding of the subject-matter. Very often they promote narrowly conceived protection of vanishing natural features. The second group of games attempts to decrease the factor of chance, to simulate reality and to broaden the scope. The third group of games are simulations, replicating a simplified reality. They especially emphasize the environment-man relationship, and point out the complicated social relevance of environmental issues. They are very much concerned with land use, development and regional planning, and the role of ecological principles within these activities. An example is *Environ County: A Gaming Simulation of Regional Planning Process* sponsored by the National Science Foundation, Washington, D.C. (United States).[35] Developed as a learning experience for decision-makers and public participants, the simulation emphasizes the integration of political, social, economic and environmental issues in the resolution of five complex socio-technical problems. The game simulates a meeting of the Regional Planning Commission of a fictitious county, a large three-dimensional model of which is included with the package along with a game handbook discussing the considerations that should arise during the game.

Displays and larger exhibits may also to some extent be considered as multi-media instructional resources. They may, however, turn out to be not particularly efficient, as already noted.

Projects relating to environmental education mobile units, with both material and human instructional resources combined, are being carried out with a view to replacing former exhibits with more effective offerings. Two projects from the United States deserve to be mentioned in this context: the Mobile Environmental Education Laboratory of the Tennessee Valley Authority, Knoxville;[36] and the 'Eco-Bus' sponsored by Keep Colorado Beautiful, Inc., Denver.[37]

33. Carol Johnson and Jaqui Smith, *Directory of Environmental Literature and Teaching Aids*, London, The Council for Environmental Education, 1972.
34. Tom Eckman (ed.), *Environmental Games and Simulation*, 1974.
35. Peter H. Cohan, *Environ County: A Gaming Simulation of Regional Planning Process*, Oak Ridge National Laboratory, Tenn., Report, 1973.
36. Ronald B. Childress, *Mobile Environmental Education Laboratory Project, Final Report, Kingsport City Schools*, Kingsport, Tenn., 1973.
37. Personal communication by letter from Mrs Robert Fleming, Executive Director, Keep Colorado Beautiful Inc., 2 June 1975.

Mass media and their special role

Mass media are not a special instructional resource for environmental education; nevertheless, they are central to environmental education programmes.

It is important to distinguish between the information and education functions of both print and broadcast media when considering their use as environmental education vehicles. Television news programmes, periodical news magazines and daily newspapers largely report to the public on recent, factual developments. In this way, they convey information on environmental topics and it is from these sources that citizens learn about oil spills, fish destruction, the results of important research on environmental problems and the day-by-day quality of the air they breathe. While news media affect attitudes to the extent that reporters act as 'gatekeepers' in their selection of information to present to the public and 'slant' their stories to give more weight to certain viewpoints, their function is primarily to convey factual knowledge.

Outside the news sector there are other forms of publishing and broadcast programming which can be used to educate citizens on environmental issues. Specialized publications, documentary films and brief advertisements and public service announcements offer examples of the media's use as educational vehicles. The magazines of environmental groups offer in-depth articles on threats to wildlife designed to arouse citizens' interest in the problem and hostility towards the threat. Public service announcements and paid advertisements exhort listeners to stop littering, give up smoking and conserve energy; their presentation is thoroughly researched and prepared to persuade people to act in a certain way. Documentary programmes, while essentially retaining a news format, can influence listeners by focusing on a single topic, such as dangerous chemical emissions from industry smokestacks. Such techniques, along with high-impact photography and interviews with affected citizens, can sway public opinion on volatile environmental issues.

The mass media can be a powerful authority capable of promoting and stimulating activities through the printed or transmitted word and picture, and, through correspondence and other more personal contacts, between editorial staffs and their audiences. A selection of examples follows.

The popular American *Ranger Rick's Nature Magazine*, published by the National Wildlife Federation, is one important instrument in conducting the activities of 'Ranger Rick's Nature Clubs' whose membership has grown to more than 200,000 youngsters eager to learn about nature and conservation. The Czechoslovak youth movement, Nature Conservation Patrols, was created and is operated by the magazine *ABC Mladých Techniků a Přírodovědců* (ABC of Young Technologists and Naturalists). The rallies, at which editors and authors meet with readers to carry out instructive and interesting programmes (nature trails, competitions, etc.), have become very popular. A similar role in encouraging environmentally oriented scientific and practical activities by youth clubs is performed in Zambia by the *Jets of Zambia* magazine.

In the late sixties, Prague Radio, Czechoslovakia, broadcast a series of lectures and discussions entitled 'Not Only Nature Beauties are in Focus'. This programme was prepared by a group of keen environmentally oriented conservationists and marked a shift from a narrowly conceived protection of nature towards balanced environmental conservation. The popularity of the programme, which made it imperative to publish all the lectures, led listeners to involvement in action, primarily for their local environments.

Environmental education programmes transmitted by radio are of outstanding importance for developing countries where transistor sets are now quite common and, in remote rural areas, often represent the only means of quick communication with the outer world. Good results may be achieved through environmental education broadcast programmes such as, for example, the *Wildlife Clubs of Kenya.* Each African country uses radio to educate the public. This education is based on issues of general concern and, particularly, environmental problems. The Latin American Association for Radio Education (ALER) has a network of radio schools. Among other themes, the programmes cover agricultural and fishery production, and the conservation and

improvement of living conditions (hygiene, nutrition, health, etc.) for farmers. ALER is also oriented to the training of rural leaders and instructors in various centres distributed in different countries.

In Czechoslovakia in 1975, one of the summer newsreels of the Czechoslovak National Film Company was devoted to one of the country's 'landscape protected areas'—a category of protected territories very similar to the 'biosphere reserves' currently promoted by the Unesco 'Man and Biosphere' programme.

The Maine Public Broadcasting Network in the United States recently organized an experimental project using simulated models as part of a 'viewer-participation' series. Long television programmes were broadcast, each presenting alternatives for the use of a simulated area of Maine land. On request, viewers received guides and a land-use game free of charge and after each programme voted on needs of the land via a toll-free phone line. It was concluded that such television simulations were useful instruments of public education and policy-making.[38]

Learning environments

In environmental education, the environment itself has a logical role to fill as an instructional resource. Because the topic of learning environments is covered in more detail elsewhere in the present book, however, it should merely be pointed out that local environments play an important teaching role. The learning resources they offer are living examples of environmental elements interacting in their natural state.

Every environment can be utilized in this sense; some especially suitable environments are being selected and equipped for educational use. All kinds of instructional resources central to environmental education, both material and personal, are being employed to enhance their instructional potential.

Outdoor study areas are designated in areas of natural significance, some located in state or national parks. An example is the Ragged Ridge Outdoor Center in Spokane, Washington (United States), where classes from surrounding areas come to participate in environmental education activities. Similar environmental study centres are also common in the United Kingdom.

Learning environments are also found in non-protected areas surrounding every community; workshops and other special programmes can enhance their educational potential. An example was the conference entitled 'Water Clean-up and the Land', sponsored by the United States Environmental Protection Agency and Department of the Interior in Boston, Massachusetts. One of the activities for those attending the meeting was a field trip to see actual water quality conditions in rivers surrounding Boston.

Learning environments exist everywhere; they offer the greatest opportunity for spontaneous interaction between students and their surroundings. Full utilization of learning environments as instructional resources depends upon the effective use of environmental education activities by leaders who will encourage exploration and discovery by their students.

Human resources

Environmental conservation is concerned with the environment in the interests of the people. Logically, there can be no environmental education without resource persons to initiate and conduct it.

Educationalists are an important resource. They include educational decision-makers, i.e. those who approve educational systems, programmes, curricula, syllabuses, textbooks, teachers' guides and teaching aids; educational scientists, i.e. those who work out methodology, propose educational systems, programmes and curricular innovation, write textbooks, and prepare teaching aids. Environmentalists must help by consulting on all the above activities in order that environmental education can be based on sound scientific and human reasons; thus they also belong to the category of human instructional resources for environmental education.

38. Grayce Papps *et al., A Blueprint for a Television Environmental Simulation Project: The Land and Me*, Orono, Maine Public Broadcasting Network, 1975.

As already emphasized, however, the key person in environmental education programmes is the practising educator; but a practising educator is not only the schoolteacher who works at all levels and types of educational establishments; he is also the youth leader, nurse, editor, journalist, writer, park ranger, reserve warden, mountain guide, etc. These resource persons must all receive pre-service and in-service training, both in environmental conservation and in environmental education.

As already pointed out, human resources are resources for direct instruction (by teaching, guiding, etc.), and also for indirect instruction through the creation of material resources. The practising educator needs instructional materials for the classroom; those functioning outside the formal education system will use materials that are more general in nature and scope. What is urgently needed are instructional resources closely related to the local environments of teachers and students. The educator is unlikely to obtain them unless he produces them himself. For this purpose he or she must be educated and trained.[39]

> She/he has no alternative but to research and write the sheets of background information, programmes, plans and diagrams for the class needs, to take photographs for slides and illustrations, to make tapes and films, and to lay out nature trails. . . . This is, of course, very good for the teacher. He must be always on his toes and he can seldom hide behind a textbook. One of the applied objectives of environmental studies in fact is to keep the teacher on his toes.

In environmental education, the practising educator by no means conforms to the model of an old-time schoolmaster, acting as the source of a body of established knowledge and skills, and ruling in a predetermined process. The practising educator who, in many instances, is a volunteer more qualified by his talent than by his academic titles, must instead be an initiator, promoter, organizer and adviser, the person so well described in French as an *animateur*.

From this point of view, social, traditional, artistic, spiritual, religious and political leaders must be taken into account. A Communist Party Secretary in Eastern Europe and a Catholic priest in Latin America can both contribute a good deal to the cause of environmental education in the community. In Cuba, 82 per cent of the population are members of the 'Committees for the Defense of the Revolution'. Among the activities of the committees, there are projects for cleaning the city, constructing recreational areas for children, painting houses (an effort is currently being made to preserve the colonial sections), planting gardens and trees throughout the city, etc. In 1974 the Cuban Committees for the Defense of the Revolution saved more than 8 million pesos on raw materials, partly through recycling. The children who took part in this community work, organized into groups of three, helped the community save energy and electricity by visiting homes in the evening to remind their neighbours not to waste electricity. This is an example of mass-scale environmental education in the community by practical involvement.

It should be repeated that the learner himself can and should to some extent be his own instructional resource. This will result when he or she participates in the most active manner in the process of environmental education.

Some problems of production and distribution

The question of real needs

If the actual needs for instructional resources are to be met, they must be objectively explored through investigations. Such investigations have to determine the best channels and the best mechanisms for appropriate distribution of such resources.

In this connexion, a United Kingdom report and recommendations, the 'National Survey into Environmental Education in Secondary Schools in England and Wales',[40] sponsored by the Conservation Trust for the Conservation Society, Walton-on-Thames, Surrey, are of interest. Data

39. Watts, op. cit.
40. ibid.

was collected from over 420 schools, usually by means of a structured interview with the school staff. Only a quarter of the schools had a definite syllabus geared to environmental problems, probably because of problems relating to staff size and capability. Nationally, only 15 per cent of the schools surveyed had at least one staff member with special qualifications in environmental studies/science. Over one-eighth of the schools regarded the lack of teaching resources and aids as a major problem in connexion with establishing environmental work.

The question of technology

Techniques used for the production of instructional resource materials for environmental education must be carefully adjusted to environmental ethics. It is out of the question to use raw materials which lead to the depletion of rare natural resources. No real specimens of vanishing plant and animal species or other rare natural features can be used as teaching aids. They should be replaced by models. It is out of the question to use technologies which would aggravate pollution or contribute to other environmental deterioration. On the other hand, the use of recycled board and paper is very appropriate.

It is imperative to design the instructional materials for environmental education in accordance with the national, and even local, traditional cultural background. This primarily concerns instructional resources for developing countries. If produced by their own efforts and especially if supported from foreign or international sources, this principle should be carefully observed; experienced local writers and, preferably, local languages and local artists should be utilized.

The question of producers

The production of instructional material resources, especially those used for formal school education, is often sponsored by governments and educational authorities. But many voluntary (private) organizations are also extremely helpful in this field. Some of them even have very productive special environmental education units—at both national and international levels. Many headquarters of national parks and similar protected territories develop valuable instructional materials for their own use or for outside institutions. In Madagascar, for example, instructional charts designed in the Timbazza Park are used by teachers and distributed to different schools. An increasing number of materials are now being produced by commercial organizations. Some are free, some offered at subsidized prices. It is always essential to weigh the acceptability of the advertising usually associated with such materials.[41]

Sometimes, particularly in the case of materials on local environments and situations, students themselves can take part in the production. This can be regarded as an integral part of environmental education programmes and deserves to be encouraged in every way. This seems to be a very efficient means of producing materials in, and for, developing countries. There is no reason why students should not participate in the creative production of games and more simple simulations, for example. Students in Rabun Gap, Georgia (United States), began a magazine project called *Foxfire* several years ago. Interviewing local residents on cultural and environmental customs, they developed a programme which has been copied elsewhere in America.

Conclusion-international co-operation

The importance of international sharing of information is evident, as is the need for international co-operation in the production of instructional resources and for financial aid, wherever necessary. The Unesco-UNEP Environmental Edu-

41. Peter S. Berry, *National Survey into Environmental Education in Secondary Schools. Report and Recommendations*, Walton-on-Thames, Surrey, The Conservation Society/Conservation Trust, 1974.

cation Programme should encourage, support and organize the following:

1. A data bank on instructional resources available throughout the world.
2. The exchange of experience in the field of environmental education instructional resources by publications, special workshops and courses.
3. International displays—exhibits, fairs and festivals—of media used for environmental education programmes and the international exchange of materials.
4. International training (workshops, courses, visits, etc.) of leading resource persons for environmental education.
5. International financial aid to all countries where such support is needed, based on full respect for the national and cultural independence of nations.
6. International competitions to design efficient instructional materials for environmental education.
7. A special international journal to be devoted specifically to environmental education.

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Part II

Formal environmental education

5. Environmental education at the pre-school and primary level

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Scope and purpose

This paper focuses on learners in the younger age group—pre-adolescent learners up to 12–15 years of age. This range will include approximately the ages associated with 'pre-schooling' and first-level or primary schooling in most countries.[1] It will view environmental learning in many different contexts as part of a set of basic learnings within the framework of 'lifelong learning'.[2] Learning by these young people can be seen as a beginning phase, a 'first cycle' leading on to continued, recurrent programmes of lifelong learning.[3]

The paper is concerned with the young learners in today's world preparing for life and work tomorrow. Their life styles will differ very widely and the situations in which they acquire knowledge, skills and attitudes relevant to life and work also vary markedly. Some of these young learners may be living in a densely populated urban complex, almost entirely covered with metal, concrete and plastics of one type or another. At the other extreme wouldbe learners in rural developing communities, young farm boys driving an ox around a Persian water wheel on the Punjab plain or an emaciated lad wearily trudging long distances for a minimum of water to survive in the Sahel. Within each of these groups, there is a diversity of life styles ranging from the affluent in the urban complex with all amenities, to those in densely populated urban slums, where the facilities built with modern technology are at breaking point. In the rural situations, there are similar extremes ranging from densely populated rice-farming villages in a river delta to shepherd youngsters in a scarcely populated mountain terrain or desert.

The concerns about the environment in a non-affluent world—the developing world—differ somewhat from those related to environmental degeneration as it occurs in the developed world. Often, for example, water pollution results from a different set of factors, and is in some ways different in kind to the type of situation that is often referred to when the subject of water pollution is raised in affluent societies. Similar comments apply to food and to other resources. Variations in life styles are quite different. All learning is essentially for living, and to this extent one needs to analyse life tasks in order to develop programmes in environmental education.

The many learning situations, where these young learners interact with the physical, biolo-

Continued on page 86.

1. *The Study of Environment in School*, Geneva and Paris, IBE and Unesco, 1968; Unesco, *Meeting of Experts on the Basic Cycle of Study. Final Report, June 1974*, Paris, Unesco, 1974.
2. Unesco, *Meeting of Experts* ..., op. cit.; Unesco-UNICEF, *Unesco/UNICEF Co-operation Programme, Basic Education in Eastern Africa, Report on a Seminar, Nairobi, Kenya, 1–23 August 1974, 22–26 October 1974.*
3. Unesco, *Learning to Be: The World of Education Today and Tomorrow*, Paris, Unesco, 1972; Unesco, *Meeting of Experts* ..., op. cit.

TABLE 1. A schematic description of learning situations

Level and stage	Type	Objectives	Time and space	Mediating mode or style	Learning materials
Zero o					
o–1[1]	*In*formal	Inarticulated; implicit and manifold	Young child —typically in the home—*un*structured	Mediation by parents, brothers, sisters, other relatives, etc.	Common materials in the environment
o–1	'Hybrid'	Limited; often implicit; simple skills, moral codes, rituals, etc.	Young child —typically in the temple, church, a nursery, structured	Mediation by others besides parents, etc.; routine in character	Selected materials and selected media
o–2	*In*formal	A later stage at this level can be recognized, the principal change being that the child now is older and manipulates the environment with greater confidence and dexterity			
o–2	'Hybrid'				
First I					
I–1	*In*formal	Inarticulated; implicit, but wide and diffuse	The growing child in the home, unscheduled sessions in the school, *un*structured	Mediation by parents, peers and adults; relaxed and mainly on request, increase in 'self-mediation'	Materials in the home, in the school, in the market place, etc.
I–1	Formal	Often articulated in formal terms, but wide spectrum	Typically the growing child in the school, structured	Mediation primarily by teachers and fellow schoolfriends	Materials often stereotyped, set textbooks, exercises, etc.
I–1	'Hybrid' (non-formal)	Often articulated in semi-formal terms; wide spectrum	Typically the young child in scout/guide camp groups; community play groups; semi-organized listening/viewing sessions on radio/television, etc., relatively unstructured	Mediation by teachers, peers, others in the community; 'remote' mediation on radio/television	Materials and situations varied and interesting
I–2	*In*formal	This stage is intermediate in character between I–1 and I–3			
I–2	Formal				
I–2	'Hybrid'				
I–3	*In*formal	Implicit, wide and diffuse	Young, pre-puberty child in the home and in the community; unscheduled, *un*structured	Mediation by peers and adults; mostly when requested; self-mediation (unskilled)	Materials and activities in the community
I–3	Formal	Wide and formal focused on scholastic achievement	Young, pre-puberty child[2] in school, already socio-economically selected, structured	Mediation by teachers and other adults in school	Materials often stereotyped. Activities related to academic book learning often isolated from immediate societal need and responsible tasks
I–3	'Hybrid' (non-formal)	Often articulated in semi-formal terms; wide spectrum	Typically the young pre-puberty growing child semi-formal play-cum-work groups, scouts, cadets, 4-H clubs, etc.; semi-organized listening/viewing on radio/television, etc., relatively unstructured	Mediation by teachers and other adults; self-mediation (unskilled); remote mediation on radio/television	Materials and situations varied; often meaningful and relevant to living

1. At this stage few formal programmes occur. Though unfortunately some 'nurseries' tend to be 'formal'.
2. Is he or she a 'child', adolescent, or young 'adult'?

Comments	
Developed countries	Developing countries
Relatively versatile, 'affluent' environment	Limited resources; more critically distracted by basic deprivations, e.g. hunger, disease, cold, etc.
Systematically organized; basic amenities, etc.	Poorly managed; basic amenities absent and often rigid and traditional
Material environment affluent, but human environment sometimes 'lonely', both parents working	Deprived material environment and distracted by basic deprivations—food, clothing, sickness, etc.
Increasing emergence of spontaneous and imaginative sessions of work with unobstrusive mediation by teachers, facilitating learning. Large percentage participates	Limited resources, often rigid and routine. Very occasionally, spontaneous, imaginative and free. Limited participation in schooling
A variety of opportunities in the home and in the neighbourhood; flexibly organized	Limited opportunities; but spontaneous participation in semi-formal traditional 'play' and 'festival' situations; partial organization
Young pre-puberty child is often still in school. Is actively supported by parents and community. Picture books, reading materials, radio, television and contrived play materials available	Pre-puberty child[1] is already participating in various responsible activities (not trivial) in home and immediate community; often has ceased to attend school. Little active support in learning process by parents, adults. Limited resources designed to facilitate learning. Almost no selected media, books, etc.
Most children still in school. Programmes are routine. Participation lacks spontaneity	Limited number within the school. Study programmes isolated from societal needs and linked to scholastic needs of higher level in schooling
A variety of opportunities in the home and in the neighbourhood; flexibly organized	Limited opportunities; but spontaneous participation in semi-formal traditional 'play' and 'festival' situations; partial organization

e.: Jinapala Alles, 'Mediation in Learning: the Changing Scene in Asia', *Prospects*, Vol. V, No. 2, 1975

1.00: 'Individual-personal' Aspects of the education of the individual

	Motivation for task performance arising from need to	Typical tasks	Learning episodes for task included in programmes of relevant agency			
			Programme 1 Home and family	Programme 2 In-school	Programme 3 Out-of-school institution	Programme 4 Out-of-school non-institutional

1.10: Education with respect to 'routine basic tasks' in 'individual-personal' living

'Maintenance and conservation'

			*I			I			I			I		
			F	H		F	H		F	H		F	H	
1.11	Meet physiological demands and survive as an organism	Breathing, feeding, resting excretion, sleeping, etc.	*k											
			s											
			a											
1.12	Meet functional environmental demands in home and around it	Choice and use of food, clothing, shelter, housing, simple tools, etc.	k											
			s											
			a											
1.13	Meet personal social demands in the home	Family tasks: interact, communicate as child, adult (play, marriage, sickness, death, etc.)	k											
			s											
			a											
1.14	Meet personal, religious, civic, moral-ethical demands	Religious rituals, observances, civic and political and other cultural practices	k											
			s											
			a											
1.15	Meet other similar demands	Relevant tasks	k											
			s											
			a											

1.20: Education with respect to 'exploratory creative tasks' in 'individual-personal' living

'Developmental' and 'adaptive growth'

			I			I			I			I		
			F	H		F	H		F	H		F	H	
1.21	Respond actively to exploratory, recreational, creative and other self-actualization tendencies	Physical, mechanical and other concrete activities	k											
			s											
			a											
1.22		Intellectual, cognitive and other abstract activities	k											
			s											
			a											
1.23		Aesthetic activities	k											
			s											
			a											
1.24	And other such demands	Other divergent creative tasks	k											
			s											
			a											

*I=Informal; F=Formal; H=Hybrid of I and F.
k=knowledge; s=skills; a=attitudes and values. These are relevant to the learning of the task.

Description of 'learner' or 'learning group': .....

2.00: 'Group-organizational-occupational' Aspects of the education of the individual

Motivation for task performance arising from need to	Typical tasks	Learning episodes for task included in programmes of relevant agency					
		Programme 1 Home and family	Programme 2 In-school	Programme 3 In-vocational institution	Programme 4 In-work place	Programme 5 Institutional other than programmes 1, 2, 3 and 4	Programme 6 Non-institutional other than programmes 1, 2, 3 and 4

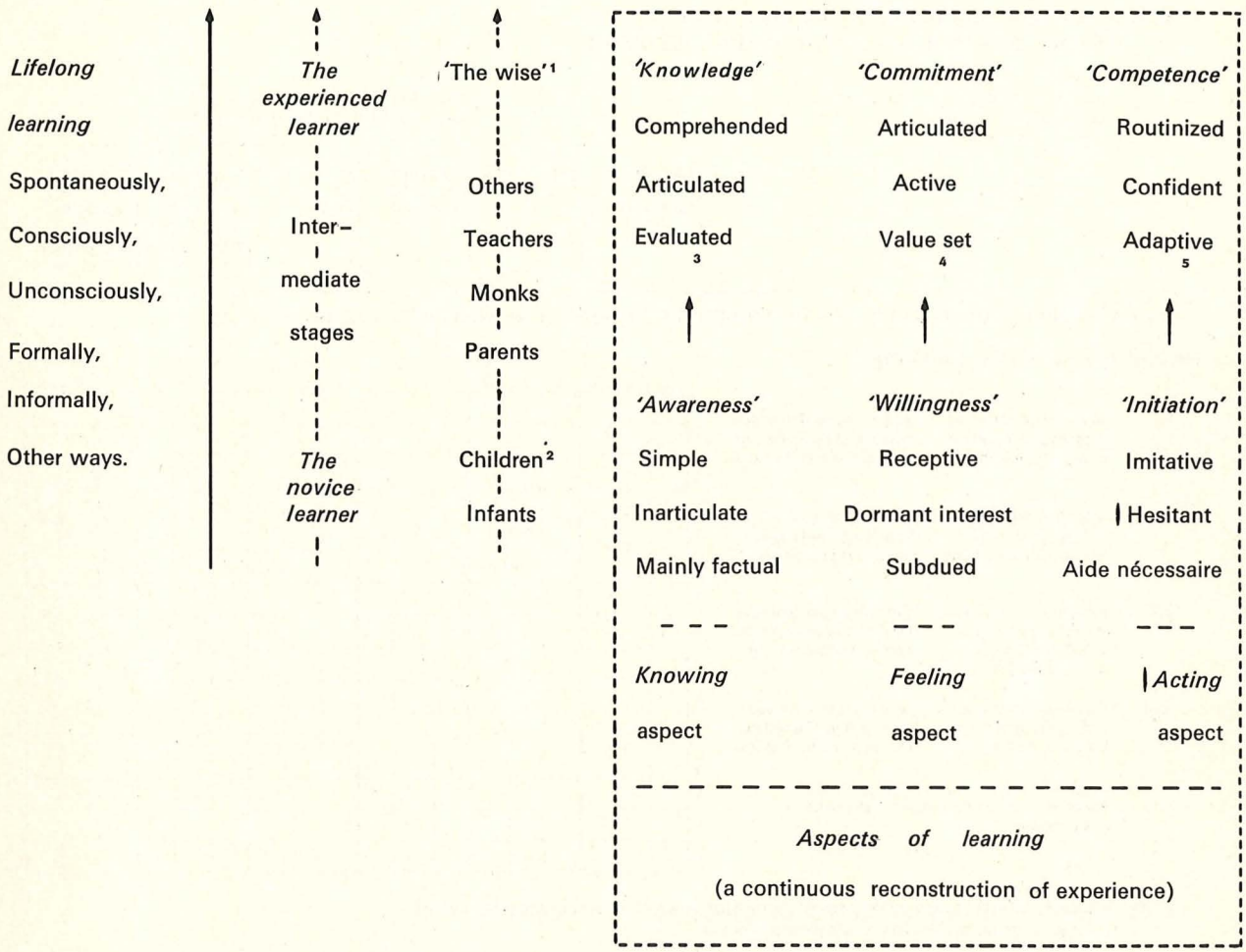
2.10: Education with respect to 'routine basic tasks' in 'group-organizational-occupational' living linked primarily to 'survival'

			I F H	I F H	I F H	I F H	I F H	I F H
2.11	Meet group-functional demands and survive as a group member	Attend, subscribe, listen, communicate, react and take part in group tasks	k s a	k s a	k s a	k s a	k s a	k s a
2.12	Meet functional demands of work place 'club' and its neighbourhood	Choice and use of tools, farm lots, workshops, recreation spaces, etc.						
2.13	Function actively, grow, 'multiply', develop as working groups, play-groups, etc.	Perform group functions take part in team, trade union, welfare activities						
2.14	Function in terms of civic and group traditions, beliefs, rituals, etc.	Group rituals, festivals, civic-political activities, and other such practices						
2.15	Function in other relevant basic modes	Relevant tasks						

2.20: Education with respect to 'developmental research innovative tasks' in 'group-organizational-occupational' living related primarily to achieving 'satisfactions'

			I F H	I F H	I F H	I F H	I F H	I F H
2.21	Respond actively, as a group, in exploratory, developmental, innovative situations leading to adaptation, growth and change	Physical, mechanical and other concrete activities	k s a	k s a	k s a	k s a	k s a	k s a
2.22		Intellectual, cognitive and other abstract activities						
2.23		Aesthetic activities						
2.24	And other such demands	Other divergent tasks						

Figure 1. Source: Alles, op. cit.



1. Wisdom—Is it analysable? And not necessarily associated with grey hair, toothlessness, etc., either.
2. Some 'children' could chronologically be old in years.
3. Cognitive potential axis
4. Affective potential axis
5. Psycho-motor potential axis

} A set of concurrently operating human potentials, that relate to retention, transferability, versatility, etc.

Figure 2. Source : Alles, *op. cit.*

gical as well as the socio-cultural environments, are described schematically with brief comments relevant to the developed and developing contexts in Table 1.

Environmental education is not viewed as yet another subject in schools.[4] Environmental concerns should permeate all aspects of learning. Concerns regarding the environment, its imaginative utilization, its conservation and protection should therefore be linked with all life tasks such as are listed in Figure 1.[5] The school learning situations may acquire, with the incorporation of environmental concerns, a renewed quality, a wider character, and another overtone of relevance.[6]

4. William B. Stapp and Dorothy A. Cox (eds.). *Environmental Education Activities Manual*, Books 1–6, Michigan, 1974.
5. Jinapala Alles, *A First Step in the Identification of Learning Priorities*, Paris, Unesco, 1975 (Unesco-Unicef, Notes Comments No. 6, March 1975) (mimeo.); Anwar Jasin *et al.*, *Life-Skills, Objectives for Primary Education, A Preliminary Tryout*, Saigon, Seameo Regional Center for Educational Innovation and Technology, 1973 (INNOTECH LS-FR/73).
6. Unesco, *Learning to Be* . . ., op. cit.; D. Harsbarger, 'The Strain Towards Irrelevance', *Human Relations*, Vol. 25, No. 3, p. 253–63.

The young learner

From several analytical points of view[7] the population of learners referred to as 'the young learners' can be divided into subpopulations as follows:

Very young learners (up to 6/7 years of age—described by Code 0).

Young learners (6/7 to 14/15 years of age—described by Code 1).

Each of these groups could be further subdivided as follows:

The very young child (up to 3 years of age—described by Code 0–1).

The pre-school child (3 to 6/7 years of age—described by Code 0–2).

Children aged 6/7 to 9/10—described by Code 1–1.

Children aged 9/10 to 11/12—described by Code 1–2.

Children aged 11/12 to 14/15—described by Code 1–3.

(The code issued in Table 1)

The above groups and subgroups learn in a number of different ways: formal; informal; and hybrid types, including the 'non formal'.

An overview of learning situations is given in Table 1.

The growth and development that results is multi-dimensional. The learner adapts, i.e. assimilates and makes the appropriate accommodation, and simultaneously evolves in his totality. The learner learns facts, concepts, principles, attitudes, values and a range of skills not only extensively but, in each case, learns these content aspects to certain intensity levels. For analytical purposes, the latter may be viewed as three potentials associated with the learning process[8] —the affective potential; the psycho-motor potential; the cognitive potential.

The learner achieves certain levels of operation and involvement as indicated schematically in Figure 2 within a framework of lifelong learning:

The following assumptions about learners and learning are made in this article:[9]

Learners grow and mature (physically, psychologically, etc.); but they take time to grow and mature and will differ significantly.

Learners learn continuously (all the time); they do so on the basis of activities which they themselves perform, participate in, or observe; they learn many things at the same time and learn these things as a 'complex'.

The initial effects of learning (verbal or action-oriented) have many things in common with the activity situation or activities-complex in which the learning was initiated, reinforced and developed.

Ability to use learnings can be developed before words and other symbols can be used to describe learning.

Ability to use words is not always linked with the ability to use learnings.

7. Joan Bliss, *Some Notes on an Investigation into the Child's Usage of a Symmetrical and so Transitive Relation in a Concrete Situation*, London, Centre for Science Education, 1975; Jon Ogborn, *A List Structure Approach to Formalising the Development of Thinking*, London, Centre for Science Education, 1975; J. Piaget, *The Language and Thought of the Child*, London, Kegan Paul, Trench Trubner, 1926; J. Piaget, *Play, Dreams and Imitation in Childhood*, Melbourne, London and Toronto, 1951; J. Piaget and A. Szeminska, *The Child's Conception of Number*, London, Routledge & Kegan Paul, 1952; J. Piaget and B. Inhelder, *The Child's Conception of Space*, London, Routledge & Kegan Paul, 1956; J. Piaget, 'How Children Form Mathematical Concepts', *Readings on the Psychology of Cognition*, New York, N.Y., Holt, Rinehart & Winston, 1965; J. Piaget, *The Child's Conception of Movement and Speed*, London, Routledge & Kegan Paul, 1969; J. Piaget, *The Child's Conception of Time*, London, Routledge & Kegan Paul, 1969; J. Piaget and B. Inhelder, *The Psychology of the Child*, New York, N.Y., Basic Books, 1969; Richard E. Ripple and Verne M. Rockcastle, *Piaget Rediscovered*, Ithaca, N.Y., Cornell University, 1964; Unesco-NIER Regional Programme for Educational Research in Asia, *Asian Study on Curriculum, Comparative Study of Curriculum Development at the Stage of Elementary Education in Asian Countries*, Vol. 1. Tokyo, National Institute for Educational Research; Unesco-Unicef, op. cit.; Unesco, *Final Report of the Meeting of Experts on the Psychological Development of Children and the Implications for the Education Process, Champaign, Urbana, 1974*, Paris, Unesco, 1974; Unesco, *Meeting of Experts . . .*, op. cit.

8. Benjamin S. Bloom, J. Thomas Hastings and George S. Maudaus, *Handbook on Formative and Summative Evaluation of Student Learning*, New York, N.Y., McGraw-Hill, 1971; Jerome S. Bruner, *Toward a Theory of Instruction*, Cambridge, Mass., Belknap Press of Harvard University, 1966; Jerome S. Bruner *et al.*, *A Study of Thinking*, New York, N.Y., Wiley, 1967 (7th printing, first date 1956); R. M. Gagne, *The Conditions of Learning*, New York, N.Y., Holt, Rinehart & Winston, 1965 (2nd ed., 1971); R. M. Gagne, *Some New Views of Learning and Instruction*, p. 268–72. Bloomington, Ind., Phi Delta Kappa, May 1970.

9. J. P. De Cecco, *The Psychology of Learning and Instruction: Educational Psychology*, Englewood Cliffs, N.J., Prentice-Hall, 1968; Denis Lawton, *Social Change Educational Theory and Curriculum Planning*, London, University of London Press, 1973.

Awareness and understandings leading to constructive action can emerge before words and symbols for description and coherent communication are available.

Words and communication by symbols do not necessarily connote and imply understanding.

It is very important to assert, however, that significant generalization and transfer of learning (and retention) is greatly facilitated by verbal and other symbolic expression.

Learning will not begin and continue in a specified direction unless the learner is motivated. Meaningful activities of various types are essential to initiate learning; continued motivation, born of interest and relevance as seen by the learner, is essential to permit the learner to overcome initial difficulties and hesitancies, to progress in a given direction; logic of subject matter as seen by professionals alone is not enough.

If the learners learn by a process of continuous construction and reconstruction of experience, and acquire a series of responses, organizing and reorganizing them as necessary, then learning involves investing cultural content with meaning and developing new potential for behaviour.

If these responses and potentials are to be fully exploited, developed and maintained, and not extinguished, then as these occur, and are occasionally imaginatively repeated, they must be reinforced, wherever possible, immediately.

Affection, support, approval, recognition, etc., by peers, parents, guides, teachers and media, recognition of coherence by the learner, opportunity to use immediately satisfying solutions to a relevant problem, social acceptance and reward, etc., may all be reinforcers.

If learnings are required to be transferred to other situations in life, then it must be recognized that one must develop a potential for behaviour that enables one to act not only in predictable situations in defined ways, but also in predictable situations in *un*defined ways, and in unpredictable situations in *un*defined ways. Such transfer and versatility in action on the basis of learned behaviour cannot be taken for granted.

Among other things, the following conditions may be relevant: (a) identity of elements in the learning and action situations; (b) deliberate generalization to cover the variety of possible situations; (c) the ability and aptitude of the learner; (d) the level of motivation during learning and at the point of action; (e) the level of emotional involvement in learning and in action situations; (f) the degree of stability, security and support provided to the learner in learning and in applying the learnings.[10]

The young learner in general develops most of his final adult physio-neurological capacity quite early in life[11] and therefore the learning, especially of attitudes and values so important to imaginative action in environmental problems, is vital and needs to be considered carefully early in these sequences of lifelong learning.

The young learner, especially in the pre-adolescent state, has a remarkable asset which he will increasingly lose as he progresses through life, namely 'the sense of freedom'. The young learner in human society in the pre-adolescent stage, especially when very young, can always rely on the support, guidance and affection of others in the family. In human society, this affection is given to the very young spontaneously. The young learner therefore is free to learn and need not be preoccupied with problems and issues of either earning his living, getting his food, preparing it, or any of the many other 'trivialities' of life. In general, the very young learner especially can assume, very confidently, that these problems will be taken care of by others to the utmost extent, within a given resource base. (This statement, therefore, needs to be interpreted appropriately in differing contexts.) This remarkable degree of freedom provides a unique opportunity for learning such as perhaps no other

10. The authors have prepared a brief and very useful outline, 'Summary: Current Knowledge Relating to the Young Learner'. A limited number of copies is available from the Unesco Environmental Education Section.—Ed.

11. Unesco, *Final Report* . . ., op. cit.

organism enjoys in the same way as the human child.[12] A major problem, therefore, is that of exploiting this remarkable and unique opportunity that appears but once in a lifetime, to ensure that a stable pattern of sustained lifelong action is established early regarding issues such as those in the physical, biological and socio-cultural environment.

The learning of environmental concerns by the young

The literature under the heading 'environmental education' for the younger age range, prior to the mid-1960s,[13] reveals that only limited attention has been paid to environmental concerns either in formal or in informal learning situations.

In the late 1950s and in the early 1960s, there emerged an intensive concern with the development of science and mathematics education. A multitude of efforts at curriculum development in the field of science and mathematics education in the schools is seen throughout the world.[14] To the extent that such efforts focused on learning by doing, exploratory activities by the learner and a variety of other imaginative modes of learning, the design of these learning sequences reflected a diversity of concerns with the biophysical environment. In this same period, in the early 1960s, the concern limited in an earlier phase to science and mathematics was extended to other areas of the school curriculum such as social studies and language learning. This reflects an extension of concerns to the human and social environment.

Nevertheless, it may be said that prior to the mid-1960s the active concern with presenting environmental issues and problems to young learners was almost wholly absent on a world-wide basis, although several imaginative designs were concerned with this problem. An increasing sense of urgency on environmental issues becomes apparent in the early 1970s. The literature beyond 1970 contains a large variety of documents (as compared with the 1960s) including the term 'environmental education',[15] the bulk of it originating in North America and Northern Europe, although some is from Eastern Europe, the U.S.S.R., Japan, Australia and New Zealand.

While there is little information on similar activities in the developing world, there is some evidence that there is a corresponding sense of urgency. The absence of documentation *per se* does not necessarily suggest a lack of activity in this domain in the developing world. Because of limitations in physical resources and time on the part of professionals, these activities have not often been documented in the developing countries in the manner common to the North American scene. In a recent study conducted by Unesco consultants, interesting projects were identified in a number of developing countries.

The initial focus of attention in environmental education world-wide was clearly in the field of conservation of natural resources. A variety of documentary material was produced relating to conservation activities, field trips, nature trails and other such studies linked to

12. A. Montagu, *Education and Human Relations*, New York, N.Y., Grove Press, 1958.
13. John F. Disinger and M. Lee Beverly (comps.), *A Directory of Projects and Programs in Environmental Education for Elementary and Secondary Schools*, Ohio, ERIC Information Analysis Center, 1973; Emily H. Earley, *A Bibliography of Environmental Periodicals*, Madison, Wisc., Center for Environmental Communications and Education Studies, The University of Wisconsin-Madison, 1970 (mimeo.); *The Study of Environment in School*, op. cit.
14. J. Davis Lockard, *Science and Mathematics Curricular Development Internationally, 1956–1974*, The Science Teaching Center, University of Maryland, College Park, 1975; Biological Science Curriculum Study, *High School Biology*, Chicago, Ill., Rand McNally, 1963 (Green Version); Commonwealth Education Liaison Committee, *School Science Teaching, Report of Expert Conference held at the University of Ceylon, Peradeniya, December 1963*, London, Her Majesty's Stationery Office, 1964.
15. Disinger and Lee Beverly, op. cit.; Earley, op. cit.; D. E. Hawkins and D. A. Vinton, *The Environmental Classroom*, Englewood Cliffs, N.J., Prentice-Hall Inc., 1973; J. David Lockard *et al., Working International Bibliography on Trends in Environmental Education, 1975*, Maryland, The University of Maryland, 1975; William B. Stapp and Mary Dawn Liston, *Environmental Education, A Guide to Information Sources*, Vol. 1, Detroit, Gale Research, 1975 (Man and the Environment, Information Guide Series).

conservation of natural resources.[16] Some of this documentation was merely exhortative; much of it took the form of guidelines for teachers, and others in leadership positions, as to how they might gain active participation in practical activities directed towards the conservation and preservation of natural resources. Attention is usually concentrated on animal life, plant life, conservation and protection of water resources and related themes. The earlier literature is only slightly differentiated as to rural-urban problems, but the later explicitly recognizes that the biophysical environment in urban contexts provides as rich a basis for problem identification and problem solving for the young as the natural environment on the seashore and in the countryside.[17] Thus, increasingly, one finds a variety of special teacher guidelines suggesting ways and means of using the urban biophysical environments for the presentation of significant problems to young learners in the schools. In relation to rural areas, the concern still relates to nature conservation and nature studies in the traditional mode. A few significant guidelines are available for exploring the countryside with more concern for changes in the environment as a whole.[18]

Even in the early 1970s, only limited attention was directed to providing for concurrent learning in informal situations. Learning materials focused on the parents in the home and others in the community and the mobilization of all learning channels is not extensive. In the mid-1970s, there is a greater anxiety to take a wider perspective. It is being increasingly recognized that the school is not the only place, and not necessarily the most important place, for the nurturing of attitudes and values.

It would often seem to be assumed that, if the young in schools are taken care of through the school programme, then the problems of environmental education are largely in hand. There is but limited recognition—one is tempted to say, almost no recognition—of the fact that recent research, episodic observation and reflection suggests that the manner in which the young learn to be adults has significantly changed throughout the world in recent decades.[19] The roles of the family, the workplace and the school are rarely systematically reviewed and critically analysed in the context of the presentation to the young of environmental learnings. These remarks do not imply that those concerned in the development of learning materials for the presentation of environmental issues and concerns to the young are unaware of the important roles played in this context by parents, peers, the community and the mass media. The awareness perhaps exists but the predominant concern is with school programmes. There is a virtual absence of systematic effort to analyse coherently the manner in which responsibilities for presenting these learnings are shared (or might be shared in the future) in the various types of learning situations encountered in the different nations of the world.

Some interesting examples of this type of effort are, however, in existence. One such project is under way in connexion with the installation of drainage and water facilities in cities and communities of Paraguay.

Sometimes pleas have been made for inventories of learning opportunities contributing to an awareness of the changing role of the school, the home, the community, the workplace and the mass media in the current phase of development. But as yet there is little systematic documentation relevant to this aspect of the design of learning systems. A summary of a relevant workshop session conducted in Sri Lanka is given in the Appendix to this chapter. A more careful analysis of informal learnings as they occur in the home and the community and of the role of the mass

16. Joan Carvajal and Martha E. Munzer, *Conservation Education: A Selected Bibliography*, Danville, Ill., The Interstate Printers & Publishers Inc., 1968; Joan Carvajal and Martha E. Munzer, *Conservation Education: A Selected Bibliography-Supplement*, Danville, Ill., The Interstate Printers & Publishers Inc., 1971; Disinger and Lee Beverly, op. cit.; International Union for Conservation of Nature and Natural Resources (IUCN), *Conservation Education. Papers presented at the Workshop of Conservation Education, Nairobi, 1963*, Morges, IUCN, 1965 (Supplementary Paper No. 7); International Union for Conservation of Nature and Natural Resources (IUCN), *Conservation Education and Training, Papers presented at Conference on Conservation of Nature and Natural Resources in Tropical South-East Asia, Bangkok, 1965*, Morges, IUCN, 1968 (Supplementary Paper No. 11).
17. William Burns, *Noise and Man*, Lippincott, 1969; Keith Wheeler, *Introducing Town Trails*, Vol. IV, No. 2, Summer 1972, p. 41–2.
18. Lockard *et al*, op. cit.
19. James S. Coleman, *How do the Young become Adults?*, p. 226–30, Bloomington, Ind., Phi Delta Kappa, December 1972.

media in this area of learning is needed. A new pattern of co-operative work to present environmental issues to the young, involving home, the community and the school, needs to be evolved.

A more critical analysis of documentation reveals that while it is recognized that the environment is composed of social, cultural and human factors, as well as the biophysical, a very limited sense of urgency seems to exist with regard to the former. Although there is documentation relating to the degeneration of the environment, especially in densely populated urban areas, only limited evidence exists of an active concern in presenting these environmental changes to young learners.

The concern to prepare extensive sequences of learning for the presentation of environmental issues to the young is often accompanied by a failure to take note of the nature of the young learner. This is aggravated by the adoption of limited 'efficiency' and 'performance' criteria. The result has been the emergence of learning situations about which a responsible observer has been impelled to remark:[20]

> It is not possible to spend any prolonged period visiting public school classrooms without being appalled by the mutilation visible everywhere—mutilation of spontaneity, of joy in learning, of pleasure in creating, of sense of self. . . . Because adults take the schools so much for granted, they fail to appreciate what grim, joyless places most American schools are, how oppressive and petty are the rules by which they are governed, how intellectually sterile and aesthetically barren the atmosphere, what an appalling lack of civility obtains on the part of teachers and principals, what contempt they unconsciously display for children as children.

These remarks—perhaps with an over-emphasis on some unhappy aspects behind classroom doors—may well be applicable in a wider set of learning situations than the one specifically referred to. In this context, it is very important to recognize in organizing learning sequences linked to environmental concerns in the school, in the home, in the community that every effort must be made to avoid perpetuating this 'oppression', said to exist in the classrooms, and to see that it does not permeate the other learning situations where children still find it possible to play, laugh, relax and, if they so wish, occasionally just 'stand and stare'. The design of learning sequences will need to take note of the possibility not only of bringing environmental concerns into the classrooms but also enhancing the human and social environment in the learning situations themselves—bringing into these some degree of laughter and joy, two precious elements which are closely linked to the development of wholesome attitudes that may trigger constructive adaptive action.

Many homes and community environments, even in developing countries, may have the capacity to excite wonder in children and encourage them to explore and learn, often relatively spontaneously. The question then is how can environmental learning sequences be evolved which will maintain the spontaneity of these informal tasks and will involve the young learners in environmental concerns in simple but responsible ways appropriate to their levels of growth, and their potential for learning.

The various guidelines for environmental learning do not reveal a sufficiently active awareness on the part of their designers, and those implementing them, of the need to recognize the nature of the young learner, his level of growth and his particular potential and the critical necessity of matching the learning sequences so that freedom and spontaneity in learning are retained. It is not always recognized that in many homes young children are learning many things spontaneously and much of this is highly relevant to living. In fact, as has been remarked of many such situations, learning cannot be differentiated from living. This is the essence of 'quality learning'. It is this character which is so valuable, because learning about environmental concerns must lead to constructive continuously adaptive action. There is a critical need to focus on the extraordinarily valuable resource—the learner's time—and it is imperative that, in both formal and informal situations, the child should learn with joy and satisfaction.

In presenting environmental issues and problems to the learner, it is repeatedly asserted that the learner's participation and involvement should be won in such a way that the learner not only

20. Charles Silberman, *Crisis in the Classroom*, New York, N.Y., Random House, 1970.

assimilates the facts relating to the problem, not only understands the conceptual issues involved, but also more or less spontaneously develops a continuing sense of concern and commitment to studying the problem. Ideally, he would be seeking all the while for opportunities for constructive adaptive action; even more important is the acquisition of willingness to do a number of simple things which cumulatively will have an impact on the problem. A variety of methods for the nurturing of such attitudes and values are considered in the literature, including formal and informal participation in groups and individual work in problem identification, analysis and solution.[21] These methods, to a limited extent, are usable even with young children. In the case of the younger age group, attitudes are acquired by simple but responsible participation in little things done in the home, and by seeing others perform relevant actions. The older children are, in addition, exposed to similar experiences in the extended community. Attitudes and values are often 'caught like an infection' rather than consciously taught and consciously learnt—there is an element of spontaneity in their acquisition.

If they are to produce a lasting impact sessions of learning in the school should be linked to a series of informal activities in the home and community. The learning situation should be characterized by an informal but complex team-teaching by the school, the home and the community. It is sometimes asserted that it is this multiple learning opportunity that leads to the child finding meaning and relevance in what he learns about the environment. The specific things where action is relevant may range from the simple casual throwing away of a piece of paper or some other item to a variety of activities in themselves simple but linked to wider processes of recycling of material resources or, in more subtle situations, to simple activities/behaviour that relate to aspects of the human, social and cultural environment.

The manner in which the school, the home, the community and the mass media share the responsibilities will vary widely from one learning situation to another. Those concerned in the design of learning sequences are obviously conscious of this fact, as is evident from the manner in which some of the teacher guidelines are written. But it is very rarely that one finds within this literature a careful analysis of the manner in which the responsibility for the objectives of learning are shared between the various mediators in learning. Even when such multiple learning situations are recognized, there is, as yet, no really satisfactory technique for recording the complex nature of some of these learning situations (see the Appendix). This is an aspect which requires closer examination.

In the developing world, there is often an unfortunate tendency to follow uncritically the patterns of action for the extension of environmental education that have been applied in developed countries. In the developing world, because of economic necessity, many things such as bottles, tin cans, paper, etc., are regularly collected and recycled. There is less of the 'waste' of these materials that one observes in the affluent world. It would be interesting to know what coherent efforts are undertaken to conserve these practices and encourage the young to participate in these activities with satisfaction, and often with economic profit, in the school, the community and the home. It may be that these simple and desirable activities are taken for granted and no deliberate efforts made to conserve and develop them. If this is the case, increased prosperity could soon kill these practices and extinguish these patterns of behaviour—which will have to be laboriously reinstated later! There is little evidence of early deliberate action to recognize the socio-economic parameters, the cultural traditions and the value frameworks which lead to desirable programmes for the imaginative use of materials. There are a variety of tasks in which young learners can participate in responsible activities and which have a high learning value in relation to environmental issues.

Similar comments might be made in regard to certain socio-cultural features. Among the rural people, concern for one another is important for survival. To what extent could other values and traditions of the extended family, the tribe, etc.,

21. Stapp and Cox, op. cit.

be adapted to tomorrow's problems? These questions are not often raised in the literature of environmental education.

Environmental education is not another type of education or another subject within the school curriculum, and it is not wholly a new concern in informal learning situations either. Environmental education relates to processes which involve the identification and development of values and the clarification of concepts, in order to develop problem-solving skills, both manual and mental, that will lead to an understanding and appreciation of the interdependence of man, his culture and his biophysical surroundings. Such learning aspects, when integrated into school learning sequences, will give a renewed quality with wider perspectives and an additional overtone of relevance to those sequences. When they are included in informal learning situations in the home and in the community, the results will lead to a greater appreciation of such inputs. In both cases, functionally useful programmes of environmental education must necessarily include simple skills for the young in decision-making and formulating codes of behaviour about issues concerning the quality of the environment and the quality of living.

These general goals of environmental education can, as necessary, be translated into more specific aims, and at a subsequent stage into concrete learning objectives to guide the design of instruction. The statements of specific objectives can be used as guidelines for the evolution of learning modules with all the necessary overtones of relevance, including those demanded by a concern for environmental issues. Examples of how to pursue these lines of approach are reported in the literature from several countries.[22] As already noted, the above process in curriculum development is not a one-stage operation. It must necessarily be coupled with continuous evaluation, both formative and summative, of the learner, and the outcomes of such evaluation will lead to a continuous programme of revision, upgrading and enhancement of the quality of learning sequences.

Environmental education is an integral part of general education, the latter being a complex of learning experience, relevant to and necessary for all, essential to adequacy and satisfaction in terms of personal and social needs. General education is not in itself a specialized training for a vocation or a particular occupation in life. In the context of the current paper, the following quotation from the final report of the Meeting of Experts on Curriculum in General Education[23] is relevant:

> General education is a pervasive activity associated with all phases of life. The young child participates in a pattern of general education in the home and in the community in the pre-school stage. The young adolescent pursues general education in the school in addition to learning informally in the home and in the community. The student in vocational institutes and higher education continues this general education to varying extents, in addition to, and along with, the pursuit of his vocational and academic training and education. The adult in his community continues to be exposed to forms of general education throughout life through many modes of communication and of personal and social activity.
>
> General education is sensitive to both time and place. The fact entails that programmes of general education need to be specifically designed for each context. Patterns of human living have many basic common aspects and yet differ significantly. General education must be in harmony with these various patterns and be continuously adapted to trends of change and growth in a society.
>
> The school, as a specialised agency of the community, has its particular share of responsibility for general education. The role of the school in this respect differs in some ways, depending on the patterns of social life and the stage of development of the community.

Learning about environmental concerns, then, entails integrating those aspects of environmental issues which are learnable by the young and teachable to the young within programmes of general education.

A model environmental education programme is one which helps the individual to be (a) aware of the environment and its associated problems; (b) concerned, knowledgeable, and accurately informed about those problems; (c) knowledgeable and informed about the possible future consequences of the problems; (d) engaged in clarifying values and making decisions based on attitudes and beliefs; (e) involved

22. David Lowenthal (ed.), *Environmental Perception and Behaviour*, Chicago, Department of Geography, University of Chicago, 1967 (Research Paper 109).
23. Unesco, *Meeting of Experts on the Curriculum of General Education*, Moscow and Paris, 1968.

in finding the solutions to environmental problems-alternatives, trade-offs, compromises and costs; and (f) committed to, and involved in, some type of constructive action which enhances environmental quality.

In relation to the novice learners in the youngest category in Table 1, the 'awareness' postulated may have to be very simple. It is difficult to specify the significance of the terms 'accurately informed' and 'future consequences' in relation to these very young learners. This group will be receptive if others around them are involved in environmental concerns and committed to constructive actions which enhance environmental quality. They may be ready to assume habits and codes of behaviour that would be conducive to environmental quality. For these very young learners, informal mediation by parents and peers and others around them is of critical importance. Many environmental programmes in today's world fail to reach out effectively and assist parents in providing this mediation in learning. This is an area where a more intensive search and analysis of current experience is needed and development work is imperative.

In the developed world, many of these young learners are in schools, but nevertheless they learn intensively in the home and in the community, the contributions of the latter being at least as important, if not more important, than the contribution of the school to their development and growth.

In the developing world, while considerable numbers of these children are in school, many are outside schools, but to a greater or lesser extent all are learning various things in their homes and communities.

In this diversity of contexts, how does one: (a) achieve even a simple, inarticulate and factual awareness of the environment and its associated problems; (b) enhance this simple awareness with concerned knowledge and accurate information on selected critical issues; (c) project the future consequences of these issues sufficiently vividly for the young learner to perceive them clearly and meaningfully; (d) engage the learner in value clarification and a move towards simple but significant decisions based on growing attitudes and beliefs; (e) assist the young learners in finding solutions to environmental issues, recognizing alternatives, compromises, costs, etc.; (f) support them in achieving commitment to various types of constructive action leading to enhanced environmental quality, however simple this action may be?

Once the novice learner in the earlier age ranges, for example in the primary school level, grows up to be a more experienced learner, for example in the later stages of the primary school age range, how does one: (a) sharpen awareness so that the situations are comprehended, and partly articulated; (b) enhance the concern with, and strengthen the commitment to, the search for additional accurate information; (c) strengthen the commitment to examining possible future consequences of the issues; (d) obtain a continuing commitment to value elucidation and to decision-making based thereon; (e) continuously involve the learners in finding solutions to environmental issues, becoming increasingly capable of evaluating solutions to environmental issues, considering alternatives, compromises, costs, etc.; (f) obtain an active commitment to constructive action leading to enhanced environmental quality and, as the learner reaches adolescence and adulthood, ensure that his behaviour in this respect is increasingly confident and adaptive?

In specific terms, these aspects are only tentatively examined in the current literature.

Action needed and concluding comments

The presentation of environmental issues to the young is an integral part of general education. Hence there arises the need to explore all ways of sensitizing professional groups concerned with policy formulation, design, development, implementation and evaluation of general education to the significance of incorporating environmental education issues in the curricula. Because the organization arrangements for curriculum development in schools vary widely from country to

country, and even within countries, and because very few situations provide for institutional arrangements for effecting informal learning in the home, in the community and through mass media, the particular methods of reaching out to all these mediators in learning will have to be considered specifically on a situation-by-situation basis.

Young learners, especially in the lower age range, can learn many things by participation in life activities through imitative behaviour. The actions may be very simple and relate to keeping the immediate environment clean and tidy while simultaneously disposing of temporary waste, such as paper, glass bottles, etc., thereby contributing to processes such as recycling. Consistency and regularity in doing these simple things, and the acquisition of a commitment to the continuous performance of such actions early in life, would depend on how effectively parents and adults and teachers act in these matters so as to help the young to learn. Motivating adults to carry out these actions and winning their participation in environmental concerns so that they immediately become positive models for the young is a major problem. (The problem of adult education is dealt with elsewhere in this work.)

Adults must also be actively motivated to set patterns of exploration and inquiry of a simple type which will lead to the identification of environmental issues. Such study by adults, carried out in simple situations, can promote similar exploratory study by the young on environmental situations, especially those which are often somewhat removed from direct experience.

In any given situation, some environmental issues will be more important than others; furthermore, some environmental issues will be more readily taught and more easily learned than others. Given limited resources, it must be decided which learning modules or sequences, with the relevant environmental concerns, require priority action. While taking the best possible action in the short term, a priority in the longer term is the development of a research project for identifying those learning modules with enhanced validity in the different countries and in subnational contexts.

There is an acute lack of specific research directed to elucidating the problems that arise when one starts building the required 'overtones of relevance' concerning environmental issues into learning sequences in general education. Some environmental problems are not within the direct experience of young persons and even for experienced learners a grasp of environmental problems demands the study of concepts, the capacity to interpret relatively abstract symbols, and mathematical transformations. What are the factors, both logical and psychological, which need to be explored in designing learning sequences concerning such environmental problems?

The problem of environmental education is not merely one of designing learning sequences, winning the attention of young learners to environmental concerns, or even nurturing responsiveness to critical environmental issues among young learners. For constructive lifelong action on environmental issues, the intensity of learning must be such that a definite commitment is made, leading to continuing constructive action. Exploratory research is needed as to how such 'learning intensities' can be achieved across a diversity of types of learners, learning modules and learning styles. What further exploratory actions are needed to resolve the problems in this regard?

It is essential to consider environmental concerns and issues relating to the biophysical environment, as well as the socio-cultural human environment. There is little evidence at the level of planning, programming and implementation of a balanced concentration of effort in these two areas. The importance of taking a balanced view of environmental concerns in comprehensive terms does not need to be argued. An early nurturing of the belief that 'people' are as important as 'things', and that the socio-cultural environment is as important as the material environment, is critical. An undue focus of attention on the biophysical environment alone may be counter-productive. Action to redress the current imbalance seems a priority.

An assumption that appears to be made tacitly but pervasively in the literature is that the young in schools are taken care of through school programmes and other limited types of 'extracurricular' activities. This assumption is perhaps made because of a general inertia which prompts most people to equate 'education' with

'schooling'. Even when, in principle, it is accepted that educational agencies are many and include not only the formal school but the home, family, extended community and the mass media, there is a limited follow-up of this principle at the level of planning, programming and implementation. More constructive action in this regard is likely to be stimulated by systematic analysis in each situation of the way in which these various educational agencies share responsibility for selected goals, aims and objectives of learning. An attempt to record these patterns of responsibility sharing will itself clarify the characteristics of the situation. A systematic survey of the pattern of sharing for given objectives, with the active participation of the family, community and mass media, will sensitize those mediators in learning to recognize their role vis-à-vis environmental concerns and issues, and their role in helping the young to learn.

In many of these cases, the share of the family and the community in nurturing attitudes and values may well be especially important. If this is the case, it will be vital to assist parents to enhance their competence in guiding the young to learn about environmental issues and supporting them in constructive environmental action. This may demand, even as quality schooling demands imaginative teacher education, innovative and interesting programmes of orientation and learning for parents, adults and mass media specialists in the community.

In the widest terms, it is relevant to ask whether it is not urgent and important to replace competitive attitudes, often stressing individual excellence *per se*, with co-operative attitudes and values which enable the young to perceive themselves as a small part of a larger social system, the coherent development of which is their responsibility. In this way, wide societal concerns will become a priority. We have done least well in the task of encouraging development of human values based on a recognition that we are a single species; the idea of brotherhood is not new but what is especially significant in our times is that 'brotherhood' has become a precondition of survival. Learning must become a social enterprise affirmed continuously by a concern for others. In this way, the young may learn to see beyond their own needs, the needs of the family and the nation, and increasingly recognize the importance of mankind.

Appendix
An analysis of the distribution of learning opportunities for selected life-skills in a group of villages in Sri Lanka

Food, feeding and nutrition are major national issues in Sri Lanka, as in so many other parts of the world, and the theme was selected for this reason. It was subdivided into a number of categories of life-skills. Some of these categories involved the learning of 'an awareness' of the theme; others involved acquiring 'a willingness' to do something about the problem; and still others related to the actual learning of the relevant 'skills'.

The 'learner group' considered was the 5- to 10-year age group in a number of selected villages in Sri Lanka. The selection was made on the basis of the intimate knowledge that twenty-five teacher participants in the exercise had of these villages. The participants, engaged in development work in the Curriculum Development Centre of the Ministry of Education, considered the following problem: *How do young children in the age group 5 to 10 in the village I know best learn about 'food, feeding and nutrition', considering the home and family, formal school, extended community, and mass media as the principal agencies sharing responsibility for this learning module?*

In two to three work sessions of about two hours each, the teachers considered this issue at first as individuals and, in a later session, as a group.

The perceptions of the participants were recorded, using a diagram entitled 'Life-Skills Objectives—Learning Opportunities Matrix' (see below). Participants described rural villages of a similar type. At first, they recorded their individual perceptions and the tabulated results were integrated by 'simple addition' and subsequently the group examined the composite result and modified it in the course of discussion. The final outcome is given below.

The participants recorded their perceptions of the pattern of sharing of responsibility for the specified life-skills categories and the distribution of learning opportunities in the community, using the life-skills objectives-learning opportunities matrix below.

Life-skills objectives—learning opportunities matrix

Life-skills objectives [1]	Educational agencies															
	Home and family				Formal school				Extended community				Mass media			
	I 1	H 2	H 3	F 4	I 1	H 2	H 3	F 4	I 1	H 2	H 3	F 4	I 1	H 2	H 3	F 4
Knowing																
K ; Awareness of [2]																
1. Growing and production of food, e.g. rice and vegetables	4	-	-	-	-	-	-	2	2	-	-	-	1	-	-	-
2. Harvesting, storage and marketing	4	-	-	-	-	-	-	1	3	-	-	-	1	-	-	-
3. Minimal rules for selection, preparation and consumption, etc.	3	-	-	-	-	-	-	3	2	-	-	-	1	-	-	-
4. Sources of information and guidance relevant to above	2	-	-	-	1	-	-	2	2	-	-	-	2	-	-	-
5. —																
Feeling																
S ; Willingness to consider																
1. Critical value of food in today's world	2	-	-	-	-	-	-	2	3	-	-	-	2	-	-	-
2. Enhancing productivity but conserving environment	3	-	-	-	-	-	-	3	2	-	-	-	1	-	-	-
3. Continued learning in selection, preparation, consumption, etc.	2	-	-	-	-	-	-	3	3	-	-	-	1	-	-	-
4. —																
5. —																
Acting																
A ; Initiated into [3]																
1. Growing and production of food, e.g. rice and vegetables	4	-	-	-	-	-	-	2	3	-	-	-	0	-	-	-
2. Harvesting, storage and marketing	4	-	-	-	-	-	-	1	3	-	-	-	1	-	-	-
3. Selecting, preparing and consuming food	4	-	-	-	-	-	-	1	3	-	-	-	1	-	-	-
4. Obtaining information and guidance on above	2	-	-	-	-	-	-	4	1	-	-	-	2	-	-	-
5. —																

1. For analysis, the 'learning module' food, feeding and nutrition was considered resolved into these categories.
2. In simple terms only.
3. By simple modes of helping, participation (responsibly).

Note: Analysis by Jinapala Alles (Unesco), with collaboration of K' D' Ariyadas, E. L. Wijemenne (Deputy Directors-General) ; D. Cunaratne, Kamala Peiris, Perera, A.M. Ranaweera, D. Weerasinghe (Directors of Education, Ministry of Education, Sri Lanka) ; CDC staff members. This workshop session carried out through the courtesy of Dr P. Udagama, Secretary, Ministry of Education (Sri Lanka).

Symbols used in the matrix:

K, A, S with an Arabic numeral signify the specified life-skills categories
I 1 = sessions of informal learning
F 4 = sessions of formal learning
H 2 = sessions of a hybrid type, but close to the informal
H 3 = sessions of a hybrid type, but close to the formal

Scale used in the matrix:

The approximate pattern of sharing of responsibility is shown on the basis of a scale 0 to 9: 0 signifies minimal responsibility; 9 a full responsibility; the total in each horizontal row therefore adds up to 9; a dash (—) signifies no responsibility.

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6. Environmental education at the secondary school level

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The major issues and problems confronting environmental education in the secondary school

The student sector involved at the 'intermediate level' of education

Secondary school students, at the intermediate level between primary school and university or college, represent an age group which varies according to the school system (United States, ninth to twelfth or tenth to twelfth years of study; South America, seventh to eleventh years of study; Federal Republic of Germany, fifth to tenth years of study in 'middle' or 'real' schools, or fifth to thirteenth years of study in the *Gymnasium*; Romania, and probably other East European countries, have the unified school with ten years of study divided into three cycles—primary education, 'basic cycle', and professional cycle, comprising age group 6 to 16, due to be increased to 18 years of age).

Secondary school thus includes young people of both sexes who enter school as children with a subjective, emotional disposition, who then pass through puberty, and gradually become more objective, analytical and 'scientifically' disposed. This transition is critical to the process of the development of idiosyncrasies, beliefs and disbeliefs, expectations and relations towards society. The secondary school comprises a 'selection' of students some of whom proceed to higher education for specialization in various professions, in administration, or in a teaching career.

At the primary level, environmental education would consist mainly of perceiving natural objects, dimensions, plants and animals, etc. At the secondary level, although some of the essential concepts of environmental education are difficult for even the 12- to 18-year-olds to comprehend, the more scientific-ecological, social, political and economic aspects of environmental considerations should be introduced.

The so-called generation gap is directly related to the education crisis. Both make the task of teaching environmental awareness more difficult. Students may have antagonistic feelings towards school and teachers. Many of the adults' values concepts—in a time when these values themselves are being subverted—are no longer satisfying to youth. Young people are disoriented and without horizons; to them the past is irrelevant, and the future inconceivable. Their real universe is largely made up of problems to which most teachers are unprepared or unwilling to give an answer: wars, social injustice, the nuclear threat, gross utilitarianism, racial conflicts, economic, political and cultural colonialism. 'Nature' hardly has a place in their thinking.

In developed as well as in developing countries, those in the age range of 12–18 have little experience in real life, as bill payers or employees.

This compounds the difficulty of introducing meaningful environmental education, by making it difficult to examine the concepts of public participation in decision-making, the redistribution of wealth, overproduction (or underconsumption by the poor), materialism, the value of simple things in life, the questionable value of some technological innovations. Two solutions are available: first, to get students involved in out-of-school activities, including problem-solving and community action; and second, to concentrate on basic environmental facts in the school teaching: ecology, resource depletion and distribution, population dynamics, hunger and starvation, etc. Students are citizens with rights and responsibilities. They must be positively encouraged to exercise these rights—otherwise civilization will fail.

Major problems in devising environmental education for the secondary school level

The problems involved in developing new methods to give education new relevance by establishing environmental studies as a keynote in education are of different kinds. Some are fundamental, such as the distorted man-nature relationship resulting from long-practised 'ways of life' in modern society, with its costly waste of human and natural resources. Established education tends to evade the debate between people who see themselves as distinct from nature and in absolute control of natural systems, and those who hold the man-in-nature view which makes people recognize that they are part of a much larger community than just the human one, a community whose health and survival are seen as those of man himself. That this debate is essential may be hard for some developing countries to accept, countries that, in pursuing 'material growth at any cost', are striving for just the kind of society that has produced the massive reaction of the environmental movement.

In addition, there are indications that in many school systems 'modern science' has been adopted as an educational panacea, if not a new 'religion'. This hardly measures up to the human needs inherent in the actual problems of man and the biosphere in 'only one world'. Official education too often reflects a kind of pragmatism which is influenced by the traditional economic doctrine; it is significant, however, that such a doctrine ignores the 'unrewarded chemical work of natural ecosystems powered by the sun, which should provide all baseline data for economic models'.[1]

The preceding dilemmas may partly account for the confusion in the educational world, and the community at large, about the prevailing disparities in environmental education objectives, and the weaknesses apparent in the efforts to establish environmental education programmes in schools.

To this should be added the old, interdepartmental prejudices and the inability of a majority of secondary school teachers representing various school subjects to appreciate the interdisciplinary nature of environmental issues and to move from entrenched positions defending their own interests.

At the *administrative levels*, it may prove a slow or even an impossible task to bring together experts and organize the teamwork of various educational agencies, to establish programmes with valid content and to introduce them adequately in schools. This fact often relates to an official apathy and a mistaken sense of 'economy' in securing sufficient funds for these basic cultural requirements. Wrong priorities result in a lack of research into educational needs and insufficient facilities for teacher training and appropriate teaching materials.

All too often action is limited and there is a tendency to 'muddle through', due to the absence of regional and international co-operation and co-ordination in environmental education matters.

The efforts and perseverance of the 'enthusiastic few' are not enough to overcome such obstacles. Not infrequently, pioneers in environmental education are even accused of being 'partial' or 'not practical'.

Most secondary schools are in urban settings, where students are remote from nature experiences. Especially in respect of chaotically ex-

1. Hazel Henderson, 'Ecologists versus Economists', *Harvard Business Review*, July-August 1973.

panding cities, the question arises: How to become cultivated in a deteriorating environment? The essential point in this respect seems to be the content of the environmental education programme, and the most effective utilization of the given facilities for environmental study.

It may also be relevant to mention that among secondary school youth, as well as at other levels, there is in many cases a manifest tendency to underrate human environmental problems, in the belief that such matters will be automatically resolved through expedited socio-political change. This is a serious obstacle to critical awareness; the distorting element in the thesis is the failure to recognize the real transcendence of the environmental crisis as a composite problem in which ecological and sociological aspects cannot be separated.

Special mention should be made of the extreme shortage of graduate teachers for secondary schools in some countries, a dilemma which is often aggravated by the hiring of unqualified personnel. In addition, many schools have too many students per teacher (fifty, sixty or more). In Venezuela, teachers have successfully demanded that the number be limited to forty students (in the Federal Republic of Germany the average is twenty-six students in secondary schools).

School drop-out is another serious problem. The case of Venezuela may be indicative for a number of other countries with similar conditions: in primary schools about 70 per cent of the pupils abandon school at some stage during the six-year term, while in secondary schools there is a 40 per cent drop-out rate. In the Central University of Venezuela (Caracas) in 1974 there was a drop-out rate of 35 per cent, mainly during the first two years of study. The reason for primary and secondary school drop-outs is primarily critical social conditions, poverty and early parenthood.

Biology is not the best basis for environmental education

The commonest method of placing environmental studies in secondary school curricula is through the biology syllabus. But according to a survey made in 1972 by the Council of Europe, biology was 'the subject least often studied and the first to be excluded from an overcrowded timetable at secondary school levels'. Most European countries give priority to intellectual skills and habits associated with biology, but only in the United Kingdom and France was high priority given to the investigation of unknown species and the design of simple experiments. The survey disclosed that only a small amount of exploratory practical work was done in most countries. Among the Member States of the Council of Europe, aesthetic appreciation of nature occurs explicitly only in the curricula of the Federal Republic of Germany and Austria. However, in Belgium, France and Sweden, understanding of nature and respect for life are not an aim of biology teaching.

Analysis of the structure and content of biology syllabuses showed how little time is spent on ecology and ethology as a means of achieving the goals of environmental education (Fig. 1). The results of a 1974 questionnaire circulated among the council's member States revealed insufficient provision for environmental education and a number of difficulties confronting the individual teacher. The outcome of the inquiry on the use of gardens, nature trails, zoos and field centres indicates that the situation is encouraging in a few countries, but deplorable in others (Fig. 2).

Implementing environmental education in the secondary school

Suggested guidelines and objectives for environmental education in secondary schools

At the secondary school level, environmental study merits recognition as a permanent co-ordinator of the otherwise fragmented curriculum. Environmental education should not be considered as another 'subject' competing for a place in the existing school programme, but as a

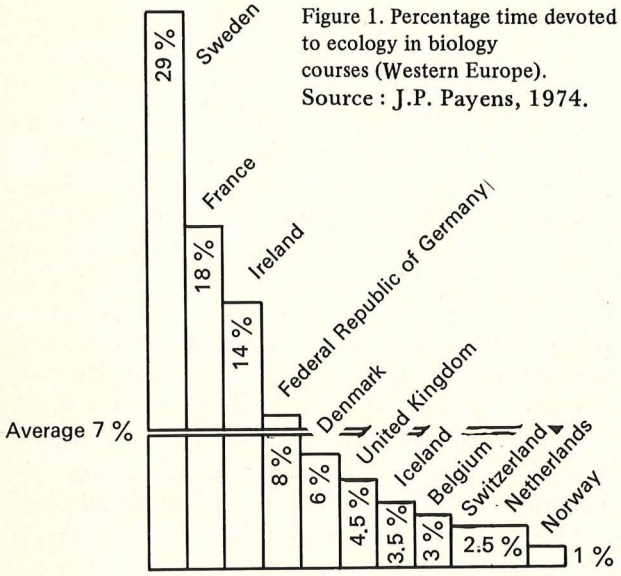

Figure 1. Percentage time devoted to ecology in biology courses (Western Europe). Source : J.P. Payens, 1974.

means of providing some unity to the educational process in the minds of the learners. Environmental education can be an effective tool for reorienting the whole concept of teaching and learning, and for 'humanizing' education.

Students must see clearly why they should be concerned with the environment. It is necessary to relate long-term ecological-environmental aims to the short-term interests of individuals. They should be enlightened as to how the environmental difficulties have already affected our lives in an already degraded environment; merely predicting future problems and hardships might lead students to respond with an implicit 'so what?' attitude.

It is essential that encouragement be given to greater participation and integration by parents, pupils and teachers with a view to co-operation not only in school matters but also in other community problems. This is one of the main aims of environmental education, i.e. that all should tackle the problems together and work towards their solution. Thus, in linking up more closely the different groups, the secondary school can play an important role in narrowing the 'generation gap' between adults and young people.

Environmental problems are apt to be approached on the basis of human communities in their relations with the natural environment. Environmental education at secondary level should help to eradicate the individualistic scale of values and foster the development of values based on the interests of the community.

Teachers can explore the environment with students, both intellectually and practically, in order to obtain both the factual knowledge (the cognitive domain of an attitude) and the motivating concern (the affective domain of an attitude) regarding man's relationship and responsibility within the ecosystem.[2] The aim should be to stir students' initiative, involving them in problems and experiments. This should promote 'environmental imagination' eventually leading to environmental modelling. What will happen if we do this or that? Besides students' commitment, environmental education should strive for students' enjoyment in learning.

Educational authorities in each country should adopt a working definition of environmental education, with clearly understood terminology, as a guide and basic working tool for educators. The major task will be the development of environmental education programmes and methodology. Programme content should be structurally related to attitudes and values perception. Instead of examination-oriented memorizers, the secondary school should develop ecological thinkers with open-minded attitudes of social responsibility. Students' inquiry should be stimulated, not suppressed. Educators must not ordain what their pupils' mental disposition and behaviour should be, but 'motivate them to make decisions based upon consideration of economic, political, technological and social factors, keeping in mind the importance of environmental and social quality' (Swann, 1970). As to the key word 'attitude', a definition suggests that attitude consists of three components: (a) cognitive or knowledge; (b) affective or feeling; and (c) action tendency or readiness to act (Katz, 1960).

The content of environmental education programmes for secondary schools need not be too technical and scientific. Environmental issues are

2. Robert S. Cook and George O'Hearn, *Processes for a Quality Environment: A Report of the National Conference on Environmental Education*, Green Bay, Wisc., The University of Wisconsin, 1971.

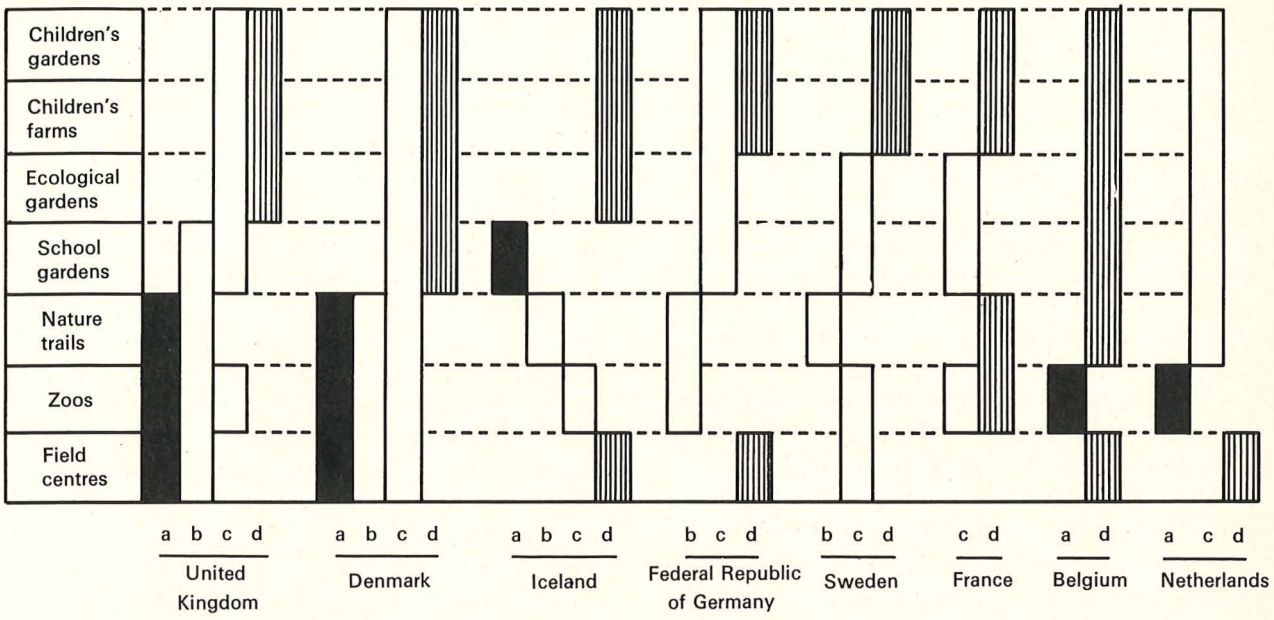

Figure 2. Use of gardens, nature trails, zoos, and field centres in Western Europe. Source : J.P. Payens, 1974.

not the province of the 'expert' scientist or technocrat; they are manifest in everyday events. Most of the ingredients of environmental understanding can be absorbed without recourse to the laboratory bench. The benefits of environmental education are practical and help us to live our lives in a meaningful and more satisfactory way.

Environmental education is: (a) problem-centred; (b) interdisciplinary; (c) value-oriented; (d) community-oriented; (e) concerned with man's survival as a species; (f) based on student-initiated activities and involvements; and (g) present- and future-oriented.[3]

Response to the environmental situation by educators must be radical. For instance, we might eliminate the distinctions between courses labelled art, music, photography, poetry, sociology, and place them in a larger, trans-disciplinary unit called perception. All curricular divisions should be thus evaluated.[4]

Within general environmental education, guidelines should be defined with alternatives that may be applicable to individual learning situations, such as are offered in communities or countries with different social and cultural backgrounds. Environmental education should not only take care of cultural values and traditions of groups and nations, but it should help to rescue and revalue them in those cases where foreign influence has neutralized cultures, and sometimes destroyed them.

As for 'rural' and 'urban' school situations, urban youth should be more 'ecologically' and rural students more 'sociologically' educated. This would apply equally to industrial and agrarian societies.

Education reform geared towards the human environment implies a revision of national policies and priorities, with new impetus from the higher echelons of government. A useful measure would be the convening of national and international forums for education, with the participation of ecologists and environmental activists.

3. Cook and O'Hearn, op. cit.
4. ibid.

Comprehensive programming of environmental education for the secondary school level

Programmes for environmental education should be structured with a clear view to the following considerations: (a) they should be based on scientific knowledge; (b) they should combine the problems of the natural-physical environment with those of the social environment; and (c) they should teach the individual how actively to help preserve and improve his environment, and to maintain this attitude through life.

This implies sound, elaborated, well-co-ordinated, ambitious and at the same time realistic programmes, to be applied through (a) co-ordination between the basic sectors, including public information, school education, and out-of-door education and activities; (b) phasing of the programmes from awakening interest and providing information, through the teaching of skills and practice in decision-making towards the final formulation of a code of behaviour and involvement in action; (c) adaption to educational levels (vertical integration) with co-ordination between separate subject areas within each level (horizontal integration), bearing in mind particularly the specific areas of professional interest and the involvement of those whom education has to reach (Čeřovský, 1971).

Programmes for the secondary school level should make students aware of the environmental facts which are important to them; they should perceive the physical, biological, economic, political, social, cultural and aesthetic issues inherent in environmental problems.

Motivation, as a basic aspect, can only be achieved through a wide range of education experiences. These should include first-hand experience through various practical, mainly out-of-door, activities: animals, exhibitions, audio-visual resources, and wherever feasible, conservation demonstration farms.

The above should be rounded out by arranging frequent talks by experts in different fields, followed by discussion. All programming should be adapted to the needs and possibilities of different communities to fit individual situations and students' backgrounds.

Each school could have some environmental project going on. Teachers can stimulate and guide student interest groups or action groups, organized in 'study centres' to form leadership in the environmental field. Participation in local, national and international contests in connexion with environmental issues should be promoted.

Programme content for environmental education in the secondary school should cover the following: landscape, topography, geology, pedology, and climate; the ecological relationships of the plants and animals naturally present in their habitat; man's use of the natural environment through agriculture, horticulture, forestry and other forms of land management: the inland and marine water environments, and the exploitation of their resources. Urban environments should be considered in terms of the possibilities which exist for appreciating real environmental problems in cities: city planning, architecture, pollution, traffic, solid waste, consumerism. Learners should acquire a thorough awareness and appreciation of the natural and man-made surroundings, and of the environmental dangers that they are exposed to.

The secondary school student and future participating citizen should be confronted with such topics as: the problems of population growth, and the meeting of human wants—food, housing, health, education, work and cultural resources; the finite nature of the earth's resources, depletion of resources and economic growth; recycling, obsolescence, inequality of wealth distribution, poverty, starvation, warfare: individual responsibility for the foregoing.

The 'population' topic needs a follow-up in sex education and responsible procreation. The fact that these questions do not receive adequate attention reflects the narrow interpretation placed on environmental matters.[5]

The question may arise of how far to go, how to avoid provoking anxiety in young people when analysing the social root causes of some environmental problems?[6] Unfortunately, many of

5. Peter S. Berry, *National Survey into Environmental Education in Secondary Schools*, Walton-on-Thames, Surrey, The Conservation Society/Conservation Trust, 1974.
6. Terry R. Armstrong (ed.), *Why Do We Still Have an Ecological Crisis?* Englewood Cliffs, N.J., Prentice-Hall Inc., 1972.

the implications of the environmental problem are unpleasant and far-reaching. Do we have the right to withhold such information from the very people who are likely to be living in conditions resulting from the decisions and actions we are taking at the present time?[7] It will depend mainly on the preparation, the talents and personality of the teacher, how these complex questions are treated in each particular situation. Open discussion appears to be the only rational procedure.

Programming is closely related to evaluation. How do we know that the desired learning has occurred? Since the aim of environmental education is to produce awareness, critical thinking, and attitudes manifested in behaviour, the method of evaluation would be to measure behaviour implicit in students' responses to environmental problems, and to recognize future implications. A more ecological indicator might be an evaluation of the actual improvement of the environment—beginning with the school premises—as a result of environmental education. In many countries, environmental improvement would consist mainly of stopping the impairment of nature and natural resources.

Programming also relates to the question of status of environmental studies, and examination successes in secondary school, in connexion with university entrance requirements and future employment. The universities tend to demand a purely academic approach to school subjects, based on books rather than real life. Environmental education is too practical for university examinations, at least in most countries. It appears that this question should be elucidated in conjunction with the adoption of those environmental teaching methods regarded as the most fitting for each situation. It might then be easier to decide whether the status of environmental education can be raised by the introduction at certain levels of suitable examination syllabuses.

As to the values at present prevailing at the secondary school level, parents tend to attach greater importance to the passing of examinations than to other more far-reaching aspects of their children's education. If environmental education subjects were included in secondary-school examinations, parents would also become more interested in this theme. The problem might also be overcome by establishing close links between the family, school and students. An example is furnished by Cuba, where the secondary school in the countryside is an integral part of a process that benefits the whole community, local and national, since students, in addition to their normal courses, carry out agricultural work. Thus community participation in the school is achieved in a natural way, since the school shares the community's problems and the community supports the school in all its needs.

As for the vocational significance of environmental education, there is a negative aspect in that the capitalist economy has been fundamentally 'anti-ecological', with jobs somehow connected with commercial exploitation, with producing more and more consumer goods, advertising them and selling them to people (who often did not need them). However, ecological and biological specialization is one possibility, and practical vocational instruction such as in forestry or agriculture or water supply is another. Through the increased efforts towards pollution control and environmental protection many more jobs will be created with relevance to environmental aspects of contemporary life.

Strategies for curriculum development

There are various possibilities that might be considered for implanting environmental education in the secondary school:

1. *Environmental studies as a special subject*

The introduction of environmental studies as a special subject, 'in its own right', taught by a specially trained teacher (or by a team of teachers) would appear to be the easiest method. The fears expressed by some teachers of conservation and ecology that through the 'integration' or 'infusion' method the subject might be lightly regarded and become diluted, would be obviated; the unity and cohesion of environmental teaching would be ensured. The new course would have a

7. Berry, op. cit.

status equal to other subjects, and lead to examinations. (The argument of an 'already overcrowded curriculum' strikes one as a pretext or a sign of apathy in view of the fact that curriculum renovation is generally overdue.)

The problem is that there may not be any true 'educational renewal'. Students may take the new subject as 'one more change' and be averse to it from the beginning. Learning in other, traditional disciplines may contradict and counteract environmental teaching. Possibilities for practical activities may be minimal, and students be little motivated towards the real human and social objectives of environmental study. Teachers of other subjects, and the school as a whole, would remain detached. In cases where environmental education is fully integrated into primary school, the 'special subject' system in the secondary school could be an educational setback.

2. *Environmental study units ('themes') in standard subjects*

This method has already been widely applied, mainly with respect to biology courses. However, to make environmental education more effective, the 'units' method should be more widely used in other subjects like geography, physics, civics, history, etc. Since the space allowed in the syllabus for such units is only a fraction of the school year, they should be planned for the whole secondary school term (usually five years). This method may avoid major administrative problems.

The risk of discrepancy and contradiction pointed out in Option 1 may still persist, as may the difficulty of organizing environmental conservation activities. It seems likely that units of environmental study could be taught efficiently only in those schools and by those teachers who have a strong commitment towards this field. In most cases, the teaching of units may tend to be incidental and may not achieve relevance to the real problems of a student's life and practical environmental issues.

3. *Integration of concepts of environmental study into secondary school programmes*

Environmental teaching could be integrated into subject areas most closely related to the environment, especially sciences and social studies, in all the school grades, through a variety of environmental units and not just one. This method, if thoroughly applied, would approximate to the reform thrust and is actually being used in some countries. It means a reorganization of the conventional subject curriculum, and requires co-operative work by teachers.

Careful planning is necessary in order adequately to relate environmental studies to the various subject areas (which may retain the existing subject titles). The choice of content material to be included and the method of presenting it are of great importance. The danger exists that in some cases environmental education will be 'dragged down' by incompetent teachers. In countries where there is no background of environmental education programming in schools, the first phase of the 'integration' approach might be to establish some such body as a national advisory committee on environmental education (Stapp, 1971).

4. *Integration of environmental study units, or of concepts, into existing subjects, and a special course on human ecology*

This would be a combination of either Options 1 and 2, or of Options 1 and 3. Considering the weaknesses of the 'units' approach, and possibly even of the 'concepts inclusion' approach, such teaching methods may be strengthened through a course on human ecology as a special subject in the curriculum. Its content should be primarily the social, economic, political and cultural issues and aspects of the environment. Such a course might also serve as a complementary and unifying element in the otherwise rather incidental or fragmentary study of the environment. The human ecology course might be planned for at least part (say, two or three years) of the five-year term of secondary education.

5. *Complete curriculum reform*

The establishment of environmental education through complete renewal of the school curriculum has long been sought by social and political reformers in many countries. The total reform would make it possible to structure a creatively and functionally designed programme, which

would incorporate the best theories and methods of learning, including practical work. This could open fundamentally new perspectives for youth and, incidentally, improve the student-teacher relationship.

In the first phase of this reform, a preliminary and necessary step would be the establishment of a national committee on environmental education (see above) to be composed of respected and competent individuals concerned with environmental education for youth and sensitive to the various segments of the population. They should possess expertise in one or more of the following areas: curriculum design, educational research, school administration, psychology, social change, industry, economics, planning, ecology, political science, business, law, communications, medicine, human ecosystems, sociology and teaching. Young people should also be represented on this committee. In addition, a national professional staff should be formed to work directly with the national advisory committee. The committee and staff would review research activities relating to environmental education, examine existing programmes, develop a model environmental education programme and work with appropriate institutions to prepare a proposal for training environmental education consultants.

The second phase might consist of developing guidelines for establishing environmental education programmes to be initiated in a number of selected 'pioneering' school systems, then developing content material and instructional aids to be used in such systems; and finally, developing an instrument to evaluate the effectiveness of the environmental education programmes, and communicating with the individuals being trained as environmental education consultants.

The third phase might be to activate and evaluate the model environmental education programmes in the selected school systems. During this period, the national professional staff could continue to develop and disseminate content material and instructional aids, and assist consultants in evaluating the programme (Stapp, 1971).

It should be added that education reforms based on the introduction of new school systems and teaching methodologies are actually under way in different countries. The environmental education reform approach would be based on such an entirely new programme structure determining educational methodology and practice. The cardinal point, however, is the programme content.

Teacher preparation

If environmental education is to be successful, open-minded teachers with a new view of their mission and with environmental imagination will be needed. This will require: (a) the training and selection of teachers; (b) ecological-environmental studies as a fundamental subject in the training of all teachers, whatever their special field (pre-service); (c) continued in-service supplementary courses for teachers, as well as for teachers who have recently graduated (updating of knowledge); (d) the preparation of a core of teachers in ecology and environmental science, to provide leadership in this field. In-service training should include members of the school council, supervisors and administrators.

Teachers should study the relationships between man and his environment at their own level of inquiry and explore the contributions which their subjects can make in this field. They should also be given encouragement, technical assistance, and funds for individual inventiveness to support the development of their own teaching materials. In addition, teachers should practise what they advocate.

What restraints might confront environmental education at the secondary school level?

There may be difficulty in reaching agreement about the purpose of education. Should it aim at preparing young people for a better understanding of their place in the world, and to play a responsible part in future society, or merely provide them with the training necessary for earning their living?

It may be difficult to reach a national consensus at all levels with respect to the common objec-

tives of environmental education. Yet this would be necessary before educational reform based on new policies and an empirical philosophy of the human environment could be adopted as a rational goal.

There are conflicting concepts of the true human objectives of 'progress' and 'development' in relation to environmental issues (environmental conservation and ecology being labelled as 'anti-economic' and 'opposed to progress').

There is a struggle in many countries over budgetary priorities, and a chronic shortage of funds for educational reform.

Educational systems are often even more inflexible than economic systems. Much of this is due, among other reasons, to the 'closed shop' attitude of the teaching profession.

There is a quasi-monopolistic control, in some countries, of modern mass media, such as radio and television, which indoctrinates youth in gross materialistic consumerism.

Summary

Environmental education in schools responds to an urgent need to help resolve pressing human problems on a global scale. It not only receives different emphasis in different countries, but there are also some signs of 'dilution' of environmental education, due to a lack of awareness or of a deliberate choice on the part of government authorities and teachers. A major problem confronting environmental education is implicit in the fact that, in some cases, educational authorities, heedful of the persistent public demands for educational reform, are 'restructuring' school systems but avoiding fundamental changes in the curriculum.

The cardinal point in environmental education reform is considered to be the programme content. Environmental education should thus be a catalyst or common denominator in the renewal of contemporary education. One of the aims is to give the school back to the community, and bring the community into the school.

The response of the student sector and most teachers may be favourable to the environmental education reform thrust once they become aware of its merits and its urgent importance to real human interests in 'only one world'. The achievement of this awareness may require special national and international actions. There might be a need for some kind of sustained campaign for 'environmental education for human progress'.

The practical problems of developing and implementing environmental education in school would seem to be by no means insurmountable; they refer primarily to teacher preparation and environmental teaching media, both qualitatively and quantitatively appropriate to the needs of individual nations. Some countries will depend on outside help to organize their environmental education projects. Even in those countries where up to now nature conservation and ecology have received no official support beyond lip-service, there exist groups of respected and competent experts and teachers who can integrate the task forces of environmental education in their communities.

National educational authorities should not be too faint-hearted in adopting environmental education reform in school. There are various strategies for this which should be analysed for their viability. In some countries, the 'total reform' approach might appear to be no more than a desideratum for the time being; yet piecemeal action offers meagre prospects and much may be lost in terms of time and educational possibilities.

Some major issues identified in the preparation of this chapter

Some definitions of environmental education are so comprehensive as to be excessively vague.

In some cases, every subject in the school curriculum has been labelled as environmental education, though usually the essential elements of environmental studies are nowhere

included. This is a dilution of environmental education by educationists.

Environmental education rests on a basic incontrovertible foundation, which is ecology, and builds towards an environmental ethic. This is the greatest inbuilt advantage of environmental education as a humane and experimental form of education. Once the individual has understood the essence of ecology, he possesses a clear guide for many of his thoughts and attitudes in life, and can build a personal environmental ethic.

Students feel that they are being 'artificially' prepared or conditioned to fit into a questionable society. Some countries, not only the developing ones, tend to prepare youth for a kind of mechanistic-technological world, with continuing growth, which they might never see because it is unlikely that adequate resources can be found to sustain permanent growth. The aim of growth, in human society, should not be seen in maximizing growth (the quantitative aspect) but in optimizing it (that is, quantity plus quality), as in a natural ecosystem.

The resurgent, unremitting insistence upon national sovereignty, which can be noticed in some regions in connexion with economic political affairs, may easily spread over to cultural matters and hinder environmental education efforts.

Environmental education should help to offset the often negative effects of some 'modern science' teaching which is a cousin to bad science fiction and produces havoc in the minds and in the sense of proportion of many young people.

Existing education in the conservation of nature and natural resources and traditional outdoor nature appreciation activities maintain their importance, especially in developing countries, but are insufficient for creating a viable environment for all human endeavours, now and in the future. Everywhere, environmental education can assist in developing an entirely new life-style.

The treatment of socio-economic and political aspects in environmental education—besides the natural-physical—should include the harder facts of real life, or environmental education will defeat itself (as traditional institutional education has done up to now). However, if those factual elements are used for political partisanship or demagoguery, environment education may defeat itself just the same.

The vocational significance of environmental education has several aspects: environmental education is too practical for existing university examinations, and has been underutilized in vocational training, at least so far. Nevertheless, environmental education is more fundamental to human existence than either, and is sometimes in conflict with both. As already pointed out, much more opportunity for work in fields related to the environmental problems should be created.

Different types of situations exist in countries throughout the world with regard to the scope of secondary education, ranging from those countries in which it is obligatory and effective for the great majority of young people of that age, to those where the proportion of children in secondary school is minimal, either through abandonment or simply because they cannot gain access to secondary courses. This variety of situations has various consequences for implementing environmental education. For instance, in countries where the secondary school population is very low (e.g. Kenya, etc.) examinations assume an excessive importance.

The problem of teacher preparation and the shortage of graduate teachers require a more thorough analysis. Whereas at present an ordinary 'indoctrinated consumer and materialist' (graduate) is allowed to teach from his or her point of view, quite often the unqualified personnel from outside, such as conservationists from voluntary organizations, may be just the people needed in environmental education (admittedly, they are not adequate substitutes for professional teachers in conventional subjects). These environmental activists might be called upon to contribute their experience to environmental education. Of course, these inputs should be followed up by teachers to the best of their ability.

Environmental teaching through the traditional school curricula may produce educational renewal, or it may corrupt environmental education itself. 'Defending our sacred soil' and 'soil conservation through erosion control' are both environmental notions, leading to entirely different beliefs and attitudes.

Other subjects have tended to 'jump on the environmental education bandwagon'. In some cases, every subject in the school curriculum is being labelled as 'environmental education', though the essential elements of environmental education—human ecology, social concerns, problems approach—are nowhere included. This is a dilution of environmental education by opportunist educationists.

Disparity in efforts in environmental education in different countries is obvious and may be attributed to socio-economic as well as traditional causes. Yet while the processes of material, industrial-technological development are being accelerated to only a certain degree, in education there is no reason for delay, provided adequate funds and co-operation are forthcoming.

List of recommendations concerning environmental education at secondary school level

Recommendations 1 and 2 originated at the European Working Conference on Environmental Conservation Education, IUCN, Rüschlikën Switzerland), December 1971.

1. 'All children during their secondary schooling should be provided with a scheme of studies designed to achieve the social and scientific objectives implied in the IUCN/Foresta definition of environmental education. The methods adopted to achieve these objectives should be appropriate to the educational structures of the countries concerned.'
2. Co-ordination at the national level:

   'There should be created at the national level, in countries where such structures are not yet in existence: i) a Centre of Information and Research on the Environment with the objectives of stimulating the activities of centres which are currently working on environmental problems; of subsidising and/or undertaking environmental research; of co-ordinating information and of providing the essential basic data for decision-making; and of promoting integrated studies on the environment. ii) a Regulatory Structure to function between the proposed Centre and the bodies carrying out the work, conceived in such a way as to influence the processes of decision-making.

   'Governments should arrange more thorough consultation with interdisciplinary groups of experts working in the environmental field as well as making use of the services of environmentally trained academics, and governments should pay more attention to the interventions of groups or associations concerned with the improvement of the quality of the environment.'
3. The establishment of a continuing programme of environmental education in each country should be backed by: (a) an internationally agreed-upon policy basis; and (b) by practical co-operation. As to point (a), the aim should be to get as much firm agreement as possible by focusing on a few carefully selected vital common problems (the environmental crisis is of global extent; the biosphere knows no sovereign autonomy, no sovereign lines of power and jurisdiction; all nations contribute to the environmental problem; the environmental free-ride complex is universal; etc.).

   As to point (b), the following items of Recommendation 9 of the Biosphere Conference, Paris, 1968 should be considered:

   'The posting of experts from Unesco and other United Nations and international organizations concerned, to assist projects to help the training of teachers in developing countries, by working with local counterpart staff, and to provide funds to support such projects.

   'That Member States make every effort

to set up or improve environmental education at the primary and secondary school levels, by collecting, producing and disseminating a comprehensive range of suitable educational aids (including textbooks, regional ecological studies, filmstrips, teachers' guides and similar materials), and

'that Unesco and other United Nations and international organizations concerned should assist these activities by helping to provide materials, information, advice and expert assistance, and by keeping Member States informed of national and regional developments in this field.'

4. Each country should adopt an environmental education law, preferably supported by an environmental protection law.
5. Countries should adopt one of the available strategies for establishing environmental education in secondary schools as outlined in 'Strategies for curriculum development', preferably the 'complete curriculum reform'. An alternative for transition, in the case of developing countries, may be the method of 'integration of environmental concepts into existing subjects, plus a special course on (human) ecology'.
6. Local authorities should appoint advisers in 'environmental studies' and should provide ample opportunities for teachers to attend special courses designed to encourage the development of environmental awareness.
7. Examination boards should consider their requirements to see what modifications are required to bring out the environmental implications of existing subjects, or what new subjects are needed.
8. In all countries, especially the developing ones, environmental radio and television programmes should be established on a continuing basis, and should be co-ordinated with the school programme.
9. In connexion with the training of teachers in developing countries (Recommendation 3, point (b)), the availability of existing training centres and the possibility that some of these may serve as regional teacher training centres should be urgently studied, taking advantage of all possible technical and scientific co-operation that can be given by international organizations.
10. The possibility of a plan for the preparation of a *Source Book of Environmental Education for the General Education Level*, as set forth by the Arab Educational, Cultural and Scientific Organization (ALECSO) in co-operation with the United Nations Environmental Programme (UNEP), Cairo, April–May 1974 (ALECSO Project No. 3.2.4; UNEP Project No. 0301–73–006) should be examined. This might be especially important for, and regionally adapted to, the needs of developing countries.
11. With respect to 'underdeveloped countries': Although these no doubt exist, it may not be necessary to overstate this aspect since it seems that in environmental education all nations are underdeveloped. Rather, in the case of environmental education there might exist a common ground, or starting point, for one concerted, universal human effort.

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7. Environmental education at the tertiary level for general students

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This paper is concerned with the need to introduce the concepts of environmental education into the academic programme of general students at university level and the problems that this poses. It is recognized that the term 'general student' does not have the same meaning in all countries; e.g. in both Eastern and Western Europe students are enrolled in specialized programmes, whereas in North America many take a generalized liberal form of academic programme. The following remarks, however, are about those students who are not enrolled in a programme dealing directly with a specialized area of environmental management or research.

Environmental education is a relatively new concept. Very little was written about it prior to the 1960s, and this lack of literature reflects a fundamental lack of concern. The modern university has evolved over several centuries. Its traditions are firmly rooted in the past. Its general reason for being was set forth long ago, and changed little until recently. Thus, it is natural that it should prove difficult to introduce a new concept such as environmental education into universities on a broad basis. It is the classic case of a new concept encountering a well-established, rather old and traditional institution.

While the fervent emotions of the late 1960s and early 1970s have calmed, the need to incorporate the basic philosophy of environmental education into tertiary systems remains strong. Just who has put together the 'right' programme or devised the 'right' course should not preoccupy academicians. The results of the study conducted by the International Institute for Environmental Affairs (IIEA) indicated a large number of different programmes under the banner of environmental education: the report describes more than 1,100 programmes in approximately 750 institutions in 70 countries.[1] The approaches described vary from single courses to highly complex programmes to the entire curriculum, and they focus on many different facets of environmental education. Some of them reveal a traditional emphasis on natural resources, an approach often designated 'conservation'. While such programmes are extremely valuable, the addition of the word 'environment' does not make them interdisciplinary, problem-focused, or community-action-oriented.

The large number of respondents to the IIEA survey does reveal that a concern for environmental problems has brought at least some response from many universities and a serious in-

1. Philip W. Quigg, *World Directory of Environmental Education Programs*, International Institute for Environmental Affairs, Xerox, 1973.

depth attempt on the part of an encouraging number of them.

University development

Universities began as institutions to train the élite of society. They were places where religious leaders and the nobility could retreat. Their principal concern was with improving certain technical skills of their students such as mathematics or languages, together with a review of various theoretical or speculative subjects.

Over the years, universities in all parts of the world were greatly influenced by this origin. They tended to remain élitist. Their students came largely from the more affluent classes. Universities remained retreats from society, as far as the students were concerned.

Prior to the 1960s, universities and university departments tended to be staffed by individuals interested in rather discrete disciplines. The disciplines tended to be cognition-oriented as far as the educational process was concerned. There was a strong emphasis on the events and the knowledge of the past. Curricula were prescribed. There was little option or choice for a student. And student-initiative education was virtually unknown.

The emphasis upon the disciplines was so great that in some instances students were precluded from taking courses outside their field of study at any advanced stage. What was required was a rigid memorization of information obtained from a single discipline.

One notable exception was in the area of the conservation of natural resources. Many universities in the developed countries had, in their natural science departments, at least one course, and in some cases whole programmes, on conservation, or the wise use of our natural resources. These courses tended to be moderately interdisciplinary and problem-focused, in that they included material on economics, politics and social attitudes as well as biophysical topics. However, the conservation programmes tended to concentrate on natural resources and did not encompass the human element or the man-made environments.

Perhaps the major unanticipated change that occurred in universities around the world in the 1960s was the tremendous expansion of higher education to include new kinds of students. A substantial number of autonomous universities were created in Africa and Asia. New universities appeared on all continents. And existing universities greatly expanded in terms of numbers of students. For the first time, many universities were enrolling a reasonable cross-section of the population.

The 1960s also brought the ugly spectre of major environmental disaster. Demands for improved air quality arose in cities like Tokyo and Los Angeles. Water supply and quality became a serious concern in many parts of the world. Agricultural surpluses turned into agricultural shortages. The possibility of mass hunger and starvation in the next few decades became a serious threat. The grave consequences of pumping chemicals into our environment became evident to all who could observe. Environmental problems were becoming too large to ignore.

Institutional change

It was in this situation that environmental education was first put forward as a major approach for many universities. Many professors modified their course syllabuses and included a variety of environmental examples. But far more significant changes took place as well. In a number of universities, professors from a variety of disciplines got together to develop new environmental courses or small optional programmes. The professors retained their permanent positions in their respective departments, and the environmental education part of their responsibilities was simply tacked on, or substituted for some other part of their normal teaching load. From the student's point of view, these environmental

education efforts were merely additional elements of the university's programme from which they could pick and choose.

A more substantial response to problem-oriented and environmental education concerns occurred at a smaller number of universities. Here, separate institutes or centres were created within the established university, having their own faculty or staff. Flexibility was achieved in part by the fact that these new institutes or centres had considerable autonomy from the rest of the institution so that their students could take specially designed courses of study, and their professors were free to experiment widely.

Finally, in a few instances, complete new universities were organized on the environmental theme. This type of organization brought the greatest degree of flexibility, and the greatest possibility of experimentation. Regardless of the particular professional application they intended to make of their education, students were assisted in thinking in environmental terms, and analysing problems from an environmental perspective.

Established universities found that it was difficult to introduce substantial innovations. Therefore, there was a natural advantage to organizing separate institutes or centres. Similarly, where new universities were being established, there were better opportunities to experiment with problem-oriented education as an institutional focus. Thus, it is not surprising that the major initial experiments in environmental education in Europe and North America occurred at either new universities or at newly established centres and institutes which had a substantial degree of autonomy from the rest of the institution.

Such a centre was established at the University of Tours in 1969 to provide a programme in environmental planning. The Centre d'Études Supérieures de l'Aménagement (CEAS) is an interdisciplinary centre of the University of Tours with an independent programme. The programme provides two cycles of two years each. The first cycle is primarily devoted to data relating to the environment and to the nature of man, data relating to human activities, functioning of the biosphere, of ecosystems and of man adaptation, and acquisition of various working tools. In the second cycle, emphasis is placed on environmental planning and protection, human ecology, and a special student project.[2]

More general in nature is the programme that evolved at the University of Waterloo in Canada. Organized in 1959, the University is a relatively new institution. The division of environmental studies first set forth its programme in 1969 and now has the status of a faculty. Most of the environmental work of the division is carried out through the Department of Man—Environment Studies. In the early years of its existence, this department had only ten full-time faculty members, and an average of sixty students entering each year. None the less, it provides an alternative education, in the form of environmental education, for the students at the University of Waterloo. With the central theme being man-environment inter-relationships, it emphasizes the biophysical, socio-economic, and man-made physical environment, as well as systems theory. A bachelor's degree in environmental studies can be obtained.[3]

A somewhat different approach was tried by the University and Technical Institute of Lund. Its environmental studies programme was initiated in 1969 for the purpose of handling the interdisciplinary teaching in the environmental area that was of concern to the university as a whole. Its programme is governed by a body comprising representatives of all the faculties of the university. It has both a shorter and a longer component—the shorter equivalent to about 10 weeks of full-time work, and the longer equivalent to about 40 weeks of full-time work. The Lund programme, like those at the Universities of Tours and Waterloo, emphasizes practical involvement with environmental problems. It has a very small teaching staff of its own, relying upon other effectively the field or discipline of their greatest expertise—usually some aspect of science. On a

2. For description of CESA at the University of Tours, see OECD, Centre for Educational Research and Innovation, *Environmental Education at University Level: Trends and Data*, p. 179–85, Paris, *1973, and OECD, Centre for Educational Research and Development, Environmental Education at Post Secondary Level: The Training of Generalists and Specialists*, Vol. 1, Paris, 1974.

3. On the University of Waterloo's programme see OECD, *Environmental Education at University Level . . .*, op. cit., p. 155–9; and OECD, *Environmental Education at Post Secondary Level . . .*, op. cit., Vol. 1, p. 31–45.

professors at the university, or special staff recruited for particular parts of the work. The environmental studies programme plays a supplementary role, rather than leading to a separate degree.[4]

In contrast to the programmes at Tours, Waterloo and Lund, the programme at the University of Wisconsin Green Bay (UWGB), established in 1969 after three years of planning, represents an environmental education approach involving an entire university. The whole curriculum of UWGB is organized along problem lines. Faculty are grouped in interdisciplinary problem-oriented departments called concentrations. Students major in those same problem areas. Thus, the plan is that all students who attend the university have to become cognizant of environmental problems. Their approach to particular disciplines or professions consists of exploring, with other disciplines or professions, the ways in which each can contribute to the identification and analysis of environmental problems. The students get a regular four-year bachelor's degree. There is also a graduate programme along the same lines.[5]

While these four programmes are good examples of the earliest and the broadest attempts, by the 1970s many programmes were being established in many countries. In addition, both formal and informal efforts were being made at the national level to promote environmental education. Occasionally, this occurred at ministry level as in some European countries. In the U.S.S.R., a variety of efforts were implemented by integrating environmental topics into traditional courses such as geography, biology, law and economics; by requiring special courses on the environment in each technical school; and by establishing special professional chairs at major universities, to deal with such subjects as environmental conservation and the environmental dimension of engineering.[6]

Occasionally, supportive efforts occurred at the level of professional organizations, such as the Conservation Foundation and the American Institute of Biological Sciences in the United States. These organizations conducted a study of fifteen environmental education programmes at the tertiary level and issued a report in April 1972.[7]

On still other occasions, conferences were organized on environmental education, such as the first National Conference on Environmental Education held at the University of Wisconsin Green Bay in December 1970 and the International Workshop on Environmental Studies in Higher Education and Teacher Education in September 1972 in London, Ontario.

International initiatives

It did not take long for initiatives to be taken at the international level. A world leader in environmental education has been the Organization for Economic Co-operation and Development (OECD), through its Centre for Educational Research and Innovation (CERI). Initially, it displayed its interest in this area rather obliquely, by organizing a Conference on Interdisciplinarity at Nice (France), in September 1970. Most of the conference was devoted to rather theoretical and abstract consideration of the definition of interdisciplinarity. But the concluding thrust of the conference concerned interdisciplinarity as a technique for synthesis and comprehensiveness and as an essential device in problem-oriented research and teaching. The written report of the conference describes the programmes of three universities in some detail—Sussex University in the United Kingdom, the University of Wisconsin Green Bay in the United States, and Hacettepe University in Ankara (Turkey). It was emphasized that at the University of Sussex, all the unit

4. For description of the programme at Lund, see OECD, *Environmental Education at Post Secondary Level . . .*, op. cit., Vol. 1, p. 84–92.
5. For a description of the programmes at Green Bay, see OECD, *Environmental Education at University Level . . .*, op. cit., p. 161–8 and OECD, *Environmental Education at Post Secondary Level . . .*, op. cit., Vol. 1, p. 176–207.
6. Personal communication from Professor I. P. Laptvev (U.S.S.R.), 11 October 1975.
7. James L. Aldrich and Edward Kormondy, *Environmental Education: Academia's Response*, Conservation Foundation and the American Institute of Biological Sciences in the United States, April 1972.

centres and institutes with a social science base were designed as problem-solving organizations with policy preoccupations. The University of Wisconsin Green Bay is an example of an institution-wide approach to environmental education. Hacettepe University is an institution which emphasises an interdisciplinary approach to health problems. A sample programme of a theoretical university was developed in the area of international relations, and a second sample programme was developed for an institution with a special emphasis on the environment.[8]

CERI-OECD organized a second conference which focused on the problem level itself, rather than on the process of interdisciplinarity. The title of the conference was 'Environmental Education at University Level', and it was held at Tours (France), in April 1971. While the conference was significant in itself, its report entitled *Environmental Education at University Level: Trends and Data* was an important contribution to the environmental education literature. J. R. Gass, Director of the Centre for Educational Research and innovation, in a preface to the report, observed:[9]

> There is an irreversible trend in all modern countries towards closer relationships between education and the community. This reflects the reality that education today affects many of the stages of the individual's life, and is a keystone of the capacity of societies to progress. What more natural, therefore, than that the emergence of the environment as a public issue of the highest importance should be reflected in the rapid and widespread emergence of environmental programmes in education.

The report includes some of the major presentations made at the conference, such as that by the French minister in charge of the conservation of nature and environment, and those of various officials of OECD. In addition, the report contains: analytical papers on the objectives, curricula, teaching methods, and institutional structures associated with environmental education; six case studies from institutions in OECD countries; and the results of surveys on environmental education in OECD member countries. The conference stressed the need for further international co-operation and exchange of information.

Following the Tours Conference, CERI-OECD developed a plan for far more elaborate case studies, to be used at a third conference held at Rungsted (Denmark), in June 1974 on the topic 'Environmental Education at the Post Secondary Level'. The two volumes of case studies, entitled *Environmental Education at the Post Secondary Level*, are an excellent source of information on particular programmes in this field. The first volume contains twelve case studies that focus on the training of generalists and specialists. The second volume concentrates on courses for educators, decision-makers, and members of professions concerned with the environment. This volume includes case studies of fifteen additional specialist or professional programmes. At Rungsted the emphasis was on the further implementation of environmental education and its status within universities, rather than on the definition of the concept of environmental education, and the identification of ways for its initial application. The keynote speech emphasized:[10]

> We in environmental education have an opportunity to give leadership to problem-oriented education, and not just to a narrower environmental education. This is a necessary next step if the term 'environmental' is to retain a broad meaning. More important, the ultimate significance of the environmental approach to education lies in such a course of action—in relating environmental factors to the other problems of the world. Thus, after Rungsted we will still have important unfinished work to do. The goal is to work for systems of higher education in each of our countries in which problem-oriented education is a normal pattern in the majority of universities.

There have been other international organizations interested and active in environmental education over the years. The 1972 United Nations Conference on the Human Environment in Stockholm attracted considerable attention to environmental education, even though it did not

8. OECD, Centre for Educational Research and Innovation, *Interdisciplinarity: Problems of Teaching and Research in Universities*, Paris, 1972.
9. OECD, *Environmental Education at University Level . . .*, op. cit., p. 3.
10. Edward W. Weidner, *Environmental Education: An Academic Plan for Universities*, p. 12, June 1974 (keynote address prepared for the OECD Conference on Environmental Education at the Post Secondary Level).

focus on that topic. Another initiative by the United Nations, together with Unesco, was the establishment of the United Nations University (UNU). UNU was authorized by the General Assembly late in 1973. It was designed as a post-graduate applied research university, to be entirely problem-oriented. In January 1975, the UNU Council, together with the newly appointed Rector of the university, designated natural resources, world hunger, and human development as the three priority problem areas on which the initial activities of the university would focus.

In Eastern Europe, the Council for Economic Assistance has initiated a research programme for determining the adequacy of the general basic curriculum needs in the humanities and the technological areas. The purpose is to seek the best basic curriculum in each area. The programme aims at including and evaluating basic environmental education at all levels, from kindergarten through the university. All schools in each member country are involved, except Yugoslavia, which is participating solely in an observer capacity. Czechoslovakia is the co-ordinator.[11]

The Commission on Education of the International Union for Conservation of Nature and Natural Resources (IUCN) was established in 1949 and is concerned with the promotion of environmental conservation education. In this regard, the IUCN has issued a number of significant publications and conducted several relevant meetings. The following meetings and the materials prepared in connexion with them are particularly germane to the issues dealt with in this chapter: Symposium on Conservation Education, Lucerne, Switzerland (June 1966); Conference on the Conservation of Renewable Natural Resources, Bariloche, Argentina (March 1968); European Working Conference on Environmental Conservation Education, Rüschlikon, Switzerland (December 1971); and International Workshop on Environmental Studies in Higher Education and Teacher Training, London, Ontario, Canada (September 1972). (Reports are available from the IUCN for all but the workshop held in Canada (the conclusions reached at that workshop are available from IUCN, while copies of the working papers can be had from Professor Paul Park, the University of Western Ontario, Althouse College of Education, London, Ontario).)

Over the years, the discussions at these meetings and the education activities of the IUCN have moved from an earlier focus primarily on natural resource conservation issues to the broader concerns of man and the environment involved in environmental education.

Needs of the general student

The environmental education needs of the general tertiary-level student were well stated by Ambassador François Valéry, head of the French Permanent Delegation to the Organization of Economic Co-operation and Development, in an address to the closing session of the workshop at Tours (France), on environmental education at the university level:[12]

> Education would seem to have a dual role in connection with the environment; first, to foster basic and applied research, train managerial staff and introduce environmental viewpoints into the teaching of various disciplines; secondly, to educate public opinion and channel its emotive reactions to the problem so as to prevent a negative response; for the choices will be so difficult and their evaluation so painful that nothing worthwhile will be accomplished without enlightened opinion among these various social groups.

While Ambassador Valéry indicated that we must be concerned with research and the skills and attitudes of future administrators, it is his reference to the need to introduce an environmental concern into the teaching of all disciplines that is especially exciting and appropriate. Not only should teaching focus on real problems in order to give a practical aspect to education, it should also help students to develop a sound fundamental philosophy about life. This idea will be referred to

11. Personal communication from J. Koci (Czechoslovakia), 11 October 1975.
12. OECD, *Environmental Education at University Level* ..., op. cit., p. 21.

often in the following pages. Valéry's second point—the need for an enlightened public—is also extremely relevant. This should be interpreted to include visits to classes by local community leaders who would serve as discussion resources and encounter current student concerns and thoughts, thus broadening the views of both. It is important that students be provided with a practical as well as a philosophical element in their academic programmes. Discussion of real problems with actual community leaders helps to bring this about.

The OECD Tours Workshop closed with a number of recommendations for university action, e.g. 'Universities should undertake environmental education at all levels, and for all categories of people whether they are students or not.'[13] In addition, the recommendations stressed that four components be the basis for all programmes established: basic disciplines; integrating themes leading to interdisciplinarity; relevant problems; and practical, real-life, local projects.

There are a large number of definitions of environmental education, some brief and some elaborate, and a great variety of environmental study programmes. While the differences are of great interest, what is more important here is the fact that the majority of the descriptions include the four basic components listed above and simultaneously express the need for environmental concern in all aspects of higher education programmes.

The myriad variations in environmental education for the general tertiary-level student are what make discussion, assessment and evaluation difficult. But then variety has characterized institutions of higher education around the world, and the goal for environmental education cannot be homogeneity.

Implementing environmental education

During the past six years, several surveys have attempted to assess the state of environmental studies in higher education at the national and international level, e.g. a 'Study on Environmental Education in OECD Countries' (except the United States and Australia) conducted during June and July 1971;[14] 'A Survey of Environmental Science Education in the United States', in 1969;[15] 'Survey and Evaluation of Environmental Education Programmes of Selected Universities of the United States', in 1971;[16] *Environmental Education: Academia's Response*, a study of fifteen selected United States and Canadian colleges and universities during the fall of 1971;[17] *World Directory of Environmental Education Programmes*, a study of environmental education at the tertiary level in seventy countries in 1973;[18] *Environmental Education at University Level*, a study during spring and summer 1974 in selected member countries of the Council of Europe;[19] and *An Overview and Summary of the OECD/CERI Rungsted Conference, June 1974*.[20]

In addition, other conferences and studies embodying environmental education concepts were conducted, such as the Unesco-sponsored conferences on integrated science teaching held in 1969 in Bulgaria and in 1973 in the United States. Committees of the International Council of Scientific Unions were proceeding along similar lines; the Committee on Science and Technology in Developing Countries began work in 1966 and

13. For final recommendations of the workshop of Tours on Environmental Education at University Level, see OECD, *Environmental Education at University Level . . .*, op. cit., p. 31.
14. Jean-Marie Abillon, 'Study on Environmental Education in OECD Countries', *Environmental Education at University Level: Trends and Data*, p. 201–28, Paris, OECD, Centre for Educational Research and Innovation, 1973.
15. Karl E. Schaefer, 'A Survey of Environmental Education in the United States', *Environmental Education at University Level: Trends and Data*, p. 229–46, Paris, OECD, Centre for Educational Research and Innovation, 1973.
16. Lee Peterson, 'Survey and Evaluation of Environmental Education Programs of Selected Universities of the United States', *Environmental Education at University Level: Trends and Data*, p. 247–72, Paris, OECD, Centre for Educational Research and Innovation, 1973.
17. Aldrich and Kormondy, op. cit.
18. Quigg, op. cit.
19. Lars Emmelin, *Environmental Education at University Level* (Committee on Higher Education and Research, Council of Europe, Strasbourg, 1975).
20. G. R. Francis, *An Overview and Summary of the OECD/CERI Rungsted Conference, June 1974*, in press.

the Scientific Committee on Problems of the Environment was created in 1969.

The above assessment studies and other programmes delineate a number of methods of implementing environmental education at the tertiary level. The major methods are discussed below:

Entire academic curriculum

Only a few programmes have been designed to reach and influence the entire student body. Most of them have been developed in the United States, i.e. the University of Wisconsin Green Bay, College of the Atlantic, and Evergreen State College. While this method appears to be highly desirable, it should be noted that those institutions are new (since 1969) and could build without having first to change existing institutional structures. Indeed, it would be extremely difficult to establish this all-university environmental education academic focus in existing universities.

A modification of the 'entire curriculum method' that could apply to established universities is one which integrates the environmental philosophy into as many existing courses as possible on the theory that some is better than none. This exemplifies environmental education in its broadest sense and is reinforced by the recommended basic components of environmental education mentioned earlier, i.e. must involve 'relevant problems' and focus on practical, real-life, local projects. This would be quite difficult for professors who are accustomed to dispensing knowledge and not assisting students in learning how to use it. While most professors have the ability to relate their disciplines to practical problems of the environment at the undergraduate level, they generally prefer to reserve that dimension of their teaching to graduate courses and research.

Survey courses

Another implementation method is a single short-term survey or overview course, basic in nature, ecologically or systems-oriented, interdisciplinary and often designed for beginning students. This type of course can now be found in most of the universities in the United States and many other countries, such as Kuwait among the Arab States, Ivory Coast in Africa, Argentina, Venezuela and Chile in Latin America, and Thailand in Asia. Such a course is often designed for specific types of students, e.g. in engineering or science.

Courses of this nature are necessarily large-enrolment courses in which it is usually quite difficult to enter the real world of local problems, or even to get students outside the classroom. At best, in these situations, community lecturers or discussion leaders can be brought into the sessions. While this method is a desirable device in comprehensive environmental education programmes, it has its limitations. Because of class size, it is difficult to create free-flowing discussion and to get the class out into the community. Hence, if this method were to be extensively employed as a means of reaching the total student body, some basic components of environmental education would suffer. It is the real contact with real problems (learning by experience) that students seem to want and need today.

Special courses

Short or minicourses and the conference seminar or workshop format are also used by students and faculty to focus attention on environmental problems. These are usually not regularly scheduled courses. Student organizations in Europe such as the International Youth Federation for Environmental Studies and Conservation with headquarters in Morges (Switzerland), the Polish Socialist Union of Students and the Baltic Committee of this union, and in North America the Union for Young Environmentalists, involve many students in their conferences, workshops and summer courses. Other organizations such as the International Union for the Conservation of Nature and Natural Resources (IUCN) also provide programmes for university youth. Such activities are usually focused on a particular topic or theme concerning a small segment of the environment. While these are proven tools for development of awareness and understanding, they are hardly

sufficient in themselves to serve all the general students in a university. By their very nature they can accommodate only a small portion of the students.

The programme approach

A set or group of courses are most often used to build programmes in environmental education usually leading to specialist training in a specific field such as engineering, land-use planning, landscape architecture, or environmental science. The University of East Anglia in the United Kingdom, the University of the Philippines, and the Federal Republic of Germany, the Institute for Agricultural Zoology, are among the many listed in the *World Directory of Environmental Education Programmes.*

The introductory courses in these programmes are usually adequate for the recognition and general understanding of environmental problems. However, only a small percentage of the general students avail themselves of any such opportunities, whether or not they are a part of a formal programme. The survey of OECD countries reported by Abillon at the Tours workshop indicated that in 1971 not more than 2 per cent of the students in most OECD countries were enrolled fully or partially in an environmental education type course.[21] Emmelin also indicated that enrolment in overview-type courses usually constitutes a very small proportion of the student body.[22] A programme conducted at the University of Buenos Aires seems promising as one involving many students as well as the four basic environmental education components mentioned earlier. All the faculties were involved as particular community problems required their expertise for solution. These problems then became part of teachers' courses, and served to involve students more deeply.[23]

The programme method is often implemented through an institute, college, or school and seems to be the one most widely applied in established universities.

Supplemental programmes

Another approach used in several universities, e.g. Trondheim in Norway, Lund in Sweden, MacQuaries and Flinders in Australia,[24] seeks to add an environmental dimension to traditional discipline programmes. The undergraduates are encouraged to seek a thorough training in a traditional discipline. They then add supporting environmental studies courses that are integrating and relevant to their specific interests. However, this approach may not come to the attention, or even capture the interest, of many students, especially those taking a typical 'liberal arts' programme.

In the U.S.S.R., in-service training programmes for returning adults emphasize environmental education concepts.[25] Another programme, in Chile, has shown great promise in using television and radio to reach thousands of students who could not assemble in one classroom.

The literature shows reasonable heterogeneity among environmental education courses and programmes now in existence. Just as diversity lends stability to biological communities, so will diversity in environmental education programmes lend stability to environmental studies in higher education.

General discussion

Peterson made an interesting observation on the variety and possible effects of different approaches to environmental education involving the practical community project-oriented aspects *v.* the theory, understanding approach.[26] He observed that one college in his study placed a great

21. Abillon, op. cit.
22. Lars Emmelin, *Teaching About Environmental Problems at Tertiary Level*, Committee on Higher Education and Research, Council of Europe, in press.
23. W. B. Stapp, L. A. Bertrand and B. R. Horn, *Environmental Education Needs and Priorities: A Preliminary World Survey (First Draft)*, Paris, Unesco, September 1975.
24. A. G. Mitchell, 'Diploma in Environmental Studies Programme', *Environmental Education at Post Secondary Level*, op. cit., Vol. 1, p. 9–24.
25. See note 6.
26. Peterson, op. cit.

emphasis on the idea of students working to solve problems in local communities as a learning process. In that programme, he sensed a sacrifice of solid background in the theory of practical application with the result that graduates lacked the ability to apply theory to the solution of larger problems. At the other extreme, another institution over-indulged in theory so that students were unable to do anything but think abstractly. His conclusion was that the neatest package occurred at a third institution where theory was taught first, then an interdisciplinary approach to problem-solving, and finally students went out and applied the theory to actual situations.

Given the vast number of programmes reported in the literature, how can those attempts be evaluated?

Some of the major problems accompanying the implementation of environmental education programmes at the tertiary level were identified in the North American study conducted by Aldrich and Kormondy.[27] That study gathered responses to the following questions relating to the establishment and operation of environmental studies programmes in higher education: (a) What were the original goals of the programme?; (b) To what extent has the programme evolved and in what way has it been modified?; (c) How does the programme or centre relate to other college and university activities?; (d) To what extent have administrative bodies been a factor in the development of the centre or programme?; (e) What are the particularly difficult problems that the centre has had to deal with?; (f) What are the priorities for the future and why were they chosen?

Those same problems were then later discussed at a conference held at the University of Wisconsin Green Bay and the collective results published.[28]

At the OECD Tours conference, Abillon reported on 'Problems Posed by Certain Aspects of Environmental Education'.[29] In that paper he posed such questions as 'At what level should environmental education be taught? What should be the curriculum content? Which teaching methods are best? How does environmental education affect university structures?' Four years later and with much experience accumulated, concise answers still elude us. Perhaps concise answers will never be possible, given the diversity of higher education in the world. Emmelin has spent a considerable amount of time visiting existing programmes and trying to understand and document them.[30] He has much to offer on the classification of various programmes, definitions, sequence of courses, institutional organization, course content, teaching methods, interdisciplinarity and recommendations for international co-operation. His study does not include a cross-section of the many kinds of programmes found in institutions in countries outside Europe. Such a study is now being conducted under the environmental education programme of UNEP and Unesco.

Interinstitutional and international communications

In order to stimulate and maintain a sustained interest in environmental concerns in academic curricula at the tertiary level, a number of activities seem to hold promise. One such activity is student and faculty exchange. Many environmental problems, by their very nature, are global, e.g. air quality, population, and use of chemicals such as DDT. Solutions to problems of this kind require the ability to think and understand on a global scale. What better way to begin than to live and learn with people of other cultures, to understand their views and to discuss possible solutions?

The sharing of ideas, successes, and failures and, most important of all, the cross-cultural discussion of problems seems to be a crucial first

27. Aldrich and Kormondy, op. cit.
28. W. J. Herrscher and R. S. Cook, *Environmental Responsibility in Higher Education: Processes and Practices*, UWGB, 1973.
29. Jean-Marie Abillon, 'Problems Posed by Certain Aspects of Environmental Education', *Environmental Education at University Level . . .*, op. cit., p. 273–84.
30. Emmelin, op. cit.

step. One possibility that holds great promise is for groups from different campuses in different countries to visit each other's communities for at least a semester. The real cross-cultural learning and discussion could take place while both groups were studying each other's local environments. The results would be a step towards real understanding of the problems and opportunities in environmental studies.

Summary

Solutions to major environmental problems involve global understandings and strategies. Recommendations for universities at the Tours workshop urged that there should be organization of environmental education at all university levels and for all categories of students with emphasis on environmental problems in the teaching of each discipline.[31] Most of the reports on environmental education encountered in this study reveal an emphasis on environmental education in small segments of relatively large university programmes with only a small portion of the student bodies affected. Environmental emphasis was mostly furnished by a few dedicated faculty members, working within traditional departmental restraints. Thus, they were only able to cover effectively the field or discipline of their greatest expertise—usually some aspect of science. On a world-wide basis, we seem to be training only a few people to solve the multiple environmental problems caused by the vast majority of citizens. If a true concern for man and his environment is to develop to the point where crisis situations are not as commonplace as they are today, then we must reach a greater audience, not only all general tertiary students, but primary and secondary students, and adults as well.

As exposure to real direct experience with real world problems does not seem a reality for most tertiary students in today's academic world. A major reform in university teaching methods seems needed in order to effectively incorporate environmental education concerns into a majority of university courses. A shift from a focus on the dispensing of knowledge to practise in the use of knowledge must take place.

An acknowledgement of man's intimate relationship with the environment and the need to maintain a quality environment is urgently needed. That most universities now include the word environment in many of their course titles is evidence of an awareness. However, all education must embody the four basic components of environmental education outlined earlier, i.e. the knowledge of basic disciplines; integration of themes leading to interdisciplinarity; a focus on relevant problems; and involvement in practical, real-life, local projects. If that occurs then the students will have access to the knowledge and philosophy necessary to solve problems and, more importantly, to avoid them in the future.

31. For final recommendations of the workshop of Tours on environmental education at university level, see OECD, *Environmental Education at University Level . . .*, op. cit., p. 31.

8. Environmental education at the tertiary level for teachers

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Conceptual framework

The process of education depends on many factors: sound curricula, appropriate textbooks, functional audio-visual aids, adequate school buildings, and the like. Most important of all, it depends on people who, through their competencies, interpret the curricula and strive to achieve the goals; make use of the different facilities of the school building; give life to the visual aids and, above all, influence the behaviour of the students and help shape their lives. These people are the men and women who make teaching their profession, those who aid students in the development of understandings, skills and attitudes. Sound teacher education is therefore basic and vital for the development of any educational programme, especially in environmental education.

Before discussing the role of environmental education at the tertiary level for teachers, it is useful to agree on a definition of environmental education. This article considers the definition formulated at the International Environmental Education Workshop at Belgrade in October 1975 as being the most comprehensive:

> To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones.

As this definition shows, environmental education is the concern of teachers of all subjects to varying degrees. Science and social studies teachers are most involved, while those teaching languages and arts are concerned to a lesser extent. Competent teachers are basic for the successful implementation of environmental education. There is a world-wide shortage of teachers with competence in environmental education and this holds for developing and industrial countries alike.

Many environmental education authorities recommend that the subject should permeate all parts of the school curriculum. This will not happen unless teachers are trained to make it happen. Teachers hold the key, at least to that part of environmental education that takes place in formal education. Given the immensity of the task to be accomplished and the limited resources available, it makes sense to place a major emphasis on the teaching of teachers in that they directly and indirectly influence large numbers of students, and the lay community.

Since 1970, the integration of environmental

1. The editor wishes to express his gratitude to Alison Igo St Clair for her assistance in the revision of this final manuscript since Dr Selim was unable to be present for the review of his trend paper at the Belgrade Workshop.

components into formal education curricula and the accompanying need for adequate teacher-training programmes have received due attention from participants at national and international environmental education conferences around the globe. Participants convened in Switzerland in December 1971, at the European Working Conference on Environmental Conservation Education, highlighted the importance of teacher education when they specifically stated:[2]

> We recognize that teacher training forms one of the most important and significant aspects in the development of environmental education programmes, and we recommend that:
> a. the training of teachers provide them with essential basic knowledge of ecological facts and an adequate background of sociology and its relationship to human ecology;
> b. efforts should be made to develop in teachers a critical awareness of environmental problems to enable them to provoke responsible attitudes concerning environmental matters in their pupils;
> c. environmental conservation is recognized as an essential part of teacher training, and that developments started in preservice training should be continued by in-service training;
> d. as teacher training in environmental education involves the use of many techniques and methods, all prospective teachers should be given training in the use and evaluation of pedagogic methods, including those relating to interdisciplinary approaches and team teaching;
> e. media banks be established at the national and international level for the exchange of information, training aids and teaching materials.

The Organization of American States co-sponsored a 1970 conference with the American Association of Colleges for Teacher Education, also to consider ways in which teacher education should respond to the growing world-wide concern about environmental problems.[3] Their recommendations were similar to those of the European Conference.

In addition to the recommendations issuing from broadly based international conferences such as those noted above, organizations with more narrowly focused interests have developed a commitment and position regarding the teaching of environmental concepts.

In the report of the Regional Workshop on the Teaching of Geography in South-East Asia and the South-West Pacific, a meeting sponsored by the International Geophysical Union (IGU) and Unesco in 1973, a working paper was reviewed which made the following points:[4]

> . . . teachers of geography could:
> (i) impart accurate information about the environment to provide a basis for the understanding of the interdependence of man and his environment.
> (ii) examine the consequences of man's exploitation of the environment including the idea of the irreversibility of some courses of action,
> (iii) put forward viable alternative solutions to environmental problems and get students to evaluate these,
> (iv) arouse sensitivity to the environment and make students aware of their responsibilities to the environment in their everyday life,
> (v) give students experience of enquiring into, analysing and taking action in relation to particular environmental issues, particularly those in their local area.
> It was deemed important not to overemphasize environmental crises, but to develop the attitude that there should be continuing concern about wise management of the environment.

But despite these important conferences and growing international involvement in environmental education, relatively little has been accomplished in the development of specific teacher education programmes with an environmental focus.

In a paper on the topic of preservice teacher education published in 1975, William B. Stapp pinpoints the responsibility of tertiary-level institutions. 'In the vital area of teacher and leadership training', he says, 'our colleges and universities play a major role. Yet, in the past they have fallen short of their mark.'[5]

2. *European Working Conference on Environmental Conservation Education*, Morges, International Union for Conservation of Nature and Natural Resources. (Supplement to the *IUCN Bulletin*, Vol. 3, No. 3, March 1972.)
3. Francis K. Sutman (ed.), 'What Kind of Environment Will Our Children Have?', *Proceedings of the AACTE/OAS Conference on Education and the Environment in the Americas*. Washington, D.C., American Association of Colleges for Teacher Education, 1970.
4. J. S. Emery, D. Davey and A. K. Milne, 'Environmental Education: The Geography Teacher's Contribution', Sydney, September 1973 (Working Paper No. 3, for the IGU-Unesco Regional Workshop on the Teaching of Geography in South-East Asia and the South-West Pacific). (Mimeo.)
5. William B. Stapp, 'Preservice Teacher Education', in Noel McInnis and Don Albrecht (eds.), *What Makes Education Environmental?*, Louisville, Ky., Data Courier Inc. and Environmental Educators Inc., 1975.

The few surveys that have been made underscore Stapp's observation and show that education colleges have indeed not done much in the area. One study reported in 1972, for example, gave this summary:[6]

> The data show that a majority of the colleges of education that responded to the questionnaire are not offering a course in methods of teaching environmental science; are offering a course involving content in environmental science; are involved in an environmental science course or curriculum development; are not involved in federal, state, county, or local environmental science projects and are not offering either a major or a minor in environmental education.

Labelling employment considerations as the key to the demand for, and subsequent provision of, environmental education for teachers in training. Swedish environmental educator Lars Emmelin has observed:[7]

> The flexibility of the school system is a key factor in this matter. In many countries the school system also governs the university structure in that a large proportion of students are going to become teachers in schools and, therefore, choose subjects at university which fit into the school curriculum. An increased attention in schools to environmental education would thus increase the basis for environmental education at university level.

It should be pointed out, however, that although teacher-education programmes have yet to reflect a high priority for environmental education, they have made considerable progress in recent years in many concepts and educational approaches that have great relevance for teaching about the environment, e.g. open education; community schools; competency-based education; career education; alternative schools; outdoor education; and the teaching of values and inquiry. When developing strategies and model programmes on environmental education for teachers, planners should build strongly upon many of the elements of these related approaches.

In addition, many curriculum development projects, although primarily concerned with preparing materials for student use, include specifically designed teacher-training components, e.g. *Man: A Course of Study, Geography in an Urban Age, Environmental Studies Project* and the *Nuffield Junior Science Curriculum*.[8] These also offer some good foundations for developing tertiary-level training programmes.

A preliminary overview of the status of teacher training for environmental education world-wide can be summarized as follows:

National and international attention has been focused on the need to train teachers who are competent environmental educators for placement in primary and secondary level programmes.

Recent trends in general educational theory and philosophy, as well as new directions in such specific areas as curriculum development, have benefited teachers with an interest in environmental education.

Well-developed and strongly supported curricula in environmental education for students training to be teachers do not pervade tertiary-level institutions at this time; such efforts seem to be limited to individual, exemplary programmes dotted around the globe.

In describing the current state of teacher-training programmes in environmental education at this time, it becomes necessary to examine the gap between a clearly perceived international commitment and an inadequate degree of practical implementation. Three avenues of inquiry are most valuable to pursue. First of all, what are the needs, i.e. what manner of preparation is deemed most desirable for teachers of environmental education? Secondly, to what degree are these needs being met in current programmes world-wide? Finally, in what direction should we move towards the preparation of a global cadre of competent and dedicated teachers firmly rooted in the principles and practices of environmental education?

6. John H. Trent, 'Environmental Education: Surveys Indicate Its Current Status', *The Science Teacher*, October 1972, p. 48–9.
7. Lars Emmelin, *Environmental Education at University Level*, Strasbourg, Council of Europe, 1975.
8. The first three are national curriculum development projects funded by the United States National Science Foundation. The fourth was a national project sponsored by the British Nuffield Foundation.

Environmental education and the teacher: What are the needs?

The key to developing effective training programmes for both prospective and practising teachers of environmental education is a three-pronged approach. First, prospective teachers need a 'working knowledge' of environmental sciences; that is, a familiarity with the facts combined with the ability to seek and acquire knowledge of specific topics as necessary. Aside from this topical competency a grasp of educational methods, especially those techniques most suited to fostering students' discovery of environmental principles and clarification of personal environmental values, is vital. Third, teacher training programmes should provide a supportive, practical situation in which students have the opportunity to test and refine their developing reservoir of skills. Teachers cannot be trained in a vacuum, if their students are to learn to deal effectively with real and complex environmental problems.

A suggested multidisciplinary scheme of training programmes may have the scope and structure shown in Table 1 below. The study of pre-service and in-service teacher training will be dealt with in more detail as case studies and examples within this scheme.

During his tenure as head of the environmental education programme at the University of Michigan, William B. Stapp summarized the pre-service teacher training requirements as follows:

> It is imperative that future teachers obtain training in the following areas: basic competencies in the environmental sciences; theoretical education foundation; instructional skills; and opportunities to combine the above competencies in a closely supervised educational work-study programme prior to assuming a professional teaching career.

His outline of desirable 'environmental science competencies' reflects a vital factor in the pre-service training of environmental education teachers, i.e. that such competency cannot be limited to the acquisition of natural science knowledge. All teachers of environmental education must be provided with facts, laws and conceptual tools to help them teach and integrate information about environmental problems and opportunities. Stapp's scheme for pre-service teacher training provides one frame of reference for achieving this end:

Environmental science competencies

Ecological foundation. An understanding of ecological principles in relation to components of the environment and disturbances affecting the ecosystems. This may be achieved through courses such as: human population, human settlements, resource management, biosphere, etc.

Economic foundation. An understanding of economic theories, national and international resources. This may be achieved through courses such as: natural resources economics, international resource development, economic theories in relation to environmental problems.

Human ecosystem foundation. Comprehensive study of the relationships between man and physical, cultural and biological processes that affect him and his biosphere. Some relevant courses: human ecology, environmental philosophy, etc.

Policy foundation. Awareness of the process of formulation and implementation of public environmental policy and the role of every citizen in this process. Suggested courses: national environmental policies, international policies, public opinion.

Educational competencies

Psychological-sociological foundation. An understanding of the process of acquiring and integrating information into people's lives, and ultimately translating it into behaviour and attitude formation.

Educational foundation. An understanding of the school and its social relations, trends in

educational thought and problems of education. Some courses are: philosophy of education, history of education and educational sociology.

Environmental education skills

The teacher involved in environmental education programmes must have skills in: environmental problem-solving, handling of values and controversial issues, use of materials and the local environment. Courses recommended are: audio-visual methods and materials, values and teaching and evaluation of school programmes.

Methods of teaching environmental education

Such competency has to be developed through field work and practice teaching. The teacher must have an understanding of the aims and objectives of environmental education methods and techniques, resources for learning, group dynamics, curriculum design, assessment and feedback, detection and solution of environmental problems, field work and environmental ethics.[9]

This summary of the broad foundations on which an ideal pre-service teacher-training programme would be built demonstrates that to equip in-service teachers—those beyond their formal training and located in actual teaching situations—is a tremendous challenge. To reach practising teachers with full-time classroom responsibilities, making the most of the limited time available to them for re-training and updating of skills, requires a precise delineation of priorities and a carefully constructed scheme of implementation.

Dr Dean Bennett, writing in 1975 as director of the government-funded Maine Environmental Education Project in the United States, capsulized the in-service teacher-training challenge this way:[10]

There are two basic purposes of teacher in-service educatiion programs—subject matter understanding and preparation in teaching methods.

A proposed outline for an in-service programme is given below. The allocation of time to the various activities listed below will vary according to the nature of the course and needs of teachers. The principal elements of in-service training in environmental education are: (a) conveying the rationale and objectives of the course and curriculum of environmental education; (b) teaching new developments in ecological, economic, policy, and human ecosystem foundations pertinent to the programme; (c) giving experience in the use of equipment to be used by teachers; (d) advising the teachers on teaching techniques, test construction, pupil assessment, course evaluation and preparation of audio-visual aids; (e) giving experience in field trips in the environment, to provide first-hand experience; (f) discussing problems of environment, local, national, regional and international, and developing a critical awareness of such problems to enable the teachers to encourage responsible attitudes towards environmental matters in the pupils—and to deal with student responses.

While participating in an in-service training programme, teachers should be offered the opportunity to implement new environmental education methods while they learn and provided with information on teaching aids and resources which can be of immediate benefit to them.

Assessing the competency of teachers

For those institutions sensitive to the measurement of competency in teachers being trained for environmental education responsibilities, the design of environmental education programmes can be organized around specific skills required in prospective teachers. This approach has as its purpose the development of specifically described knowledge, skills and behaviour that will enable the teacher to meet performance criteria for teaching. Presumably, most teacher competencies are related to learning and can be assessed by the

Continued on page 134.

9. Stapp, op. cit.
10. Dean Bennett, 'Inservice Teacher Education', in Noel McInnis and Don Albrecht (eds.), *What Makes Education Environmental?*, Louisville, Ky., Data Courier Inc. and Environmental Educators Inc., 1975.

Table 1. Suggested scope and structure of teacher-training programmes

Final target when training completed	Group receiving the training	Content of training		
		Pedagogy	Broad subject-matter	Special subject-matter
Elementary school children	Pre-service teachers	X	X	
Secondary school children	Pre-service teachers	X		X
Elementary and secondary school children	In-service teachers	Have had this content as undergraduates	X	X
Teachers and student teachers to be supervised or assisted	Those due to become educational (media, administrators, subject supervisors, EE specialists)	Were teachers first, then took further training		
Pre-service and in-service teachers	Teachers of teachers	Seldom		X
College students and university students	Those aspiring to teach in colleges for universities	Seldom		X
Non-formal education targets: youth (out of school), adults extension services	Those training to teach in non-formal ways	X and	X or	X
Public without formal education	Children unable to go to school. Parents with little education			
Business, industry and social work	Those training as specialists and not intending to teach (physicists, geographers, biologists)			X

Level			Education within the culture elders, chiefs	Location of training		
Under-graduate	Graduate	Extension workshop		Teacher college or institute		University
X				X		
X				X		
	X	X		X	or	X
	X			X	or	X
X and	X					X
X and	X					X
May be X	Probably X	X		X		
			X			
	X					X

following criteria: (a) knowledge criteria to assess cognitive understandings in the field of environmental education; (b) performance criteria to assess specific teaching behaviours; and (c) product criteria to assess ability to examine and evaluate the achievement of the learners.

There have been some attempts to summarize the current state of knowledge of teaching competencies. In one review, the correlational research of some twenty-five teaching competencies is presented. Nine of these were selected as the most promising for future research on the basis of the results obtained. These nine variables are: (a) clarity of teacher presentation; (b) variety of teacher-initiated activities; (c) enthusiasm of teacher; (d) teacher emphasis on learning and achievement; (e) avoidance of extreme criticism; (f) positive responses to students; (g) student opportunity to learn criterion material; (h) use of structuring comments by teacher; (i) use of multiple level of questions or cognitive discourse.[11]

The results of research in the field of competency-based teacher education will make it possible to identify more clearly some of the attributes of a good teacher. These attributes will no doubt help in planning for the pre-service and in-service education opportunities of teachers.

Recruitment and selection

When environmental education at the tertiary level is sufficiently well established and receiving the financial and administrative support it deserves, it will then become possible to identify among degree candidates those best suited to transmit environmental knowledge and commitment to primary and secondary students. Due to the shortage of teachers in many parts of the world, almost all applicants are now admitted to teacher-education programmes. Therefore, criteria will have to be set up for the proper selection of candidates as teachers responsible for environmental education. Some desirable characteristics are: (a) personal traits, hobbies, interest in and appreciation of the environment, and previous experience in some environmental activities; (b) acquisition of some facts, understandings and concepts about environment through previous studies; (c) acquisition of skills and attitudes pertinent to environmental education activities.

These criteria will, of course, be different for teachers 'transferring' into the field from other subject areas, e.g. geography, history and physical science.

The conclusion that arises most clearly and pervasively from a consideration of needs in the training of teachers for environmental education is that a broad, multifaceted approach is necessary. A long and arduous journey separates conference rhetoric and goal-setting from practical implementation of effective teacher-training programmes.

The challenge to those who will develop and integrate adequate programmes at both pre-service and in-service levels is monumental. A review of current programmes in teacher training can provide an indication of the forms which this effort is now taking and the degree to which we have proceeded towards our collective goal through individual activities under way throughout the world.

The role of teacher-training colleges and universities: Are they measuring up?

Competent teachers do not emerge by good luck. They must acquire and practise the attributes of competency and skills during their education. Thus, teacher-training colleges and universities must review their teacher programmes in the light of the emerging philosophy of environmental education. They must also plan to use, as effectively as possible, the time to be spent in studying environmental education and relevant courses. Among the responsibilities of teacher-training colleges and universities is the assessment of teacher competencies that contribute to the

11. *Performance-Based Teacher Education (PETE)*, Vol. 3, No. 6, 1974.

success of educational programmes in general, and environmental education programmes in particular.

Pre-service teacher education

At the tertiary level, the task of teacher-training colleges and universities is to help prospective teachers understand the basic concepts and principles that support the philosophy of living in harmony with and within our environment. Their task is also to develop attitudes and skills that are desirable for teachers of environmental education.

A concern for, and commitment to work towards, this goal has been reflected in the convening of conferences drawing delegates from several nations to discuss pre-service teacher training for environmental education. These meetings have been sponsored by national governments, universities and international bodies.

In July of 1974, for example, approximately seventy environmental educators from seventeen countries travelled to Rungsted (Denmark). Under the auspices of the United Nations' Organization for Economic Co-operation and Development (OECD), participants reviewed academic programmes under way at the post-secondary level in the participating nations. Professor Bossanyi, Senior Tutor in Biological Sciences with the Department of Extra-Mural Studies at the University of Southampton (United Kingdom), voiced the participants' main concern, namely that environmental education programmes must 'have a home of their own within the institution . . . run as the full-time responsibility of certain members of staff . . . to which specialists from elsewhere are invited to contribute'.[12]

In January of 1974, experts from nine Asian countries met in Bangkok (Thailand), to discuss teacher training with a particular focus on population education. Delegates pooled information on the status of population education in Asia, discussed the role of faculties and colleges in the placement of population studies in curricula and gave special attention to pre-service teacher-training programmes.

Similar concern has been evident in South America, where in October, 1974, a conference brought seventy-three delegates to the National University of Cordova (Argentina). Discussing 'The Conservation of Renewable Natural Resources in High School Curricula', these representatives of Spanish- and Portuguese-speaking South American countries gave special attention to the training of high school teachers.

The commitment of experts world-wide to the development of sound pre-service teacher-training programmes in environmental education is clear. But to what extent has this concern been translated into actual programmes at the university level?

A broad overview shows that many colleges and universities in developed countries offer courses and degrees in environmental education. This is true, for example, in the United States, the United Kingdom and Sweden. In the United Kingdom, seventy-four colleges of education offer main courses in environmental education for teachers. Most of these lead to the degree of B.Ed. which qualifies for primary school teaching. The position in the United Kingdom regarding teachers for secondary schools is less clear, and many departments of education generally have shown no interest in environmental education studies.

In the United States, numerous colleges offer students the option of 'concentrating' their studies in environmental education while they fulfil requirements for a bachelor's or master's (advanced) degree in education. These programmes take various forms but, generally, combine educational theory with the study of environmental sciences.

At the University of Maine, in Orono (United States), for example, the College of Education has an environmental education 'option' under its existing Master of Education degree programme. Instituted in 1974, the programme is designed to prepare personnel for environmental instructional centres and to train teachers who wish to add an environmental focus to their classes. The programme requires one calendar year of study. During the first summer,

12. 'International Environmental Education Conference', *Environmental Education Report*, Washington, D.C., August 1974.

students take environmental education course work in a field setting. The academic year includes course work in professional education, specific courses in areas concerning natural and man-made environments and practical experience in an environmental education centre. During the second summer, students again work in the field. As research team members, they identify and attempt to solve a local environmental problem.

In some United States colleges, students majoring in education can choose to fulfil their requirements for a subject-area concentration by studying environmental sciences. Glassboro State College in New Jersey offers a graduate programme in environmental education which requires one year of study. At the undergraduate, or bachelor's degree level, teachers in training may select courses from the college's environmental studies programme, rather than English, history or some other subject, to fulfil their 'academic concentration' requirements.

Another, more recent and unique avenue for pre-service training of environmental education teachers in the United States is through an option for foreign study. Northern Illinois University offers undergraduate students in environmental studies and outdoor education the opportunity to live and study in the United Kingdom for a year. At Buckinghamshire College of Higher Education, twenty-five miles north-west of London, students study such topics as natural and biophysical resources, problems of the environment stemming from man's social organization, types of pollution and patterns of land use. They attend lectures and demonstrations for five hours per week and spend the rest of the time in practical work on an individual basis.

Still other pre-service teacher-training programmes, some in other parts of the world, reflect the belief that prospective teachers should be aware of major environmental issues. A programme in one Arab state, which occurs in the teacher-training institutes and not at the tertiary level, is an example of this type of effort. There, environmental education has been introduced in biology for secondary students. The long-range programme objective of teaching science at this level is to study the biological problems facing humanity, such as: pollution, population growth, food and nutrition. The short-range objective behind teaching biology at secondary level is to enable the learner to study ecology by highlighting the economic and medical importance of the local flora and fauna.

In most developing countries, teacher-training colleges do not offer special courses in environmental education. The Arab Education, Cultural and Science Organization (ALECSO) realized this fact and is to hold a meeting for deans of teacher-training colleges in the Arab region to initiate environmental studies for prospective teachers.

In order to develop in individuals an awareness, understanding and concern for the environment with its associated problems, and the knowledge, skills, attitudes, motivation and commitment to work towards solving such problems, teacher-training colleges and universities must provide for the preparation of competent teachers and citizens.

Because most of the course work taken by teachers in training is provided by professors of other subjects, e.g. history, botany, literature, a good teacher education programme in environmental education will require a considerable amount of work with instructors in these 'other' fields. Professors of other disciplines have generally resisted attempts to make their courses more relevant to what the teachers are eventually going to have to teach to their students. This kind of in-service education for college faculty might be more effective if it were part of a comprehensive programme designed for finding ways for the entire institution to contribute more effectively to environmental literacy. (Such a programme was outlined by the Michigan State Task Force on Environmental Education.)[13]

Continuing (in-service) education

Awareness of the importance of environmental

13. William B. Stapp (ed.), *Michigan's Environmental Future. A Master Plan for Environmental Education*, p. 62–5, Lansing, Mich., Governors Environmental Education Task Force, 1973.

education in teacher education programmes is rather recent in most countries. This means that a considerable number of teachers responsible for environmental education may have had no training in this dynamic interdisciplinary area. In planning in-service activities, two groups of teachers have to be considered: (a) those with no environmental education background; (b) those with pre-service training in environmental education. For both groups, the updating of knowledge is important because of the developments relating to environmental issues. This is achieved through in-service education. For teachers without previous training, there is a need for a crash programme similar to that presented in the pre-service stage. Constant upgrading is necessary, but it should be presented in a way that emphasizes the philosophy of environmental education and reinforces the attitudes towards the preservation of natural resources.

As is the case with pre-service teacher-training programmes, in-service efforts have also received attention at international gatherings. In July of 1972, north-west European teachers convened in the Netherlands under the sponsorship of the Netherlands-based Biological Training Course for Teachers and the IUCN. Approximately seventy teachers from nine countries participated in the conference, which dealt with environmental education in primary schools, environmental problem-solving experiments and the conduct of field courses for primary, elementary and secondary levels.

Again, it is useful to examine the degree to which this commitment is receiving practical implementation via in-service teacher-training programmes around the world. This continuing education may take various forms; sample programmes are outlined below according to some of these categories.

Face-to-face programmes

Under this title are included workshops, summer institutes and other short-term courses in which teachers in environmental education might participate. Such offerings may be the responsibility of colleges and universities, or they may be conducted by other organizations, and can be carried out in many ways depending on the prevailing conditions: vacation courses; programmes based on teacher release for two or three weeks at a time; regular teacher release for one day per week; evening courses; summer courses at colleges; or visits to the region by experts to help the teachers. Because teachers are already overworked, and do not have much time for staff development programmes, strategies for this kind of in-service education are especially important.

One of the most successful new in-service approaches to be introduced in recent years is the teacher or teaching centre. These centres have been widely developed in many countries; including Japan, the United Kingdom, Sweden, the Netherlands, Nigeria and the United States. It would be wise for environmental teacher educators to work closely with such centres in the designing of new training programmes.

Because many of these centres are also in the evolutionary stage, it is possible that environmental education, comprehensive and field orientated, could help enhance the character and programmes of the teacher centre.

Another widespread approach to in-service training for environmental education teachers is through workshops and courses of one or two weeks' duration which often focus on particular topics. A workshop for in-service teachers in environmental education that was designed as a result of the 1970 OAS Conference is described below. The goals were to examine the nature of world-wide environmental problems, to examine current programmes and materials in environmental education and to develop new materials and approaches. The workshop was composed of the following elements:

Selected readings and seminars—in addition to three basic textbooks, extensive case study materials and background papers were prepared for review by the participants.

Presentation and discussion sessions conducted by guest speakers with experience in international environmental studies—speakers included professors of environmental economics, political science, geology and meteorology, and the director of a water resources institute.

Laboratory-oriented sessions with selected curriculum materials.

Field experiences pertinent to specific areas of concern as discussed in the seminars—these included conferences with a citizens' environmental action group, the staff of an outdoor education centre, representatives from the management of an atomic power plant and research team members of a river-study task force.

Group process activities—among the activities selected were simulations and communication problems designed to encourage the development of teamwork skills among the participants.

The development of a teacher-devised environmental education project—among the diverse projects received were: a programme for studying the ecology of the home at the first-grade level; an awareness project for primary-level children stressing sensitivity to the environment, co-operation, commonsense for survival and creative activity through a practical programme for fourth-grade students.[14]

Workshops are popular in the United Kingdom, one example being a four-day course called 'New Geography in the School Curriculum', held at St Katherine's College in Liverpool in April of 1976. A broader approach was taken in the 1976 conference entitled 'Environmental Studies at Primary and Secondary Level', which was sponsored by the Collegiate Faculty of Education at the University College of North Wales.

Similar workshops are found in the United States. Three examples are the programmes sponsored in the summer of 1976 by the Maine Department of Education for practising teachers. The first course, entitled 'Field Experiences for Environmental Education', focused heavily on the practical implementation of field trip methods, environmental problem solving and natural history interpretation. Enrollees in the seminar called 'Community Environmental Studies' studied such topics as mapping, topography, geology and environmental inventory methods. The final offering, 'Curriculum Enrichment through Community Resources', helped teachers identify local resources which can contribute to environmental education programmes and indicated how to organize instructional resources most effectively.

Training opportunities spread over a longer period of time are represented by programmes such as that of Shenstone New College in Worcestershire (United Kingdom). There a one-term, in-service course aims to make teachers more at ease in using the environment as a teaching tool. Field work at both rural and urban sites is part of the programme.

A second example of this approach is the programme co-operatively sponsored by member colleges of the Liverpool Area Training Organization. Aimed at teachers of students aged 9 to 13, the two-year, part-time programme is open to teachers with one year's experience. Graduates receive a Diploma in Environmental Education.

In-service teachers who can afford to devote a year to full-time study can participate in a programme offered by the United Kingdom's Poulton-le-Fylde College of Education. This course, also for teachers of the 9–13 age group, stresses the nature of environmental change, methods of involving teachers and students in local community environmental problems, and the development of environmental resources for the school.

Another type of in-service workshop, the travelling programme, provides participants with the opportunity to apply educational theories to the study of an environment very different from their home setting. Such courses, which facilitate the development of new perspectives by broadening teachers' concepts of ecosystems and the factors which affect them, often last from three to six weeks. An example is the East African Environmental Studies Institute sponsored by the School of Education at the City College of New York (United States) in the summer of 1976. The seminar involved educators and environmentalists in a seven-credit graduate programme of environmental field studies and seminars. Land and wildlife conservation were especially emphasized.

Programmes via the media

It is essential to make use of the various available

14. Oduand Dyrli and Arthur Roberts, *An Environmental Education Workshop*, Storrs, Conn.

media in providing continuing education for teachers. Television, radio, professional journals and newspapers are relatively quick and effective ways of reaching large numbers of teachers for improving both their understanding of new issues and their classroom teaching.

The privately sponsored United States monthly publication, *Environmental Education Report*, gives 'grass roots to global' coverage of funds, projects, materials and trends for teachers and other environmental educators. Numerous universities and environmental centres in the United States also have their own publications. An example is *Eco-Centric*, the bi-monthly news bulletin of the Environmental Studies Center at Bowling Green State University in Ohio. This publication summarizes teaching aids and publishes one complete lesson plan in each issue.

The United Kingdom has a similar teacher-oriented vehicle in its quarterly publication entitled *Review of Environmental Education Developments* (*REED*). This lists courses and workshops for teachers and describes in depth the results of environmental education conferences and special studies. Another British publication for teachers is the environmental education newsletter produced by the Conservation Trust and Conservation Society, which publicizes new teaching aids and advice on incorporating environmental education into various subject areas.

The use of television and radio facilities in a large-scale environmental education programme is one of the most important and effective projects in Chile. The programme has reached over 16,000 students and teachers in that country. It is hoped that by 1979 over 30,000 people will have participated in the courses offered. The programme was organized by the Facultad de Ciencias Forestales of Chile in co-operation with the national television channel and the Ministry of Education. At first, it was directed to high-level professional students and then increasingly to in-service teachers with supportive materials for curriculum design and teacher training.

Programmes carried out in Africa by ALECSO concern the use of education materials on television or radio, the preparation of video or audio cassettes for distribution to regional centres, the production of detailed handbooks and teachers' guides and the distribution of periodic newsletters. The Open University Programme in the United Kingdom and the University Without Walls network in the United States offer additional models for this kind of training.

Clearing-houses

Attempts are being made in some countries to keep teachers up to date on new environmental education resources through a clearing-house mechanism. This may consist of a printed guide published periodically or a facility whose staff is responsible for helping teachers locate the information they need.

An example of a 'clearing-house in print' is Directory of Environmental Literature and Teaching Aids (*DELTA*), a resource guide for United Kingdom teachers. Published by the School of Education at the University of Reading, it is regularly updated with supplements.

A similar publication is the catalogue of curriculum resources developed by provincial teachers in Ontario (Canada). Published by the Science Teachers Association of Ontario, the document lists prices and offers a central address for ordering any of the materials listed.

On a much more ambitious level are those clearing-houses or information networks which attempt to match teachers with specific resources, provide free referral services, evaluate environmental education materials and, generally, provide broad consulting services for environmental education teachers. While the goals of such facilities are laudable, the feasibility of implementing their services has not yet been proven. Lack of funds is the common deterrent, as a Canadian example serves to illustrate.

In 1973 the Canadian National Commission for Unesco was one of the prime movers behind a proposal to establish a national environmental information network. The purpose was to facilitate a flow of environmental education information among educators and environmental groups, enabling them to '. . . profit by new ideas, projects, teaching aids, etc., and have some means of knowing what their colleagues and counterparts are doing . . .'. Five autonomous regional centres, a national headquarters and a twenty-five-month budget of $535,885 were proposed. After more than

a year of unsuccessful attempts to raise the necessary funds from a wide variety of sources the project was abandoned.[15]

A clearing-house facility with more specific focus, namely the dissemination of information on environmental education projects, has fared better. Affiliated with the Ohio State University in the United States and representing not just environmental education, but the broader fields of science and mathematics as well, the Educational Resources Information Center (ERIC) relies on computers to summarize and index a vast array of materials on environmental education projects. Using catalogues located at libraries all over the country, teachers can locate projects developed elsewhere and utilize them in conducting their own environmental education projects. The system is an invaluable resource but needs to be more widely introduced to teachers so that they can use it fully without being intimidated by its immense scope.

The Tasmanian Environmental Centre provides Australian teachers with information on environmental matters. Future plans for this facility include the establishment of an environmental education 'data bank' and a more comprehensive collection of materials to further the development of environmental education throughout Australia. A 1976 world tour was undertaken by Research Officer Michael J. Auden to discuss a variety of school-related environmental programmes with environmental educators around the globe.

Clearing-houses for environmental education information are considered an 'extra', a luxury. In fact, however, they constitute the most viable and under-utilized means for putting teachers in touch with projects and publications that can be incorporated directly into their own programmes with a minimal expenditure of funds or development time. They provide a constant vehicle for updating the techniques and information available to in-service teachers.

Conclusion

Regardless of whether the teacher-training programme is for pre-service or in-service teachers, several concepts or issues should be given high priority:

Teacher-training programmes need first of all to instil in the teachers themselves the kind of sensitivity towards the environment that they will be asked to help develop in their students. The 1970 Conference on Education and the Environment in the Americas emphasized this point when it included the general recommendation that '. . . only teachers who are *themselves* concerned with their own environmental community will be successful in developing similar behaviour in students. Those who teach teachers, therefore, must bring to each individual the widest possible dimensions and the deepest implications of environmental education and its international ramifications.'[16]

It is generally agreed that the best kind of teacher training is that which most closely resembles the 'real thing', i.e. provides the kind of experience that either takes place in a classroom with children or at least includes similar approaches. Because the environmental education now taking place in schools can make extensive use of outdoor parks, recreation areas, urban business centres, etc., there is a need to develop more systematic pre- and in-service teacher education courses regarding the best use to be made of such areas. Year after year, teachers take students to the same nearby places and usually place most of the responsibility for instruction on the staffs of the sites visited. If the teachers were trained to handle the field instruction, they would be able to prepare for, and follow up, the field experiences more effectively. More importantly, they would have an increased sensitivity towards the environment that would be reflected in all of their teaching. Two examples of such efforts are as follows: (a) the National Audubon Society (United

15. 'Canadians Plan Environmental Education Information Network', *Environmental Education Report*, September 1973.
16. Francis K. Sutman (ed.), op. cit.

media in providing continuing education for teachers. Television, radio, professional journals and newspapers are relatively quick and effective ways of reaching large numbers of teachers for improving both their understanding of new issues and their classroom teaching.

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15. 'Canadians Plan Environmental Education Information Network', *Environmental Education Report*, September 1973.
16. Francis K. Sutman (ed.), op. cit.

States) is exploring ways of relating the educational programming at its nature centres more closely to the needs of classroom teachers and is conducting workshops for public school teachers and administrators;[17] and (b) the Curriculum Development Project on Environmental Studies of the Schools Council (United Kingdom) is helping teachers to utilize inductive education materials and approaches in field work.[18]

Teacher environmental education programmes should place a strong emphasis on the many kinds of soft and hard materials that are and will be available for classroom instruction—knowledge about what materials currently exist, expertise in how to best locate, select and adapt materials for local programmes, and most importantly, how to use them effectively in classroom programmes. Most studies of classroom activities show that students spend more time interacting with materials than listening to teachers talk. This should be even more true for environmental education. The Putting Research into Education Practice (PREP) programme in the United States outlines some information and programme strategies in this area in its series on Environmental Education Programmes and Materials.[19] A number of reports describe some of the existing materials and provide some models of materials utilization[20] but because the focus of most environmental education programmes will be on local situations, teacher educational programmes should develop their own unique materials and catalogues and instructional strategies.

The adequate training of environmental education teachers must be accompanied by an awareness of the need to apply their personal commitment and specialized training outside the classroom. The goal of teacher education must be not only to train and retrain teachers to be effective environmental educators in the classroom—although that is certainly important—but to help them to integrate their programmes into the world at large. This need was best summarized by William Stapp:[21]

> Think of the environment of the State of Michigan as a huge classroom, and think of every citizen and organization as learners engaged in critical thinking about what has to happen if we are going to solve our environmental problems. What we are into here is a state-wide environmental encounter. It is much broader in scope and has a longer time span than the encounter projects that individual teachers and students can design within schools, but that is the only difference. Educational mini-encounters conducted in conjunction with class work develop youngsters so that they are prepared for real maxi-encounters of the kind now facing all Michigan citizens. Once enough educators, citizens, legislators, and agency officials make this connection between education, environmental, and government issues, we can solve the problems that are now lowering the quality of our environment. I think it can be done.

In summary, it is possible to conclude that the development of teacher education programmes for environmental education requires the following:

Articulation of the expected competencies—regarding knowledge, attitudes, skills and behaviour. Most teacher education programmes around the world speak generally of the content need as one that essentially requires teachers: (a) to learn the content of environmental education as well as (b) to learn how to teach it or translate it to students.

Identification of target populations for training: pre-service and in-service teachers; teachers of environmental education; teachers of other subjects; teachers of environmental education and other subjects.

Assessment of related concepts and programmes (like those mentioned above).

Assessment of available research, experience models and materials on environmental education.

17. Charles E. Roth, *Environmental Education 1970. A Summary Report on the State of the Art, Pre-School College*, Washington, D.C., The Public Broadcasting Environment Center, 1970.
18. Robert E. Roth and Stanley L. Helgeson, *A Review of Research Related to Environmental Education*, Colombus, Ohio, Ohio State University and the Education Resource Information Center of United States Office of Education, 1972.
19. Stanley Helgeson and Helburn Nicholas *et al.*, *Environmental Education Programs and Materials, Putting Research into Educational Practice Report No. 33*, Washington, D.C., United States Government Printing Office, 1972.
20. David J. Lockard *et al.*, *Working International Bibliography on Trends in Environmental Education—1975*, College Park, Md., The International Clearinghouse on Science and Mathematics Curricular Developments, 1975 (prepared for Unesco).
21. Stapp, *Michigan's Environmental Future. A Master Plan for Environmental Education.* op. cit.

Development of an array of programme delivery systems, e.g. competency-based education, teacher centres.

Use of the local environment and community as a learning resource.

Although much of what is developed under these categories will have wide application around the world, there will be significant differences from place to place. For example, while in some Western countries the teacher himself can develop the curriculum range along certain general prescribed lines, the East European teacher is rather strictly subject to a curriculum scheduled from lesson to lesson.[22] Such approaches have strong implications for the design of teacher-training programmes.

The following guidelines and constraints should be kept in mind when developing teacher education recommendations, as they affect the implementation of training programmes in a very practical and real way:

Almost all environmental education programmes at the pre-university level are integrated with other components of the curricula. Therefore, environmental education is, to some extent, the concern of all teachers of science, social studies, languages, arts, etc.

The training of specialists in environmental education for the general education levels is not recommended. It may be more appropriate for the higher levels.

The systems of teacher education at the tertiary level are not uniform in the different parts of the world. There are two main systems: (a) tertiary level for the education and preparation of secondary-school teachers; (b) tertiary level for the education and preparation of primary-school teachers. Secondary teachers take most post-graduate work.

In some countries, teacher education is also conducted at the secondary level.

There is a general shortage of qualified teachers in most parts of the world, especially in the fields of science and mathematics. This affects the student teacher selection process.

In-service, or continuing, education programmes are not usually the responsibility of the tertiary level alone. They are also the responsibiligy of other professional organizations and personnel.

A review of international conferences held over the last five years reflects a strong world-wide commitment to the concept that adequate teacher training is a most vital link in the process of educating environmental decision-makers who can take intelligent action to manage and protect their surroundings. This commitment is receiving practical application in scattered, exemplary programmes around the globe. What must now be achieved is the dissemination of techniques, programmes and materials on a broad scale, throughout the tertiary level; the catalyst will be funds, coordination and the support of both governments and school administrators throughout the world.

22. Jan Čeřovský, 'Environmental Education: Yes—But How?', *Your Environment,* Vol. II, No. 1, Spring 1971.

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9. Environmental studies for specialists

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Preliminary statements

Diversity of conditions and wide range of approaches

Because goals, institutions, traditions and perceptions of problems vary, while terms are often imprecise, it is not desirable, even if it were possible, to look for universal moulds in environmental education for professionals. On the contrary, educational programmes must be adapted to the socio-economic conditions of each region or country.[1]

Sharp distinctions should be made between the industrialized and developing countries, and sometimes between different societies in each country. Whereas in developing countries the emphasis must be placed on a balanced development of natural resources, water supplies and sewage, urban settlements, and rural development, in the more industrialized countries pollution and transportation aspects may need greater emphasis.

No uniform solutions are desirable. It is, however, of the greatest importance that governments and institutions attempting innovative reforms should be provided with well-documented alternatives in order to reach their decisions. This whole process should be based on over-all national policy considerstions.[2]

To meet the rapid development in existing disciplines as well as the appearance of new environmental fields, there is an urgent need for reappraisal of our present systems of educating specialists involved in environmental matters.

We must be prepared to adopt new forms of environmental education based on systematic research in curricula design and educational methodology, and on a planned combination of initial education and continuing education. The initial education must be designed on the assumption that appropriate forms of continuing education will be available throughout the careers of those concerned. Hence, the initial education must equip the future specialist to face unknown future developments and not just short-term contemporary reality.[3]

1. G. Budowski, *The Privileged Role of Education in Environmental Conservation*, London, Ont., August 1972. (International Workshop on Environmental Studies in Higher Education and Teacher Training.)
2. UNEP, *Meeting of Experts on Environmental Aspects of Engineering Education and Training, Final Report*, Paris, 1974.
3. FEANI, *Continuing Education for Engineers* (report presented at FEANI-Unesco Seminar, Helsinki 1972).

Environmental education at university level

Basic principles for the elaboration of programmes

The major aim of university environmental education should be to help students develop broad concepts useful in resolving resource management and environmental quality problems in the light of long-term goals.[4]

To fulfil its role in the present changing conditions of the world, the university must move in four directions with respect to environmental education:

Strengthening of existing disciplines. The existing disciplines should be modified to support the search for high-quality environmental conditions for man, and to familiarize students with the existence of environmental problems.

Creation of interdisciplinary and integrative programmes. The university has a role to play in combining the expertise of different disciplines for the understanding and solution of a number of problems that transcend the traditional disciplinary boundaries.

Concept of a problem-oriented, socially concerned, and integrated educational plan. All university activities and all areas of knowledge could be relevant to a major social problem. This involves application of learning, knowledge and research to the problems of society.

Methodological approach. In many cases, a radically new framework for presentation is required, one which involves the future planner, architect, conservationist, civil engineer, social worker, etc., in common problem encountering, and problem-solving experiences. The reference point for such programmes should be the environment itself rather than the future profession, the process of activity in the environment rather than the shape or new model of any discipline.[5]

Necessity for change at the university level

Implementation of interdisciplinary fields and programmes is often handicapped by traditiona university subject areas and by the continuec separation of the natural and social sciences. Th conventional departmentally oriented teachin and research programmes have often hinderec cross-fertilization of ideas. The successful creatio of interdisciplinary and integrative programme requires a new approach where the transcendenc of the disciplines will be recognized and clos interaction of different disciplines and facultie encouraged.[6]

Need for environmental professionals

Job opportunities

As pointed out by Professor Jan H. Juda,[7] th rapidly growing threat to the environment con stantly increases the demand for specialists i environmental protection. In this case, ther should be clear distinctions between the sub categories of specialists, e.g. water protectio engineers rather than environmental engineers.

On the other hand, there is an urgent an increasing need for 'environmental integrators' this is a new type of professional having at th same time a background of specialization and a interdisciplinary environmental education. Thes environmental integrators should be placed i positions where they can influence decision makers effectively.

The job opportunities in environmenta

4. *Toward a National Strategy for Environmental Education* (draft Madison, Wisc., The University of Wisconsin (Conservatio Education Programme).
5. B. Goodey, 'Professional Barriers', *Bulletin of Environment Education*, No. 7, November 1971, p. 15.
6. R. A. Eden, *Higher Education Programs in Environmental Education Great Britain*, IUCN, London, Ont., 1972 (Internationa Workshop).
7. Jan H. Juda, 'Considerations on the Organization of Training i Environmental Engineering', *Continuing Education for Engineers*, p 55–79, FEANI-Unesco, 1974.

management may be divided into two broad categories:

Micro-scale: (a) ecology; (b) earth sciences; (c) resources and recreation; (d) environmental design; (e) environmental protection.[8]

Macro-scale: complex interdisciplinary problems of environmental management within the concept of total environment.

General classification of professionals involved in environmental concerns

The problem is to define what kind of professional training is needed to succeed in solving environmental problems, to make the best use of the environmental resources, and to undertake the most appropriate management of the total environment.

A guide to the types of personnel required for making and implementing environmental management decisions may be taken from a framework for environmental questions developed by Christman.[9] The author bases his model on four categories of operation:

Need perception. Studies of human motivation; goal and value discrimination as a function of culture, personality, and experience focused on the need for space, food, shelter, mobility, etc. (Personnel required: sociologists, psychologists, architects, nutritionists, engineers, public administrators, planners, public health specialists, representatives of the public (politicians).)

Resource description and technical developments. Studies of the quantity, quality and characteristics of any material useful to man; the ocean, forest, atmospheric resources, etc., and devices used to extract, convert or use these resources. (Personnel required: engineers, physicists, chemists, biologists, geologists, agriculturists, industrialists, etc.)

Public policy. Studies of institutional characteristics; governmental and private agency strategies for implementing or regulating actions affecting uses of resources. (Personnel required: political scientists, public administrators, lawyers, economists, financiers, planners, journalists, politicians and the people as represented by official and voluntary local organizations, students, teachers.)

Effects analysis. Studies of impact on resources resulting from activities undertaken to satisfy perceived needs; development of environmental quality indicators. (Personnel required: scientists, engineers, medical and public health specialists, agriculturists, industrialists, representatives of the public at large.)

It is evident that few professions are excluded from the decision-making process in one role or another. This diversity will have implications on the design of curricula and the methodological approach.

Professional barriers

Increased understanding between different professions is imperative, as it increases motivation to tackle in a multidisciplinary manner complex problems of importance to society.

One of the key elements in any future social planning is the 'breaking of those professional barriers which seem rigid and unhelpful'.[10] Lionel Brett has underlined the many problems which would seem to emerge from an overdeveloped division of labour between the wide range of professionals involved in environmental design and maintenance, a division which can be extended to include administrators and the welfare professions. Brett's answer is that these professionals should go through (or, more properly, participate in) a common grounding in environmental studies.[11]

8. National Society of Professional Engineers, Pollution Control, *Final Report*, Chapter 8, Washington, D.C., March 1972. (Skills Conversion Project.)
9. R. F. Christman, 'Engineering and the Environmental Challenge', *The Trend in Engineering*, Vol. 24, No. 1, p. 5.
10. Gordon Cherry in *Bulletin of Environmental Education*, No. 7, November 1971.
11. Lionel Brett in *Bulletin of Environmental Education*, No. 7, November 1971.

Environmental professional education

Over-all objective

Each specific resource use raises a series of questions about man's relationship to his total environment, and the choice of alternatives among competing resource uses involves legal, economic, social, administrative, technological, aesthetic, ecological and ethical considerations which in turn span manifold governmental agency and university department lines.[12]

Education programmes for environmental professionals must ensure that environmental considerations are taken into account in development projects, regional planning and resource management activities, especially with reference to economy of energy and other resources, development and dissemination of environmentally sound technologies, prevention of pollution and promotion of healthy urban and rural environment. Urgent priority should therefore be given to: (a) producing the environmental specialists and other professionals needed to deal with the complex problems facing mankind; (b) modifying the preparation of all the professionals involved in environmental management, or in the creation of environmentally satisfactory living conditions.

Training goals for specialists

The trend towards broad environmental concepts by no means weakens the role of the specialist. It does call upon him to have greater understanding of the long-view environmental goals and of the countless interrelationships which must operate if these are to be achieved.[13]

The over-all objective is the strengthening of educational programmes by: (a) intensification of the training of specialists in the basic environmental fields, with an understanding of the environmental impact of their special field of competence; (b) advanced training in the environmental management techniques associated with each of the professions concerned; (c) introduction into existing curricula of training for these professions, of environmental concepts and of a set of general notions on the main problems of the environment; (d) training of personnel in the techniques of incorporating environmental considerations into development planning.

New type of environmental professional

The more innovative programmes may open up possibilities for educating a new type of environmental professional at the graduate level,[14] one who can participate in the elaboration of decisions concerning environmental planning in the broadest sense.

There is a need for environmental managers who can deal effectively and creatively with whole policy issues in all of their complexity.

In other words, it is important to train public policy formulators or administrators who specialize in the management of interdisciplinary systems. Such environmental integrators[15] are persons having the capacity to direct the multidisciplinary teams required for environmental work.

'*In the production of new professionals do we start with generalists and make specialists out of some, or do we start with specialists and make generalists out of some? Do we modify, expand, broaden, intensify the curricula of existing departments and schools, or do we invent custom configurations?*'[16] There is no single solution but the following principle may give guidance: whatever the type or level of professional environmental management education, the product should be specialized enough to be viable in field operation and broad enough to appreciate the

12. *Towards a National Strategy . . .*, op. cit.
13. D. H. Simms, *Conservation Education in Universities and other Institutions of Higher Learning in the USA* (IUCN, Symposium on Conservation Education at the University Level, Lucerne Switzerland, June 23–4, 1966).
14. G. R. Francis, 'Man-Environment Studies: One Approach to Undergraduate Education', *Workshop on Environmental Studies in Higher Education and Teacher Training*, London, Ont., September 1972.
15. UNEP, op. cit.
16. *Towards a National Strategy . . .*, op. cit.

complicated biotic and human phenomena over which he presides. '*The goal here is not to produce generalists with no specialty but specialists with breadth.*[17]'

Programme content

Difficulties

Due to the great variety of specialists required, the wide range of disciplines involved and the diversity of the socio-economic conditions encountered, certain difficulties arise in defining programme content: (a) the areas of knowledge required to deal with environmental issues seem very broad; consequently conflicts between depth and breadth may occur; (b) the trend is towards a reduction in the length of studies necessary to acquire a given qualification without reducing standards;[18] (c) there is a contradiction between the aim of giving as complete an environment education as possible and the difficulty resulting from the very diversified background formation of the candidates.[19]

Part of the solution lies in an improved methodology considering that the aim is not to know much, but to be educated in the art of acquiring knowledge and using it purposefully.[20]

The improved methodology needed consists in: (a) perfecting teaching methods by accelerating the learning process; (b) carefully selecting knowledge to be acquired; (c) combining study with problem-solving work. This last point is very important and relates to the broad agreement about the responsibility of the university to tackle environmental problems confronting the community. To make programmes more economical, specialized institutions could serve regional needs.

Environmental content of specialized curricula

The question is: What should professionals of various fields, more or less related to the environment, know about environmental management education in order to contribute to the betterment of the human environment?

Environmental education background in specialized fields. The implementation at the undergraduate level of an environmental education background must be considered of the utmost importance for future specialists.

The problems of environmental aspects of the education of professionals for environmental planning, management and development can only be approached effectively by a consideration of both the socio-humanistic and the scientific-technological elements in the process of education of these professionals.[21]

Consequently it is absolutely necessary at university or higher education levels to introduce some concentration not only on the imperative need for environmental protection, but on the complex nature and interdependence of the phenomena involved. That objective may be achieved by creating one or more special courses on environmental subjects which must comprise both the aspects relating to technology and natural sciences as well as the aspects relating to social sciences.

Necessity of adapting specialists' training to environmental concerns. In addition to providing specialists with an environmental education background, programmes must foresee a realignment of subject content to allow for ecosystem or process-centred, as well as human-centred, studies.[22]

In recent years, the number of specializations in environmental protection has increased considerably. There is, therefore, an urgent need for the adaptation, renovation or creation of courses or programmes needed to solve environmental problems. Advanced training in environmental management techniques related to each of the professional fields involved is particulary required at the undergraduate as well as the post-graduate level. Thus, special environmental teaching pro-

17. ibid.
18. *Unesco International Co-ordinating Council of the Programme on Man and the Biosphere.* Final Report, First Session, Chapter VII: *Education, Training and Exchange of Information* (Unesco Doc. SC/MD/26). Unesco, Canadian National Commission for Unesco, *Canadian Reactions to the Faure Report,* Paris, Unesco, December 1973 (Conf. Doc. 12).
19. E. Binder, *Teaching of Environmental Sciences at the University Level,* December 1971 (Rüschlikon Conference, IUCN Conf. Doc. 33–6/KP/5).
20. J. Riha, 'Training in the Synthetic Branch: Care for the Human Living Environment', *European Working Conference on Environmental Conservation Education,* Rüschlikon, December 1971.
21. UNEP, op. cit.
22. J. C. Smyth, *Thoughts on the Planning of an Environmental Studies Course, International Workshop on Environmental Studies in Higher Education and Teacher Training,* London, Ont., September 1972.

grammes and courses for engineers, architects, agriculturists, foresters and other specialists should be promoted: courses in ecology, as well as courses in the integrated study and rational management of natural resources.

Particular attention should also be given to the introduction of ecology in the training of potential decision-makers such as economists, lawyers and administrators.[23]

Curriculum guidelines. The following scheme is adapted from one proposed at the meeting of experts on environmental aspects of engineering education and training,[24] which can be applied, *mutatis mutandis,* to the training of other specialists.

Undergraduate education: (a) introductory courses on environmental protection and quality, including environmental and ecological principles and studies aimed at a general understanding of environmental problems—but particularly those related to the field of specialization; (b) programmes centred around society, technology and development as part of the social sciences and humanities context—as a possible means of strengthening social science components, experimentation should be encouraged in the use of case studies on the past and present impact of technology on man and his environment; (c) projects emphasizing interdisciplinary and systems approaches—depending on their specialty, students should be trained to approach complex situations requiring interdisciplinary knowledge and the use of systems analysis methodology; (d) courses, workshops and seminars should be developed in each country in areas of local relevance with, if necessary, support or expertise from abroad; (e) workshops on environmental standards, instrumentation and techniques should be for professionals preparing for positions in government and industry.

Whenever necessary, training on environmental problems of a special nature must be included in specific branches.

Post-graduate education: (a) programmes ought to be offered in environmental planning, management and development, based on 'system' and 'resource' approaches; (b) professionals intending to specialize in environmental impact should pursue suitably arranged post-graduate higher degree courses (c) workshops could be held so as to enable different kinds of educators to develop environmental insights in their respective disciplines, for use in their instructional programmes.

Training of environmental integrators or environmental managers

True interdisciplinary studies

Particular attention should be paid to the training of environmental integrators or managers who must become the leaders of multi- or interdisciplinary teams involved in integrated environmental studies and broad planning projects, and who must participate in decision-making processes. It is also at this level that the training of high-level decision-makers, politicians and society planners in general takes place.

The content must deal with the analysis, planning, development and management of natural and man-made environments; the students must become familiar with the objectives, principles and methods of global environmental planning processes.[25]

Goals of interdisciplinary post-graduate programmes

The training of environmental integrators should be provided at the post-graduate level, grafting an additional environmental education to a basic formation (specialty) obtained in one of the various areas of interest involved in the environmental field. The goals are: (a) to improve cooperation between disciplines or to join the activities of major groups interested in various fields related to environment—this reduction of the boundaries between disciplines allows a progressive evolution from a multidisciplinary to an interdisciplinary stage; (b) to combine expertise of different disciplines so as to give scope to studies

23. Unesco, *International Co-ordinating Council . . .*, op. cit.
24. UNEP, op. cit.
25. L. K. Shaposhinkov, *Experience in Conservation Education and Propaganda of Nature Conservation in the U.S.S.R. and in the Countries of Eastern Europe*, p. 41–8, 1965 (IUCN Publication New Series, Supplemental Paper No. 7).

which must range over the complex inter-relations of man with the biophysical, socio-economic and man-made physical environments; (c) to encourage interdisciplinary environmental research—depending on the highly complex character of the environment, all research studies and project development in this field can only be carried out by multidisciplinary, or better, interdisciplinary teams composed of relevant technical specialists, who have a deep understanding of environmental issues, and of environmental integrators who have a special interdisciplinary training; (d) to enable mutual exchange of information and mutual understanding among the various professional groups to take place—in order to understand environmental situations, graduate students should learn to work in team situations, bringing together engineers, economists, managers, lawyers, sociologists, political scientists, etc.; (e) to explore and develop a wide variety of problem-solving processes capable of integrating more and more of the unique skills and special knowledge of the various disciplines and professions concerned with the natural and man-made environment; and (f) to combine efforts towards the understanding and solution of interdisciplinary problems.

Types of implementation

At the university level, various kinds of implementation in connexion with environmental concerns may be distinguished, depending on the goals and study levels.

To get a world-wide picture of the state of environmental education at higher levels, a questionnaire was submitted in 1975 to a number of universities or associated technical institutes. The results are given in Table 1.

TABLE 1. Results of the 1975 world-wide survey on environmental education for specialists[1]

Country	Institution	Level				Projects	NP
		A	B	C	D		
New Zealand	The University of Auckland [1]					*	
	School of Architecture [2]				X	X	
	Faculty of Science [3]				X	X	
	The Law School [4]			X		X	
	Victoria University of Wellington, Faculty of Science						
	Department of Geology		X				
	Department of Geography			X			
	Department of Botany [5]			X		X	
	Department of Botany and Zoology		X				
Australia	University of Queensland						
	Department of Architecture [6]			X	X	X	
	Department of Civil Engineering [7]			X		X	
	Master of Engineering Science [8]		X			X	
	Department of Economics [9]			X			
	Department of Geography [10]	X	X	X	X		

1. Explanation of the table: Level A, the students receive only a general course on ecology; B, more emphasis is given to the interrelationships between man and his environment; development of awareness of the impact of technology on the environment, e.g.: pollutions, modification of the natural balance, consequences on human development, etc.; destruction of wildlife or habitats; C, the environment is considered in the broad sense of total environment, including not only ecological aspects, but also the interrelated human aspects (i.e. sociological and economic aspects); we here face an interdisciplinary approach to environmental problems; D, participation in an interdisciplinary programme. All aspects of the total environment are considered as linked together, each discipline or area of interest contributes with the others to an interdisciplinary approach of environmental concerns; NP, no programmes or courses related to environmental matters; (*), general information only submitted; X, specific programme data submitted. The figures in square brackets refer to the notes at the end of the table. *Source:* M. Maldague, *International Inquiry on Environmental Education in Universities and Higher Technical Institutes,* 1975.

Country	Institution	Level				Projects	NP
		A	B	C	D		
	Department of Geology [11]	X	X			X	
	Department of Zoology [12]	X	X	X			
	Department of Botany [13]	X	X			X	
	University of Sydney						
	Faculty of Law [14]						X
	School of Biological Sciences [15]		X		X	X	
	The University of Western Australia, Nedlands						
	Faculty of Architecture	X	X	X	X		
	Faculty of Law [16]	*					
	Murdoch University, Perth [17]						
Malaysia	University of Malaysia, Kuala Lumpur						
	Faculty of Science		X				
	University of Science [18]			X		X	
India	Banaras Hindu University						
	Department of Botany [19]						X
	Indian Institute of Management, Ahmedabad [20]						X
Iran	University of Tehran, Faculty of Public and Business Administration						X
Lebanon	Université Libanaise, Beyrouth						
	Institut des Beaux-Arts [21]					X	
	Lebanon University						
	Faculty of Business Administration [22]						X
Indonesia	University of Indonesia						
	Faculty of Law [23]				*		
	Bandung Institute of Technology						
	Department of Biology [24]	X	X	X			
Japan	Kyoto University						
	Faculty of Law [25]						
	Department of Forestry			X		X	
	Hokkaido University						
	Faculty of Engineering [26]				X		
	Faculty of Law	X					
	The University of Tokyo						
	Faculty of Agriculture [27]			X		X	
United Republic of Tanzania	University of Dar es Salaam						
	Department of Civil Engineering [28]	X					
Mexico	Universidad Nacional Autonoma de México [29]						
	Facultad de Contaduria y Administración						X
	Faculty of Engineering [30]	X					
	Department of Geography			X	X	X	
Brazil	Universidade Federal do Ceará						
	Departamento de Teoria Econômica [31]					X	X
Czechoslovakia	Technical University of Prague						
	Faculty of Nuclear Science and Physical Engineering [32]	X					
Poland	University of Warsaw						
	Faculty of Chemistry [33]					X	X

Country	Institution	Level				Projects	NP
		A	B	C	D		
	Department of Geology (Institute of Environmental Sciences and Protection of Natural Resources) [34]				X	X	
	Faculty of Law and Administration [35]				X	X	
Yugoslavia	University of Zagreb, Institute for City-planning, School of Architecture [36]			X		X	
Austria	Universität in Graz	X	X				
	Johannes-Kepler-Hochschule			X			
Federal Republic of Germany	Universität Dortmund, Economics and Social Sciences [37]			X	X	X	
	Universität Stuttgart, Institut für Baukonstruktion [38]		X				
	Technische Hochschule Darmstadt [39]	X				X	
Sweden	University of Stockholm						
	Department of Human Geography [40]	X		X	X	X	
	Geological Institute	X	X				
	Institute of Botany		X				
	Chalmers University of Technology [41]	X	X				
	Uppsala University [42]		X			X	
Spain	Universidad Politécnica de Madrid, Escuela Superior de Ingenieros Industriales					X	
Ireland	University of Dublin, Faculty of Natural Science [43]				X	X	
	University College, Dublin, Faculty of Engineering and Architecture [44]		X				
	Trinity College, Engineering School						X

Notes

1. Auckland offers Environmental Studies as a B.Sc. subject; one paper at Stage II level is available, *Environment 200*, carrying 3 credits; the credit value was raised to 4 in 1975. *Environment 200* provides an introduction to environmental topics of global significance. There is also a special committee of the Senate called the Board of Urban Studies comprising elected representatives from a number of departments including architecture, town planning, geography, sociology, civil engineering, law and political studies. First objectives are the obtaining of information on, and co-ordination of, university research on urban and rural studies. The board has concerned itself with matters such as the introduction of a diploma course in human ecology, the spread of ecological and environmental information, etc. Environmental law is being considered within the law course.
2. New Zealand (The University of Auckland, School of Architecture). The course is still primarily a course for architects but, in an interdisciplinary environmental design sense, is rather restrictively professional. There are contributions from virtually all disciplines, perhaps least from biologists.

   In a more general way, the University of Auckland has several professional and general faculties and departments which embrace all aspects of environmental concern. Each helps service others from its special viewpoint. The Board of Urban Studies encourages interdisciplinary co-operation. There are no vague general diplomas in environmental studies as these are regarded as likely to be superficial. There are also projects in continuous environmental extension programmes.
3. Undergraduate (second year) multidisciplinary course organized by the Faculty of Science, but including contributions from arts, commerce, engineering, medicine and law. One year. The course considers environmental problems of global significance, at an introductory level for second-year undergraduates. Project: It is expected to develop a post-graduate diploma course for environmental specialists who will already have a master degree before entering the course.
4. A course in Environmental law is offered as an advanced subject for the LL.B. degree and also as an LL.M. subject. One year. The course is taught on the basis of identifying problem areas, e.g. air pollution, coastal development, cost-benefit analysis, technology, looking at the existing law both in New Zealand and overseas, and examining developing trends. New areas of law are examined as they develop.
5. The inclusion of ecology as fragments within both Botany and Zoology majors does not allow a fully integrated approach. It does, however, ensure an ecological component in the training of Botany and Zoology students. Project: It would involve either completely new courses integrated at Level B, or the use of a prescribed course from existing undergraduate courses, the whole integrated at Level B in a specialized Honours course in Ecology. Problem: Conservatism on the Professorial Board. Project: Personal endeavours to educate the Professorial Board to see the need for environmental education.

6. The variance in aims, objectives, attitudes, methodology and terminology of various disciplines makes integration difficult. Project: A pos graduate 'Man and Environment' research unit involved in several interdisciplinary programmes. It is hoped that this will feed back mo deductive information into undergraduate teaching.
7. The best graduates, who are most likely to be promoted to positions requiring multidisciplinary understanding, are difficult to attract further academic study due to poor funding of post-graduate programmes in competition with prospective employers' offers. Projec Within a few years, a broad range of additional environmental engineering subjects and related courses in other disciplines will l introduced to the master's programme. Eventually, it is hoped, a strong multidisciplinary doctoral programme (Level D) will be achieved
8. In an expanding technology, it is difficult to find time to allow more interdisciplinary studies without either sacrificing depth for breadt or causing undue specialization, both of which would have serious disadvantages. Project: Environmental considerations are alreac receiving more attention in all civil engineering courses, rather than being treated as separate subjects. This trend will continue towa Level C.
9. The department offers a course lasting one semester in environmental economics in which post-graduate students may enrol. Consider topics: World model, natural resources, population, food, capital, pollution.
10. Geography is considered in part as being the study of human ecology especially as related to space. Therefore many courses are directly indirectly environmental, e.g. resource management, rural land use, biogeography, population and resources, economic geograph climatology, urban geography, etc. In these the environment is approached at all levels (A, B, C). At Level D: introduction environmental studies, jointly sponsored by geography, botany, architecture. Problems: Discipline-oriented individual resistance, lack formal multidisciplinary organization, growth-minded society.
11. The geology department is heavily involved in environmental studies from two aspects. First in the form of development of eart resources; in this field we not only train students to work for mining and oil companies, but are taking steps to warn of the consequences the abuse of these resources. There is a second area of concern, that is that the present ecology has a past; as palaeontologists in th department, we are intimately concerned with the evolution of life and its changing relationships to changing environment. Although course this is past history it none the less sets the scene for the present and is indispensable for any profound understanding of th environment and Man's relationship thereto. Problem: Overwhelming amount of basic science that needs to be covered. Project: Cour on the use and mis-use of mineral and energy resources by Man.
12. Problem: The emotional attitudes engendered by the popular writers which makes it impossible for some students to be objective.
13. Difficulties in integration in multidisciplinary studies for all but the brightest students—ever-increasing 'ecosystems analysis' approacl Project: Experimenting with ecosystem analysis as an integrative teaching tool.
14. The curricula of the undergraduate courses have recently been revised and the application of this curriculum will postpone furth development for some time. There is, however, space for optional subjects and no doubt matters concerning the environment will be take up as soon as possible.
15. Courses in year 1, 2, 3 on populations, communities, management.
16. Discussion of aspects of environmental considerations in property law course. No particular course at this stage giving more tha rudimentary details. A seminar is planned on urban problems in future years. Environmental issues are coming into the foreground i Western Australia when before there was little interest and consequently little interdisciplinary contact in the university.
17. There is a Department of Environmental Studies at Murdoch University in Perth. More courses will be brought into being in the nea future as staffing priorities change.
18. The lack of trained personnel is one of the greatest limitations to the development of environmental education. There is also a serio shortage of national or regional scientific organizations which can direct and administer such educational programmes, especially provide the expertise, facilities and the data to assist and further promote such studies. Project: Future training of technocrats in this field.
19. Still in the planning phase; lack of resources to implement whatever is planned.
20. Post-graduate Diploma in Business Administration. Environmental education is restricted to economic and social environment.
21. A general course on environmental matters will be offered next year.
22. Pollution and environmental problems do not seem to be important issues as the country is not yet industrialized to the degree man Western countries have reached. Plans seem to be at the more basic level of fostering economic and social development, as does th structure of education.
23. No specific course on environmental education. Incidental participation in seminar courses dealing with sociological and economi problems in relation to environmental issues.
24. B Level, during first years common to all students. A, B, C level for students majoring in Biology. The major problems facing th development of environmental education are lack of books, adequate teaching staffs, teaching facilities, such as film, audio–visual aids, etc.
25. Undergraduate courses given by the college of liberal arts.
26. An environmental department was started in April 1975. Environmental education programmes for master and doctor degrees. Projec Participation in an interdisciplinary programme by members of the science, agriculture, sociology, economics and medical faculties.
27. One of the major problems is that the separations between each faculty and between each department are, for historical reasons, ver pronounced. Project: At the University of Tokyo, post-graduate courses in new systems have been planned. One of the aims of the ne plans is to make the courses interdisciplinary, incorporating life sciences and environmental sciences.
28. Students receive courses on public health engineering and sewage disposal, while environmental conditions are being considered in oth civil engineering subjects as well.
29. Projects: The Research Institutes, at the graduate level, participate with governmental offices in some programmes related to manageme and the use of renewable and non-renewable resources.
30. Within the subject of Systems Engineering, different topics are being studied in connexion with ecology. The Mechanical and Electric Department is including general ecology in its revised programme of studies.
31. It might be possible in the future to include in the curriculum an interdisciplinary seminar on environmental problems.
32. Problem: More emphasis is necessary on the complex understanding of environmental problems. Project: The research programme of t university includes a complex project of environmental study and the ecological consequences of technological activity. This researc

should also be reflected in the training of teachers and students.

33. There is a project to organize a new institute for faculty with participation of the existing faculties of biology, chemistry, geology and geography for the training of students in environmental problems.
34. Problem: A closer co-operation with specialists from other fields and especially with specialists in spatial planning.
35. Project: To organize special interdisciplinary environmental studies (special faculty or institute) including all aspects of this problem (i.e. economic, political, legal, biological, etc.).
36. Preparations are under way to found a complex post-graduate study course on ecology and environmental development. The post-graduate programme should include, among others, courses on city planning and environmental development, landscape protection, community hygiene, etc.
37. There is a project for an institute dealing with urban economics which will function at levels C and/or D.
38. Psychological aspects are taken into consideration in the man-made environment.
39. It is planned to enrich the specialized training in all disciplines established at the Techniche Hochschule by courses on environmental science and technology, including the sociological, ecological and economic aspects. Problems: The major problem in the development of environmental education—which, in all cases, must be interdisciplinary—is the growing specialization of all disciplines and the underdeveloped ability of the specialists to co-operate. At the university level, the main task will be: (a) to reduce or modify the specialized training in non-environmental fields; (b) to organize post-graduate interdisciplinary courses relating to environmental problems; and (c) to provide planning and organizing capacity.
40. Project: Curriculum on human geography dealing with problems in connexion with the evolution of the agrarian landscape in Sweden today.
41. The problem is mainly to integrate this education with ordinary subjects, e.g. chemistry, water supply, while still maintaining it as environmental education.
42. Two courses deal with environmental problems: (a) a basic course (A1) on environmental problems at the Biology Department; (b) a basic course (A2) on physical geography at the Department of Physical Geography. The A2 course requires a completed A1 course. Both courses are intended for students from various subjects who want to widen their knowledge of environmental problems. In addition, environmental aspects are gradually being introduced in many other courses, such as medicine, chemistry, physics, pharmacology, psychology, law. There is a clear trend towards a more interdisciplinary approach to these problems both in course studies and in research.
43. The environmental education in this faculty depends on the appropriate selection of unit courses given by at least five separate departments. An interdepartmental environmental sciences group is at present being formed in the faculty to facilitate research co-operation and to develop a moderator's course in the environmental science area.
44. At the end of the primary degree course in engineering which is of four years' duration, students who attain honours standard may continue for a fifth year to pursue post-graduate studies in the form of individual research projects. At present, the Engineering School is actively engaged in the fields of atmospheric and water pollution.

Problems and obstacles

The working group which considered this paper at the Belgrade Workshop on Environmental Education (October 1975) mentioned the following points among the problems and obstacles anticipated in the education of qualified professionals: (a) a danger of isolation of the new specialists from other types of specialists already in existence; (b) the mushrooming of superficial or fashionable labels without substantive changes in the specializations; (c) the prohibitive cost of establishing and carrying out the specialists' programme on a single-nation basis; (d) the misconstruing of international action as interference; (e) the likely frustration of graduate specialists by misinformed policy-makers and decision-makers; (f) difficulty of establishing and maintaining mechanisms to train receptors to accept new ideas and the new specialization; it might therefore be necessary to find some means of reaching non-specialists in positions of power.

Continuing education

Definition

Continuing education may be taken to mean any formal educational activity appropriate for a university graduate other than a programme leading to a diploma or a degree.[26]

The education of the individual is never fully achieved. Education must be an on-going and lifelong process fully provided for by diversified and appropriate means.

Some argue that the task of keeping graduates up to date in a changing and competitive professional environment is even more important to the community than introducing new and professionally immature graduates.

26. A. H. Corbett, 'Continuing Education of Professional Engineers in Australia', *Continuing Education for Engineers*, p. 31–6, 1974.

In formal continuing-education courses the major emphasis ought to be on the stimulation of interest and the creation of an appetite for up-to-date knowledge that will impel the student on returning to his duties to continue to educate himself. In short, the primary objective must be to arouse the desire for the continuing acquisition of knowledge rather than covering specific data in the short space of a week or so.[27]

Educational methods and means

In-service training or continuing education may take various forms: (a) special courses at the university (extension educational services) such as evening courses; (b) residential courses; (c) courses sponsored by professional or learned societies; (d) courses in institutions for continuing education; (e) courses in industrial companies; (f) conferences in the field; (g) intensive, short study sessions; (h) seminars and workshops; (i) courses on radio and television; (j) open-line programmes, operated for example by commercial radio stations; (k) use of audio and video tapes on environmental subjects; (l) guided individual project study; (m) correspondence studies.

The effective application of new techniques such as audio-visual aids or programmed learning calls for great expertise and, possibly, further research. An early survey conducted by Hoben and Van Ormer for the United States Armed Forces concluded that the effect of audio-visual instruction is liable to be transient unless backed up by solid, old-fashioned reading.[28]

There are many other open questions in the continuing education of mature professionals:[29] (a) whether short annual courses are preferable to longer courses at less frequent intervals; (b) whether part-time study is preferable to full-time study; (c) the relative merits and demerits of in-company and external courses; (d) whether external courses are best provided by universities, professional institutions, private consultants, or a combination of these.

Organizational aspects

The following aspects have to be taken into consideration to succeed in a process of con - tinuing-education:[30]

Distribution of a preliminary volume of notes which will enable the student to review relevant areas of knowledge.

Adaptation of methods of instruction to the needs of the students.

Distribution of carefully prepared printed notes covering the content of the course.

Utilization of adequate visual aids in lectures.

For efficiency, the educators must be specialists, and the contribution each is to make to the continuing-education programme must be carefully specified.

For the success of an intensive residential course, arrangements should be made for at least a portion of the academic staff to reside with the students.

There are obvious advantages in locating a residential course in a quiet, relaxing and healthy atmosphere, provided the cost is not excessive and travel facilities are adequate for staff and students. Residential courses are often accommodated in university colleges when undergraduate students are on vacation.

Standards must be found and adopted that are acceptable to both the academic and industrial worlds.

It is important to ensure that the programmes developed make an impact on the neighbouring community and that the latter feels a sense of involvement.[31]

Experience shows that the more restricted and defined the subject, the greater is the interest shown by professionals in the field.

27. F. Warner and R. E. Johnstone, in: *Continuing Education for Engineers*, p. 15–21, 1974.
28. ibid.
29. ibid.
30. S. K. Bose, 'The Status of Continuing Education for Engineers in India', *Continuing Education for Engineers*, p. 37–40, 1974.
31. ibid.

Role of professional bodies, learned societies and organizations

Educational responsibility at professional level

Each type of association or institution, each part of the body politic, must assume its share of responsibility in the over-all educational process. This duty results from the importance of education at large in the decision-making process.

Education and training through professional organizations may have a catalytic effect and stimulate collective thinking between the members.

It seems important to explore the possibilities of such an action on a large scale, to improve environmental understanding and awareness among the members of professional bodies, and to take action to stimulate the implementation of environmental subjects in the curricula at university level.

This professional education is also intended to develop the ability of making effective decisions in practice and formulating laws related to the achievement of environmental quality.

It is the responsibility of the professional bodies to take measures to reduce the barriers which often exist between them and hinder a true interdisciplinary approach to environmental problems. The disappearance of professional barriers through education will facilitate liaison between the different disciplines and professions concerned.

These organizations must also be involved, directly or indirectly, in the preparation and dissemination of printed matter on environmental issues. Responsible special committees or task forces should be formed by professional groups to adapt environmental information to the specific needs of the group concerned. Failure on the part of professional societies to take these steps may retard the development of multi- or interdisciplinary approaches.

Organization of conferences, seminars, study sessions for professionals

Environmental associations should be encouraged to organize conferences, seminars, workshops and study sessions dealing with environmental problems or with special environmental management techniques and methods. For example, some management training sessions and symposia may be organized for the benefit of executives dealing with environmental quality problems.

A number of international seminars and symposia might be promoted for the exchange of information among professional bodies on ongoing national experiments in the field of interdisciplinary environmental education, including me thodology of environmental studies and research at higher levels. Such international symposia or seminars should act as catalysts, contributing to the development of environmental knowledge, the promotion of the most active exchange of information, the improvement of the curricula for the training of future professionals, and the facilitation of a continuous review of research directions and objectives.

Role of professional journals in continuing education

The dissemination of relevant information to the general as well as the specialized public is an important aspect of environmental education. It may be achieved through various means and channels, including professional bodies, societies devoted to various aspects of the environment and their publications.

Professional journals can provide valuable support for the establishment of continuing education. It is therefore of great importance to recommend this element of information, communication and discussion to the young student as well as to the experienced practitioner. As pointed out,[32] however, the content and form of professional publications might be better adapted to the purpose of continuing education. This is not meant

32. H. Hahn, 'Demands of Society with Regard to the Continuing Education of Engineers', *Continuing Education for Engineers*, p. 85–100, 1974.

as a criticism of their scientific or technical quality, but rather a suggestion that they should include pedagogical considerations in the writing or reporting of scientific and technical advances.

Recommendations

In all programmes concerning the education and training of professionals in fields related to environment, the importance of local and global environmental concerns and concepts, should be stressed. *Target:* universities and related institutions.

Basic training of all professionals should include the study of environmental principles so that they foresee, instead of simply reacting to the environmental implications of their work. Whenever necessary, training in environmental matters of a special nature must be included in specific branches of a specialist's education. *Target:* United Nations Specialized Agencies; universities.

At a regional or subregional level, countries having similar ecological and developmental problems should be encouraged to develop links between their higher education institutions and professional societies, so as to develop co-operation in teaching and research in environmental fields, chiefly in the methodological approach. This co-operation might take the form of a regional multinational teaching and research centre in interdisciplinary aspects of environmental education, at the highest level; such a centre should serve for the training of potential leaders in complex interdisciplinary environmental matters. *Target:* Unesco Member States; United Nations Agencies; foundations; international non-governmental organizations.

At a national level, those engaged in the education of specialists whose activities could have an impact on the environment should reappraise the orientation and objectives of teaching and research, taking into account local development needs and environmental conditions and study the need for more environmental studies to be included in the curricula. *Target:* universities; professional societies.

The continuing education of practising professionals should be considered a priority. The professional bodies and educational institutions concerned should make arrangements for in-service training for members of all professions related to environmental matters in view of the rapid expansion of environmental problems and knowledge. Professional associations should see to the inclusion of environmental components in continuing education programmes for their practising members. *Target:* professional societies; universities.

In contributing to regional planning and development, professionals should attach increasing significance to the limits of environmental quality thus developing a better understanding of the interaction of development with the environment. *Target:* professional societies; United Nations Agencies.

Professional barriers should be reduced or even removed by improving the training of all professionals concerned with environmental planning, management and development. *Target:* professional societies.

Studies should be carried out in every country to determine the environmental areas which currently are most important with regard to professional practices, and to outline the qualification characteristics of the personnel whose work will influence these areas. *Target:* Governments of Unesco Member States; professional studies; universities.

An emphasis commensurate with the government's over-all environmental policy should be placed on environmental quality objectives when the reform of higher education is contemplated. It will be necessary at that time to formulate teaching programmes in accordance with the level of previous training received by the potential students and to take into consideration the level of specialization desired. This will be true for undergraduate as well as for graduate studies, and for specialized continuing education. *Target:* universities; professional societies.

In the study of alternatives for the reform of any kind of programme, government and higher education establishments should give due consideration to the need for reorganization of institutional structures; e.g. the creation of inter-departmental institutes or laboratories oriented towards problems of environmental quality and the establishment of new organizational structures to facilitate co-operation between such areas as engineering, architecture, planning, law, economics and social sciences in teaching and research on the environment. *Target:* governments of Unesco Member States; professional societies; universities.

In the regular revision of curricula, attention should be given to the strengthening of environmental concepts, through the inclusion of additional course or through integration into existing programmes. *Target:* universities.

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Part III

Informal environmental education

10. Environmental education programmes for out-of-school youth

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Introduction

The purpose of this paper is to examine the role which out-of-school youth activities play in environmental education, to describe the activities and organizational structures involved, and to determine problems and constraints facing the development of environmental education programmes for young people. The author has attempted to present a world review of out-of-school environmental youth activities, based on his own experience in this field and upon input from some twenty-five environmental youth leaders and educators in Africa, Asia, Australasia, Europe, Latin America, North America and international youth organizations.

Youth is usually defined as being under 28 years old—though this concept differs from one part of the world to another. The effective age range for members of most environmental youth organizations is from 11 to 25 years. Young people comprise more than half the world's population; their education presents a great challenge and also an opportunity to achieve social change and environmental improvement.

Environmental education is essentially a practical process for equipping people with the knowledge, skills and commitment to protect or improve their environment. It is important as part of this process that students come to understand not only what the environmental problems are—e.g. pollution, shortages of food and other natural resources, degradation of soils and ecosystems—but why they have arisen.

In recent years, concern for the environment has become fashionable and environmental organizations have proliferated; but the environment has continued to deteriorate at an alarming rate. One reason for this may be that much environmental education has remained at a superficial level, and in many instances has not addressed itself to the economic, social and political pressures affecting the environment.

Out-of-school environmental youth activities are not exempt from this indictment; but they do provide involvement in society and with actual environmental problems. Out-of-school environmental activities are a valuable extension to formal education at all age levels, and are of special importance for those who have limited access to school education. These activities can provide enjoyment and recreation for young people in their natural environment, while achieving educational objectives and contributing to community involvement. Participation in such activities can also lead to an understanding of some of the root causes of the environmental crisis, such as those which have been identified by several youth organizations: overpopulation; economic systems aimed at growth through induced consumption of natural resources; the unequal distribution of wealth between industrialized and less-developed nations, and between different sectors of the community within each country; and a senseless drain on resources in wasteful technology

including armaments. [1]

Educators have recognized that young people are more motivated to environmental awareness by out-of-school activities than by classroom experiences. It is therefore essential that, since environmental education is encouraged in all school and university curricula, field work be integrated with problem-solving activities in the classroom, so that in-school and out-of-school environmental education activities can begin to strengthen and reinforce each other. Environmental activities undertaken by young people on their own initiative, particularly within environmental youth organizations, can be instrumental in developing an individual and collective commitment and sense of responsibility towards the environment.

In a recent survey of environmental youth leaders[2] 'practical knowledge of ecological principles' was considered the most essential element of out-of-school environmental education programmes, for many developments in the modern world are undertaken without any regard for ecological principles, and mankind is suffering the inevitable consequences. Other important elements were 'the study of nature', 'the improvement of the local urban and rural environment', 'the knowledge of agriculture', and 'action campaigns against environmental threats'. The main objective of environmental education for young people as expressed by the youth leaders was to stimulate meaningful environmental action. The kinds of environmental action often thought up for young people by adults, 'beautification campaigns and litter clearance', were considered the least relevant.

Those groups working to structure sound out-of-school environmental activities face challenges from both the youth and adults involved. Many young people are disenchanted with the apparent corruption and inertia in adult affairs, and may be resistant to adult interference in their own plans and activities. Often adults find it difficult to accept that young people can achieve anything worth while on their own initiative. The most successful adult environmental educators see their role as that of resource persons, available to give advice and assistance. These educators recognize the ability of young people to act as propagators of environmental education and action in the community; and further recognize that the energy and free time of young people can make a major contribution to environmental improvement.

Activities and structures

Although environmental youth organizations are established in over forty countries, their membership is relatively small. Fortunately, environmental education is beginning to reach a larger section of young people through the programmes of several youth, student and outdoor organizations, a few government departments and educational institutions.

In most countries environmental education is not compulsory and few if any facilities are provided. Out-of-school informal activities may offer the only means of introducing environmental education. An important contribution in this area has been made by enthusiastic teachers, students and youth leaders, working independently of any organization, who have started up environmental programmes for young people.

The types of organizations providing out-of-school environmental education for young people are: self-governing environmental youth organizations; conservation work camp organizations; university and college student environmental societies; school clubs; environmental action groups, ecology and recycling centres; museums, zoo clubs, young naturalists' clubs; nature and field study centres, and centres for young naturalists and scientists; non-specialist organizations such as Scouts, Pioneers, young farmers, and civic, religious and political youth groups.

A brief outline of the activities and development of each type of organization is given below:

1. 'Statement of Eleven International Youth Organisations to the U.N. Conference on the Human Environment', *Environment Stockholm*, p. 19, Geneva, CESI, 1972.
2. David Withrington, *Questionnaire on Out-of-school Environmental Activities by Youth for Unesco/UNEP Environment Education Programme*, April 1975.

Self-governing environmental youth organizations

These are the traditional pioneers of out-of-school environmental education for young people; the first was founded in the Netherlands in 1923—Nederlandse Jeugdbond voor Naturrstudie. By the late 1950s, organizations of this type were established in most European countries and were developing camps and projects with the emphasis on study and conservation of nature. Now they have spread to countries in Asia and other parts of the world, and their programmes have evolved to embrace a more total concept of environmental conservation, concentrating on ecological surveys and environmental action campaigns, with the understanding that environmental problems require social and political solutions. These organizations have a strong democratic tradition; the members gather at a national congress to elect officers and discuss the year's programme. Working groups co-ordinate environmental action, educational activities, and the study of plants and animals. Action guides and identification keys are published, as well as a regular magazine or newsletter. Often based in a clubhouse, local group activities include weekly excursions, ecological surveys, study camps, demonstrations against environmental threats, and social gatherings. Membership over an average period of eight years can turn into a way of life, a symbiotic relationship with human companions and nature.

Environmental youth organizations undertake projects in almost every sphere—for instance, studies of seasonal activities in plants and birds, of amphibian mortality due to motor traffic, of endangered landscapes, of water pollution, enforcement of legislation on hunting, trapping and trade in protected animals, educational displays and exhibitions, campaigns for energy conservation, protests against nuclear power stations, consumer information on the level of phosphates in washing powders, and action against commercial exploitation of national parks.

Camps under canvas or in huts are regularly held to enable members to study different habitats; foreign participants are invited in the summer months. Training courses are organized in field study techniques. Leader training is given in administration of local clubs, finance, public relations, and camp organization. Some countries have special courses for teachers, and members give lectures and guided field trips at schools. Booklets on environmental topics for use in schools have been produced by Sveriges Fältbiologiske Ungdomsforening (Sweden) and Jeunes et Environnement (Luxembourg). Other active organizations include Osterreichische Naturschutzjugend (Austria), Belgische Jeugdbond voor Naturrstudie and Natuur 2000 (Belgium), Natur og Ungdom (Denmark and Norway), Luonto Liitto (Finland), Jeunes et Nature (France), Christelijke Jeugdbond van Natuurvrienden (Netherlands), Deutscher Jugenbund für Naturbeobachtung (Federal Republic of Germany) and, more recently formed, the Mauritius Youth Council for Environmental Studies and Nature Conservation, the Indian Environmental Society and the Indian Youth Association for Environmental Studies and Conservation.

This type of organization probably gives the most comprehensive environmental education to young people, but memberships of these groups throughout the world at any one time may not be more than 75,000. The expansion of this type of organization, run by youth, has been limited chiefly by relative lack of financial and material support as compared with other more formal bodies.

Conservation work-camp organizations

These recruit young volunteers for practical management tasks, usually in nature reserves, national parks and recreational areas. Work may include dredging a pond, scrub clearance, tree planting, and construction of nature trails. The volunteers carry out the work under expert supervision at weekends or during longer residential camps. They develop skills with tools and techniques, and may also learn about the ecology of the area where they are working. There is a danger that young people may simply be used as cheap labour, but in Czechoslovakia, for instance, all youth camps held in the Krkonose and other national parks are obliged to include environmental education in their programme, and

special training is provided for the leaders. Other well-known bodies which organize conservation work camps are: British Trust for Conservation Volunteers, Instituut voor Natuurbescher-mingseducatie (Netherlands), Etudes et Chantiers (France), the Student Conservation Association and the Youth Conservation Corps (United States). In addition, many school clubs, environmental youth organizations and non-specialist groups have such work camps as an integral part of their programmes.

Work camps for agricultural and community development are widespread, involving young people from Cuba to Kuwait, and bodies ranging from the 4H and 4D Clubs to Pioneer organizations and government departments. As long ago as 1955, there were 795 such camps in India alone.

University and college student environmental societies

These are a mixture of faculty associations—biology, botany, zoology, ecology—and environmental action groups. They include: Pollution Probe (Toronto), Felag Natturfraedinema (Reykjavik), Auckland University Field Club, Survival (Cambridge), Tabiati Koruma ve Tanitma Türk Genclik Dernegi (Ege), Symbioosi (Helsinki). Their activities decline during vacations, but some national coalitions have been formed to conduct ongoing programmes. In the United States there is the Union of Young Environmentalists based at the University of Wisconsin, Green Bay; one of its projects is to find employment of an environmental character to give students practical experience during their vacations. In the U.S.S.R., a Youth Committee for the Protection of Nature has recently been formed by students at forty-two universities in co-operation with the republican societies for nature conservation and the Community Union of Youth; its programmes include a study of poaching as a social phenomenon, the effect of tourism and recreation on the environment, the recultivation of land following mineral extraction, and the formulation of legislation for protecting rare species and establishing nature reserves.

The Polish Students' Committee on the Human Environment organizes environmental activities within the framework of the Socialist Union of Polish Students; it holds multidisciplinary study camps during vacations, where the students' research is part of their degree course and also assists with management plans for national parks, the improvement of agricultural methods, urban and rural planning, and the control of industrial pollution; local, national and international seminars and study camps on environmental problems have been convened by the Committee since its formation in 1971. The Youth Environment Programmes for West Africa, which has been started for student teachers at the University of Ife (Nigeria), is also in this category.

In Thailand, student environmental groups have been instrumental in environmental reform, including the National Environmental Quality Act of 1975. The pioneer group was formed by students in the Natural Resources Conservation Group of Kasetsart University following the October 1973 revolution, in which the students played a big part. Now such groups are established in nearly every institute of higher education. At first, the students worked mainly for nature conservation and against pollution, but through their experience they realized that most environmental problems are caused by social and economic exploitation, so they are now working on a more political basis. In March 1975, after several months of protest, the students persuaded the government to withdraw mining concessions from the American-Dutch-owned Thai Exploration Mining Company.

The valuable role which student associations can play in working for a better environment is shown by the above examples from a few countries. In general, however, university education tends to be academic rather than practical, and the potential of students for environmental work in society is under-utilized.

School clubs

There are many thousands of school clubs engaged in environmental activities outside school hours in all parts of the world. Those for younger children are usually operated by teachers and adult organizations. The Blue and Green Patrols

in the U.S.S.R. look after water resources and forests; in the R.S.F.S.R. alone, there are more than 5,000 school forests where children plant and take care of the trees and study the wildlife. In the United Kingdom, the Advisory Centre for Education recently launched a movement called 'Watch', with the assistance of a national Sunday newspaper; more than 30,000 school children took part in its survey of river pollution, and the current project is concerned with the architectural heritage. The Wildlife Youth Service also organizes projects in British schools in connexion with 'Project Tiger' and other fund-raising campaigns of the World Wildlife Fund. In Zambia, the Wildlife Conservation Society sponsors the Chongololo Clubs with their own magazine in over 250 primary schools.

Secondary school environmental movements organized by young people exist in several countries, and most depend on the active co-operation of interested teachers. The Wildlife Clubs of Kenya were started in 1969 and are established in 265 secondary schools. They arrange school camps and excursions in national parks, art competitions, teachers' workshops, and mobile film-units for lectures to school clubs, publish a quarterly magazine, and to date have furnished some 130 fortnightly radio programmes for Voice of Kenya schools broadcasts. In November 1973, they held a demonstration in Nairobi to present a petition to the government against poaching with some 8,000 signatures. Wildlife Clubs are also established in Zambia and have recently started up in Uganda. Other self-governing environmental organizations in secondary schools include the Schools Eco-Action Group in the United Kingdom, INSPECT which has branches in all the Australian states, and the Youth Environment Action Group which operates under the sponsorships of the Hong Kong Conservancy Association. In Venezuela, the first Centre of Science was set up in 1957 to introduce secondary students to the principles of conserving natural resources; the centres now operate in several towns. In some countries, school science clubs are undertaking environmental activities—for instance, the Federacion Espanola de Grupos Juveniles para la Iniciacion de la Ciencia, Jeunes et Science de Tunisie, and the Al-Ahram Science Clubs in Egypt. In the United States, there are local environmental movements in secondary schools such as the Open Land Project in Illinois, Foxfire, and Protect Your Environment; in addition there have been national efforts like Students Towards Environmental Participation, and a new project for an Energy Conservation Corps.

Competitions on environmental subjects have been organized for school children, particularly in Eastern Europe, where students are encouraged to undertake projects, design nature conservation posters and submit photographs; such competitions in Czechoslovakia are the 'Biological Olympiad' and 'Natura Semper Viva'.

The formation of a school environmental club or close co-operation with a local environmental youth organization are excellent means for the teacher to involve pupils in practical environmental activities.

Environmental action groups, ecology and recycling centres

A new vitality has been brought to the concept of popular democracy by the growing number of citizen groups formed to defend environmental interests in different parts of the world. With improving standards of education, the younger generation is challenging the wisdom of policies of government and industry which it sees to be detrimental to the environment.

Environmental action groups protest about environmental threats by lobbying parliament and local authorities, usually putting forward a viable ecological alternative to the proposed development. They have exposed vested interests in society which stand in the way of rational environmental decision-making. They conduct campaigns on basic issues such as food production and energy conservation, and they inform the public about their role as consumers and citizens. Most of the work is carried out at the local level in the form of community action.

The Friends of the Earth (FOE) was founded in 1969 in the United States and is now active in many developed countries. In the United Kingdom there are some 120 local FOE groups, and their activities are augmented by campaigns and

research carried out by head-office staff. The programme of a typical local group operating in an area of London with some 100,000 inhabitants is described here:

The group was formed at the end of 1973 around a core of national FOE supporters who live in the area. The active membership is now about 20, but we do not seem to be able to increase this number. Most of our members are aged between 19 and 29, but the editor of our newsletter *Spaceship Earth* is 12 years old. Our first major activity was the monthly collection of newspapers from residents of local blocks of high-rise flats. We conducted an opinion poll and feasibility study to convince the local Council to make its own door-to-door collections; we were successful, but the Council has recently had to stop collections because of a fall in waste paper prices.

The Council allowed us to convert an empty shop into a 'recycling centre', open on Saturday mornings for people to bring in newspapers, jam-jars, aluminium foil, wine bottles and sump oil; the shop is now overflowing as the waste market has come to a standstill. With the money gained from recycling, we were able to insulate the roof of the local Old People's Friendship Club against heat loss, to print *Spaceship Earth*, and to put together a series of colour slides on environmental conservation and local issues which we show to local schools and colleges, youth organizations and housewives' groups. For the national General Election in October 1974, we organized an election forum on environmental issues. This was the only occasion when all the candidates spoke at the same meeting. We maintain a close co-operation with our Member of Parliament. With other local and national organizations, we have opposed commercial helicopter flights in London. As part of a national campaign for standardization and easier return of bottles and containers, we demonstrated outside a supermarket on the main shopping street and found the public very sympathetic. The manufacturers, retailers and Parliament, however, have failed to respond. We have organized 'bike-ins' and free bicycle repairs in order to promote better facilities for cyclists. We have cleared rubbish from derelict land and encouraged the local residents to make use of it for recreation and growing vegetables.We held an 'Eco Fair' and environmental exhibition at Christmas 1975 which was visited by several hundred local people. We invite the press and photographers to all our special activities, and each week we write an article for the local newpaper on conservation in everyday life—such as how to save energy in the home, or how to make better use of your garden.

Many environmental youth organizations are conducting campaigns against the waste of natural resources, such as excess packaging and non-returnable cans and bottles. A popular method is to have a street theatre in a shopping area to entertain and educate the passers-by. The Sveriges Fältbiologiske Ungdomsforening in Sweden held an action week in 1973 when members mailed 160,000 non-returnable containers to the offices of the government and the manufacturers; the issue was then taken up by Parliament and by the television, radio and newspapers. Friends of the Earth in the United Kingdom dumped several thousand bottles outside the head office of a large soft-drinks manufacturer, and linked the action with well-prepared publicity and statistics. In this manner they expressed their opinion that the consumer pays as much for the container as for the liquid inside it, he pays again in taxes for the municipal authorities to collect and dispose of it, and again in loss of energy and natural resources when a replacement bottle or can has to be made; he also has to pay for the unwanted advertising on the streets, in the media and through his letter-box; in some cases he has to pay for pseudo-environmental competitions sponsored by the manufacturer.

Other issues taken up by environmental action groups include opposition to new motorways which are strangling many countries; campaigns in favour of better public transport, traffic-free city centres, public access to the countryside, and the introduction of environmental education in schools. The fight against pollution has to cope with more and more problems, such as the new menace of aerosol sprays. Actions against nuclear weapons tests in the south Pacific were undertaken in 1972 and 1973 by many groups including Green Peace and the Nuclear-Free Pacific youth conference in Fiji. There has been a world-wide campaign, involving Project Jonah and others, to prevent overhunting of whales and the import of sperm oil and other whale products. A strong movement exists in many countries in favour of free contraception and abortion to prevent unwanted children from being born on our overcrowded planet.

In certain instances, environmental groups have derived assistance from legal processes whereby the courts have restrained commercial exploiters—at least temporarily—as in the case of the trans-Alaskan oil pipeline; the anti-SST hearings by the aviation authorities in New York; the occupation in 1975 of the construction site of a nuclear power station at Whyl, Federal Republic of

Germany, by over 10,000 people, securing the legal review of the project which could not have been obtained by any amount of polite letters and petitions.

Many environmental actions have been unsuccessful, not just because they were unable to overcome the strength of vested commercial and political interests, but because they were attacking symptoms instead of root causes. When a citizen group supports the building of a new airport on another site to that proposed in its locality, it is only exporting the noise, pollution and concrete jungle to other citizens. The group should question the need for more air travel and whether aircraft represent the most energy-efficient and socially equitable form of transport.

In the United States, ecology and recycling centres are carrying out many of the above activities and, like many civic groups, are collecting waste paper and metals for re-use. In industrialized countries, there is a growing movement towards self-sufficiency in small rural communes, using alternative technology such as wind and solar power, and non-mechanized organic agriculture. Young volunteers are working on farms to produce organically grown fruit and vegetables, while in less-developed countries, too, young people are organizing themselves against industrial pollution, planting trees against soil erosion, pressing the authorities about water pollution, and educating the people about proper sanitation and family planning.

Museums, young naturalists' clubs and environmental study centres

Facilities for out-of-school learning in this category exist in many forms in almost all countries. Much of the work done in these 'learning environments' is carried out in co-operation with the formal school programme and the teaching staff. For example, in the United Kingdom there are some 400 field study centres with trained personnel and simple laboratories which school classes can visit for the day or where they can stay for a week or two. Various organizations run these centres, including the Youth Hostels Association and the Field Studies Council, which have built up considerable expertise in such programmes. In the United States there are over 800 nature centres. In the U.S.S.R., most towns have a Centre of Young Naturalists, whose counterpart in Bulgaria is the Young Biologists' Centre. The Zentrale Lehrstätte für Naturschutz at Müritzhof in the German Democratic Republic also conducts courses for training youth leaders in environmental conservation. In certain countries, national parks provide facilities for young people to learn about wildlife conservation—good examples are the Tree Tops School Camp in Zambia, and the Education Section of Kenya National Parks. In urban areas, where most schools are situated, there is a lack of such study facilities; the Council for Urban Study Centres in the U.K. is pioneering urban centres where school classes and community groups can study local history, architecture, town planning, noise pollution and traffic problems, and become involved in local issues.

Especially in the developing countries, there are scientific youth centres and clubs of young scientists. While most of these are aiming to develop scientific and technological skills connected with industry, some of them—for instance in Iraq, Upper Volta and Malagasy Republic—seek to introduce young people to ecology. Many museums are involved in environmental education, not only through displays, but in extra-curricular programmes; some examples are: the Museum of Natural History (Budapest), the Museo Nacional de Historia Natural (Santiago), the Nova Scotia Museum (Canada) and the National Museum (Kenya). Zoo clubs carry out similar activities, while the School Gardens Centre in the Netherlands is a rather special 'learning environment'. Junior sections of adult natural history societies and young animal lovers' societies have a fairly large though mainly postal membership.

Non-specialist organizations

Several youth organizations have traditional links with the country-side—among these are Scouts, Pioneers, Guides and 4H and other young farmers' clubs. In recent years, these and other

youth and student organizations have incorporated environmental activities in their programmes, thus involving several million young people in some form of environmental education.

The World Scout Bureau has: (a) developed a World Conservation Badge in collaboration with the World Wildlife Fund; (b) organized a conservation training course for European scout leaders in Sweden in 1973; (c) included conservation in the programme of the World Jamboree in Norway in 1975; and (d) published a series of booklets on conservation topics and projects. Activities undertaken by scouts in the 104 national associations include clean-up campaigns, tree planting, famine relief and pollution monitoring. Half of the ninety-one national associations of girl guides and scouts have environmental programmes, including ecology workshops in Canada, tree planting to prevent erosion in Latin American countries, agricultural development in the Philippines, and beautification and litter clearance in Australia. The counterpart of the scouts in most socialist countries are the young pioneers. In Czechoslovakia, the pioneers have a long-standing environmental programme and have exercised a strong influence on the introduction of environmental education to the school system. In Cuba, the pioneers co-operate with the Committee for the Defence of the Revolution in saving electricity, planting trees, cleaning up towns and villages, linking the school with the community in recreational and cultural activities in the local environment.

In many countries, organizations such as the 4H Clubs are introducing young people to farming and countryside matters. Quite often these are connected to training programmes sponsored by ministries of agriculture. In North America, 4H Clubs have developed an energy conservation programme involving 48,000 students in South Carolina alone; while in Dahomey, the 4D Programme has a mobile educational unit which shows films and slides on agriculture in rural areas. The Young Men's and Young Women's Christian Associations, Moslem Youth Organizations, and other religious youth groups are becoming involved in environmental activities. The YWCA members in Aulstralia have undertaken clean-up actions in cities and campaigned against pollution and energy intensive technology. In France and Fiji they have objected to nuclear tests in the Pacific. In Japan they have focused public attention on pollution. United Nations Student Associations have organized seminars and programmes on environmental problems in Italy, Poland, the United Kingdom and Uruguay.

The Red Cross Youth are introducing principles of ecology in their health improvement programmes; the theme for World Red Cross Day in 1973 was 'You and Your Environment: Priority for Red Cross'. National associations of Red Cross Youth have undertaken actions against pollution (Finland), for parks and recreation areas in urban centres (Bulgaria), for urban and rural community development (United Republic of Tanzania) and clean-up campaigns in many countries. The World Assembly of Youth started a family-planning programme in 1969 which now embraces some twenty countries; national youth councils are involved in rural development schemes (Sri Lanka, Indonesia, Ghana and other African and Latin American countries), and many national student unions have environmental projects (New Zealand, Sweden, United Kingdom, etc.). The national affiliates of the World Federation of Democratic Youth also organize environmental activities. Government agencies in some countries sponsor environmental poster competitions, travelling exhibitions, study and work camps and school activities on the environment; but these initiatives are not very widespread.

International and regional co-operation

The first international youth camps for environmental studies (inter-camps) were held in the Netherlands, Belgium, Sweden and the Federal Republic of Germany in the early 1950s. Under the auspices of the International Union for the Conservation of Nature (IUCN), environmental youth organizations from eleven Euro-

pean countries came together in Austria in 1956 to create the International Youth Federation for Environmental Studies and Conservation (IYF). The federation is the only international youth organization specifically devoted to environmental conservation.

IYF sponsors an annual programme of intercamps, which have been held in countries such as Czechoslovakia, Finland, India and Switzerland. These inexpensive camps enable young environmentalists not only to appreciate the environmental problems of different regions, but to establish international friendship and understanding. IYF now has member organizations in eighteen countries, and its bulletin *Taraxacum* is distributed free of charge to environmental youth leaders in over ninety countries.

For its members, who are between the ages of 15 and 28, IYF organizes projects and annual themes on topics such as wetlands conservation, energy and environment, detergents and environment, endangered animals and plants, and action on the waste of natural resources. Its working group on education is producing material in five languages, and its working group on land-use planning has organized international symposia for young professionals in Yugoslavia and Sweden. IYF depends entirely on the voluntary work of officers elected by member organizations at an annual General Assembly; it raises money for its projects from bodies such as Unesco, the European Youth Foundation and the World Wildlife Fund.

In August 1971, the first International Youth Conference on the Human Environment was convened by IYF, IUCN and Environic Foundation International. It was held in Hamilton (Canada), and attended by young environmentalists from seventy-five countries. The conference was invited to submit its conclusions to the 1972 United Nations Conference on the Human Environment. A set of action proposals and a statement of environmental policy were prepared.[3]

The Hamilton Conference was the beginning of world-wide co-operation between environmental youth movements, on the basis of autonomous regional development. IYF has appointed Regional Co-ordinators in each continent and has embarked on a programme of regional training courses, similar to its European Youth Leader Training Course which has been held each year since 1955.[4]

In 1974, the first Eastern Africa Youth Course in Environmental Conservation was attended by participants from eight countries in Nairobi.[5] This was a co-operative venture between IYF and a group of Kenyan organizations convened by the Unesco Regional Office for Science and Technology in Africa. As a result of the course, Wildlife Clubs were set up in Uganda and the United Republic of Tanzania, as well as an environmental youth organization in Mauritius. A second course for Eastern Africa is planned for Zambia in 1977. IYF, together with the Indian Environmental Society, convened the first Workshop in Environmental Education for Asian Youth in India in May 1975. Another course was held in Hong Kong in December 1975 to enable youth leaders from more countries in South-East Asia to participate. Regional training courses in West Africa and Latin America are being prepared.

International youth organizations have come together to co-operate on environmental issues within the framework of their informal meetings at the United Nations in Geneva. The first conference took place in 1971 as an input to the United Nations Conference in Stockholm in 1972, where eleven international youth organizations collaborated in a joint statement to the governments.[6] In 1974, the same organizations which meet regularly in Geneva organized the International Youth Population Conference before the World Population Conference in Bucharest. They also sponsored a follow-up programme of environmental projects. The international youth organizations held a workshop in Nairobi, in March 1976, with the planning being undertaken by the International Student Movement for the

3. *The Hamilton Documents, proceedings of the International Youth Conference on the Human Environment*, St Louis, Mo., 1972.
4. International Youth Leader Training Course, 1974 (IYF, 1975); *IYF Luneburger Heide Course*, 1955–69 (IYF/IUCN, 1971).
5. *Eastern Africa Youth Course in Environmental Conservation, Report and Proceedings*, Nairobi, 1974.
6. 'Statement of Eleven International Youth Organisations . . .' op. cit.

United Nations (ISMUN), the League of Red Cross Youth and IYF. The purpose is to extend their environmental concern and co-operation to the regional and national level. The common ground of the environment, and the commitment of the younger generation in many countries to its improvement, can give a new impetus to international friendship and understanding.

Problems of implementation and possible solutions

Programmes for non-school youth

So many young people lack any opportunity for formal school education that it is important to provide them with an alternative source of environmental education. As many of these people may be illiterate, or perhaps have completed only primary education, greater use must be made of broadcasting and personal contact with the family unit and the village unit. Several countries have programmes which could be adapted for environmental education, such as the *enseignement télévisuel* in Ivory Coast, the *enseignement moyen pratique* in Senegal, and the radio clubs in Dahomey. Environmental topics could also be integrated in agricultural training schemes and in environmental hygiene programmes. In the execution of such programmes, it is always best to train one or two community leaders rather than to attempt to directly educate the local people, especially in rural areas. A proposal was made to the Unesco Biosphere Conference in 1968 that simple conservation principles should be incorporated in literacy and rural development programmes;[7] governments and international agencies could enlist the assistance of environmental youth leaders in this process.

Training of environmental youth leaders

The need for trained youth leaders able to carry out the essential elements of an environmental youth programme was identified as the highest priority by respondents to the survey made for this paper[8] and by the experts gathered at the Unesco Workshop in Belgrade. At present, the only training programmes are the regional and national youth courses cited in this paper, most of which are carried out by voluntary environmental youth organizations. In order to be more effective, these courses need more financial support, a good programme and the right participants. Using the existing manpower and experience, youth leader training programmes could be gradually expanded with the assistance of governments and international agencies. At a lower level, environmental study camps can provide the basic introduction for young people in ecology and environmental conservation; here programming is also becoming more sophisticated.

Obstacles to progress

Although environmental education should be a fundamental part of every individual's upbringing, it is still given a very low priority in education programmes around the world. When environmental education is given consideration at the national level, the out-of-school element is often neglected, despite its effectiveness. Compared with the facilities provided for social, religious and sporting bodies, environmental youth organizations receive little support. Thus, the development of out-of-school programmes is left to a handful of enthusiasts and to the initiatives taken by the young people themselves. When support is forthcoming, it is often directed towards superficial litter clearance programmes or to projects by groups which have no competence in the field of environmental youth activities—for example, the young volunteer's card for nature conservation issued by the Council of Europe in collaboration with the Touring Clubs of Italy and France. Environmental youth organizations are rarely, if ever, consulted by governments and educational bodies—even in their own special field of competence.

7. Jonathan Holliman, *Introductory Statement to the Commission on Education at the Unesco Biosphere Conference*, Paris, September 1968.
8. Withrington, op. cit.

Respondents to the survey of environmental youth leaders all mentioned the lack of money, equipment and facilities available to environmental youth programmes, and the poor response to youth initiatives. They also emphasized the apathy and lack of knowledge about environmental issues amongst the public in the face of so many material distractions, and the stifling effect on teachers and students of rigid school curricula.

Conclusions

Out-of-school environmental activities provide an enjoyable and constructive education for young people which will certainly be relevant in their adult life as citizens. Without fundamental environmental education, it is doubtful whether we can improve social and economic relationships in our world. The potential of environmental education for youth by youth can be utilized effectively through the co-operation of schools, adult organizations, funding bodies and governments with environmental youth organizations. The whole funding process must be reviewed to prevent environmental youth leaders spending half their time making funding applications, and funding bodies failing to provide adequate support for youth activities. If governments and international agencies allocated an annual budget for environmental education programmes for youth, each project could be judged quickly and on its merits.

Within the present framework of funding and given the limited opportunity for meaningful involvement in environmental conservation activities, young people are not being used effectively, especially in developing countries. The current environmental education programme of Unesco and UNEP may make it possible to improve this situation and help young people to create a better world environment for tomorrow.

Recommendations

In recent years, many conferences and organizations have made constructive proposals in support of environmental education for youth; the majority of these have not been adequately considered by governments and international bodies. Two important sources of recommendations have been:

1. The European Working Conference on Environmental Conservation Education which, in 1971, made eighteen proposals[9] for action by government and local authorities, adult organizations, schools and international bodies. They include establishment of national conservation centres; support for environmental youth organizations; an international fund for training courses, etc.; and environmental service as an alternative to military service.
2. United Nations Headquarters Youth Caucus Environmental Task Force, whose proposals, amended by the IYNGO meeting in Geneva in May 1974,[10] suggested that UNEP and other United Nations agencies arrange voluntary and professional posts for young people in their programmes; an annual youth campaign on tree-planting, water and energy conservation; support for the IYF bulletin; consultation on programme implementation; and an international youth conference on the environment.

Young people concerned about their environment have put forward coherent and consistent policies for changes in society to replace the current system of economic materialism and exploitation. The first Youth Manifesto on the Environment was presented by delegates at the thirteenth National Conference of the United States National Commission for Unesco in 1969. Several international youth meetings have issued declarations since then,[11] but the majority of govern-

9. Jan Čeřovský and David Withrington (eds.), *European Working Conference on Environmental Conservation Education, 1971—Final Report*, p. 40–4, Morges, 1972. (IUCN new series no. 34.)
10. *Proceedings of IYNGO Informal Meeting, 2–3 May 1974*, p. 2, Geneva, United Nations, Division of Social Affairs, July 1974.
11. T. Vethaak (ed.), *International Youth Forum for European Conservation Year, Report*, Inzmuhlen IYF, 1970; *European Symposium on Youth Strategy in Environmental Conservation*, Filzmoos, 1971; *International Youth Conference on the Human Environment*, Hamilton, 1971. *Hamilton Documents*, St Louis, Mo., 1972; 'Statement of Eleven International Youth Organisations . . .', op cit.; *Statement of the International Youth Population Conference*, Bucuresti, 1974; *European Seminar on the Role of Youth in Environmental Protection*, Katowice, 1973.

ments and intergovernmental bodies have chosen to disregard them.

The participants at the Unesco/UNEP Workshop in Environmental Education in Belgrade, October 1975, discussed this paper on 'Out-of-School Environmental Education Programmes for Youth' and formulated the following proposals:

1. That test programmes for courses in leadership training should be developed at the regional and national levels, using the experience of existing programmes and personnel; that a special research effort should be made to devise courses suitable for young people who have not had any formal schooling.
2. That regional and national youth training courses should be supported as the most suitable means of expanding youth cadres for environmental activities in different parts of the world. That support should be given to the follow-up of such courses, including regional contact bulletins and the formation of new environmental youth organizations.
3. That in connexion with the Unesco/UNEP Environmental Education Programme, and based on its principles and experience, the Youth Environment Programme for West Africa be organized as a pilot project for Africa on teacher trainee youth leadership environmental programmes. Such a pilot project would form a supporting regional environmental education programme as a follow-up (currently restricted to West Nigeria).
4. That regional and national training courses be maintained free of charge to participants wherever possible, in order to prevent environmental education becoming the province of rich countries and rich people.
5. That the Unesco Environmental Education Unit be made permanent with specialist consultant staff experienced in practical environmental education programmes, including youth activities. The unit should have the following additional tasks: (a) visits to Member States in both industrialized and developing areas to assist with the implementation of out-of-school environmental programmes; (b) the distribution of information on environmental education activities relating to youth; (c) liaison with bodies carrying out international environmental education programmes; (d) provision of a translation service for selected environmental publications of interest to youth; (e) setting up of pilot projects in the field of youth leader training.
6. That central units responsible for environmental education be set up in each country, or strengthened in the case of existing ones. They should be staffed by people with practical experience in environmental education programmes. The tasks of such centres would be to co-operate with bodies active in the field, including environmental youth organizations; to organize publicity and distribution of information about current programmes including youth study camps and training courses; and to co-ordinate the distribution of financial support for such programmes. This unit should also keep in touch with the Unesco Environmental Education Unit. In many countries it will be appropriate for this government unit to organize training courses and other programme activities.
7. That governments set up an annual budget to support environmental youth activities. Funds are needed at the local, national and international levels to support regional and national seminars and training courses for young people, publications of environmental youth organizations, meeting rooms, equipment for field work, travel assistance and subsidies for administration.
8. That exchanges between Member States of youth leaders and students in the field of environmental education be encouraged under the auspices of Unesco/UNEP. Existing exchange programmes and expertise should be utilized.

A very relevant recommendation came from the discussion on secondary school environmental education:

That in order to encourage a greater involvement of secondary school pupils in the community and to assist teachers in organizing fieldwork, local authorities and/or organizations should compile a list of local branches of community groups and environmental youth organizations which could help in these tasks. Ministries of Education should authorize such bodies to participate in school pro-

grammes. Teachers should also encourage pupils to join in these activities on weekends and outside school hours; in some cases, special school environmental clubs could be formed for this purpose.

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11. Environmental education programmes for adults

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The need for environmental education for adults[1]

Although the need for environmental education for adults has repeatedly been stated in general terms through such phrases as 'environmentally literate citizens', etc., the precise implications in individual nations have seldom been worked out. This seems to be true both in relation to the types of environmental problems encountered and to educational strategy.

Concern about environmental issues obviously leads to a call for environmental education for adults:[2]

> The adult education effort is to me most critical. First, because this element—now outside the formal channels of education—will continue to be the decision makers for the next 15 to 20 years, and it is within this period that the most critical and disruptive decisions will have to be made. We cannot afford to focus on youth and let the elders die off before changing our course, which, if time permitted, would be the most efficient way of instituting change. Not only are these elders the most difficult to reach but they are the most reluctant to accept the required changes in their life styles.

The United Nations Declaration on the Human Environment states that:[3]

> In the developing countries most of the environmental problems are caused by underdevelopment. . . . therefore, the developing countries must direct their efforts to development, bearing in mind their priorities and the need to safeguard and improve the environment.

The difference in situation would seem to create demands for very different approaches and educational content for adults. It may be correct, however, to claim that one of the main goals of environmental education is common to all situations. The need for a sufficiently sophisticated understanding of the functioning of the environment must be one of the requisites for coping with both those environmental problems generated by industrialization and technological development, on the one hand, and those created by under-development, on the other.

The levels of environmental education

In discussing adult education, it may be useful to consider briefly those products of environmental education effort that can be discerned and are usually called for.[4]

1. Integration of environmental concern, knowledge and skills into all relevant areas of learning.
2. An environmentally literate citizenry.
3. The preparation of experts qualified to deal with specific environmental problems.

1. The operational definition of 'adult education' adopted for this article is education for persons above school-leaving age but not enrolled in any institution of post-secondary/university education. The various further restrictions will appear in the article.
2. Statement by Peter S. Hunt in *Environmental Education: The Adult Public.* Report of a Workshop Conference sponsored by the American Institute of Biological Sciences, Washington, 6–7 April 1970.
3. The United Nations Declaration on the Human Environment, Sect. 4.
4. L. Emmelin, *Environmental Education at University Level*, Strasbourg, Council of Europe, 1975.

4. A deeper understanding of environmental matters by a large number of groups—politicians, planners, civic leaders, teachers at all school levels, and so forth.

What is the position of adult education in relation to these four goals?

The first point applies to all forms of formal education and thus to many adult-education programmes. It seems that the only educational sector in which there is in fact any progress towards integration of environmental considerations is in the compulsory school system.[5]

The role of adult education would seem to be of the greatest significance in respect of the second point for the reasons already cited. An environmentally literate citizenry may be achieved through formal education, including the use of mass media, direct citizen action and so forth.

The role of adult education in achieving the last two goals depends largely on the limits set to the term adult education. For the purposes of this chapter, the third point will be excluded since the production of experts is normally considered the task of post-secondary educational institutions. It is becoming increasingly clear, however, that this type of education will have to move into the adult-education sector in order to cope with the problem of updating expertise.

Select groups having, or believed to have, influence of some kind are often the targets for environmental-education efforts. In this case, there may be a quantitative separation in the goals one is trying to reach, although, for instance, the second of the points mentioned above might be achieved through action aimed at achieving the fourth. The reason for keeping the two sets separate is that there is more than a quantitative difference between them. In the sense used here, there is also a need for specialization in the knowledge and skills imparted in the fourth case—a planner's educational needs are different to those of a politician or an industrial manager.[6]

The status of adult education

The following classification of educational programmes according to personal needs is relevant to the fields of environmental education:

Remedial education: fundamental and literacy education—a prerequisite for all other kinds of adult education.

Education for vocational, technical and professional competence—this may be designed to prepare an adult for his first job or for a new job or to keep him up to date on new developments in his occupation or profession.

Education for health, welfare and family planning—including all kinds of health and family problems, consumer matters, planned-parenthood, hygiene, family relations, child-care, etc.

Education for civic, political and community competence—including all kinds of educational programmes about government, community development, public and international affairs, voting and political education, etc.

Education for self-fulfilment—including all kinds of liberal educational programmes, education

5. Of the few examples the author has been able to find, the most interesting seems to be the inclusion of a short, compulsory course on the environment by the Norwegian correspondence college—NKI Skolen. This school teaches mainly technical subjects at college of technology/community college level. For a discussion of the problems of integration see Emmelin, op cit.

6. For a discussion of the role of recurrent education, see J. Bossanyi, 'Recurrent Education in Environmental Science and Management'. Document from OECD/CERI for the conference held in Rungsted in June 1974. Obtainable from the OECD as document CERI/HE/CP 74.10.

For a discussion of programmes of education for decision-makers, see V. Giacomini, 'Courses for Decision-makers', *Environmental Problems and Higher Education*, Paris, OECD, 1976.

It is worth noting that a unique effort aimed at educating decision-makers took place in the United States during the month of August 1975. Fifteen people, led by a United States Congressman and members of the Interstate Commission on the Potomac River Basin, traced the entire length of the main stem of the Potomac River. Five members of the group were secondary school students. Each student was selected to represent a jurisdiction that drains into the Potomac (Maryland, Pennsylvania, Virginia, West Virginia and the District of Columbia). The group travelled by foot, bicycle, horse, coal car, canoe, sail boat, research ship and oyster-boat before reaching the Chesapeake Bay, 386 miles from the head-waters. The group met with residents in more than fifty riverside communities, from tiny upstream mining towns and downstream fishing villages, to Washington, D.C., a city of 3 million inhabitants, where 75 per cent of the Potomac Basin's population resides. Tours were taken of activities which impact on the Potomac and its people: power plants, water supply and waste-water treatment plants, industries, mines and farms and key recreation areas.

in music, the arts, dance, theatre, literature, arts and crafts, whether short or long term; all programmes which are aimed primarily at learning for the sake of learning rather than achieving the aims included in the other four categories listed above.[7]

In relation to environmental education, the following brief comments seem appropriate. The second group is still the dominant preoccupation of adult education. In environmental education, this may be clearly seen in some of the university-type short courses given in the industrialized nations. These clearly originate in a perception of a lack of knowledge on the part of planners, politicians and industrial managers. Regarding knowledge, it is obvious that what such courses try to remedy is a lack of natural science information in planning processes and decision-making.[8]

In relation to the needs of communities, it would seem that the third group would be of the greatest relevance to the developing nations whereas the fourth group would be of particular interest in industrialized nations. The fifth group is perhaps characteristic of much of the present conservation education and some of the university-type courses.

Regarding the official status of adult education, Lowe makes three points concerning the situation which existed when Unesco planned its 1972 conference on adult education in Tokyo:[9]

First, governments seemed reluctant to treat the education of adults as an integral part of their educational systems. Second, except in one or two countries, the level of financial support was very low. Third, and above all, those who most needed education were not participating in adult education programmes because by and large the lower the level of a person's education and the lower his occupational status, the less likely is he to want to pursue his education in adult life.

Although the situation regarding adult education in general has changed somewhat for the better, this is hardly true to a significant degree in environmental education for adults.

The nature of the learner

At all educational levels defined by the target population, a number of more or less generally valid assumptions are made as to characteristics of the individual members of that population. It is obvious that no generalizations of any relevance to adult education can be made until the target population has been narrowed down considerably from the original definition of adult education.[10]

Failure to break down the 'general public' into identifiable target populations, with a number of defined common denominators from the educational point, may be one of the reasons for the inadequacy of environmental education for adults, which is a recurring theme of this chapter.

Knowles summarizes the most important assumptions on which the adult-education process is based:[11]

As a person matures 1) his self-concept moves from one of being a dependent personality toward one of being a self-directed human being, 2) he accumulates a growing reservoir of experience that becomes an increasing resource for learning, 3) his readiness to learn becomes oriented increasingly to the developmental tasks of his social roles, and 4) his time perspective changes from one of postponed application of knowledge to immediacy of application and accordingly his orientation toward learning shifts from subject-centeredness to one of problem-centeredness.

7. After Liveright and Haygood, from J. Lowe, *The Education of Adults—A World Perspective*, Paris, Unesco, 1975.
8. For a discussion see, for example, L. Emmelin, *Envrionmental Education at University Level*, AMBIO (In Press), or Emmelin, op. cit. It is not implied that all courses have this approach nor that it is the only one of those that have it.
9. J. Lowe, op. cit., p. 11.
10. Consider that we are dealing with education which may be aimed at any subgroup of the world's approximately 800 million adult illiterates or at a British school teacher (the latter group makes up about one-third of the students of the Open University).
11. Malcolm S. Knowles, *The Modern Practice of Adult Education*, New York, N.Y., Association Press, 1970. The quote seems to sum up in a reasonable manner some characteristics of the adult. However, the implications as to the nature of the child as a learner seem doubtful.

Based on this description of the adult as learner, Roth[12] states that 'because of its basic problem-centered, transdisciplinary nature, education for environmental issues should be a natural for adult education programs'. Roth goes on to note the increase in participation in adult education in general in the United States.

This trend has been much the same in other industrialized nations. However, there has been no similar increase (at least not proportional) in formal environmental education. Some of the reasons for this will be dealt with below.

It is clear from the examples examined by the author that thorough studies of the target group for environmental education are rarely conducted prior to the designing of the programme.[13] The fact, which is now becoming generally recognized in other adult-education efforts, that the target population has to be well defined and the educational effort (including the question of attracting students in the first place) geared to specific criteria defined by a careful analysis of the target population, seems to have had little impact on environmental education as yet.[14]

The typical learner who in fact makes use of adult education on the environment is described by Nowak.[15] His description may superficially seem to apply to the 'average citizen' in any industrial nation. One should note, for example, that a high percentage are interested for work reasons and that many are involved through their work in citizens' groups. Most educational efforts are more or less consciously directed at this kind of group since most of those who design courses, whether in universities or in organizations for environmental action, often equate this group with 'the general public' or realize that this is the category likely to be attracted.

In developing countries, the focus on various sorts of community leaders is often quite clear and intentional. The multiplier effect that this is thought to have is part of the economics of adult education in such situations. It is important for environmentalists to take into account those leaders who are accepted by the community in respect of various programmes.

Education needs

There seems to be a reasonable degree of consensus as to the need for an environmentally literate citizenry such as that envisaged by the Minnesota state plan for environmental education:[16]

> What is needed is a continuous stream of information to inform the public about environmental matters in general. Then when a crisis does arise, people will have a background of knowledge to use in dealing with it.

The plan discusses this concept in contrast to the usual sequence: a crisis arises, small informed groups organize to meet it and have to educate the public as a first measure before taking action against the crisis itself. This pattern is well known to conservation organizations all over the world and is a major motivation for their educational programmes.

Most plans of a national or regional type go from this position to outline courses of action which include clearing-houses for environmental information, liaison with action groups, conservation organizations, civic organizations and professional bodies, increased adult education and so forth.[17] The general vagueness of those recom-

12. Charles E. Roth, 'Formal Adult Education', in Albrecht and McInnis (eds.,), *What makes Education Environmental?*, Washington, D.C., Environmental Educators, 1975.
13. For an example of a programme designed after careful study of the target population, see Sister Constance Banks, 'Police and the Environment: A Design Strategy for Adult Environmental Education', in Swan and Stapp (eds.), *Environmental Education*, New York, N.Y., Wiley, 1974. As pointed out in the text, environmental education in the developing nations—where it exists—seems more sophisticated in this respect.
14. See S. J. Muskin (ed.), *Recurrent Education*, Washington, D.C., National Institute of Education, 1973, for a set of articles and an extensive literature on the problems of identifying target groups.
15. Paul F. Nowak, 'The Development and Evaluation of an Innovated Approach to Environmental Conservation by Independent Study Through Correspondence', dissertation, University of Michigan, 1969.
16. 'A State Plan for Environmental Education for the Citizens of Minnesota', St Paul, Minnesota Environmental Education Council, 1972.
17. See, for example, *Michigan's Environmental Future*, Lansing, Mich., Governor's Office, 1973; *Umweltpolitik—Das Umweltprogramm der Bundesregierung*, Stuttgart, Kohlhammer, 1974; or *Environmental Quality: The First Annual Report of the Council on Environmental Quality*, Washington, D.C., 1970.

mendations dealing with adult education will be discussed below. The question here is whether in fact a need exists for formal programmes of education as a means of reaching the adult population. The answer is often, with little or no analysis, assumed to be 'yes'. Often this is for the very good reason that such programmes are in fact being requested. This may, however, bear little relationship to the goal of providing environmental information.

In order to answer the question it becomes necessary to examine the effectiveness of other means of communication as educational tools. The opinion that the formal education system is doing a poor job in providing citizens with useful information relevant to their daily lives and social functions is becoming widespread—not least among administrators and those dealing with educational theory: 'Most learning is not the result of instruction. It is rather the result of unhampered participation in a meaningful setting.'[18] The two means of environmental education for adults which are most frequently quoted as being of importance, and which for the purpose of the present discussion need examining, are the news media and participation in some kind of environmental action. The latter may be aimed at producing change at local, regional or national level through a wide range of mechanisms ranging from direct work such as cleaning up a piece of land to political lobbying and legal action at the national or international level.

The media as environmental educators

The learning of behaviour patterns and the acquisition of values directly detrimental to sound environmental development is an interesting aspect of education which lies outside the scope of this discussion. It would seem reasonable to guess that the role of mass media is considerable in this *anti*-environmental education process. What, then, is their role in the positive sense?

Sandman[19] discusses the role of news media in relation to the three educational goals of imparting knowledge, skills and motivation to the general public. He finds that

> their effectiveness as environmental educators is greatly diminished by their inattention to environmental skills training, their lack of educational goals for entertainment,[20] and their delivery of persuasive content (advertising) into the hands of the environmental exploiters.

Discussing the role of media as motivators, Sandman concludes that:

> Four relatively effective kinds of environmental information are: basic ecological principles; prescriptions for environmental action; early warnings of incipient problems; and assessments of blame for environmental degradation. The media tend to deemphasize all four of these information categories, stressing recent public events of passing environmental relevance instead.

Other studies seem to be in agreement with Sandman regarding the skills and knowledge. However, in motivating people, the educational role of the media may be rather more important. Surveys of attitudes towards pollution control and specific environmental problems show a reasonable correlation between awareness in a general sense of a given problem and the news coverage given to that problem. When, however, surveys are followed by any form of testing of factual knowledge about a problem, the sharp limits of the

18. Ivan Illich, *Deschooling Society*, London, Open Forum, 1971.
19. Peter M. Sandman, 'Mass Environmental Education: Can the Media Do the Job?', in Swan and Stapp (eds.), *Environmental Education*, New York, N.Y., Wiley, 1974.
20. The exception to this (as Sandman points out) may be such programmes as the series produced by Commandant J. Cousteau on underwater life.

educational role of media is usually clear.[21]

The tendency of media to concentrate on the form rather than the content of an environmental message, the emotional nature of the message and the focus on events rather than processes are among the characteristics that may explain the limited educational value of the media.[22]

The preceding discussion is relevant to situations where the media are to a large extent commercial. In many developing nations and in the socialist countries, this is not the case. For various reasons, the situation may not be any better in some of these countries. Although television and radio may not be directly commercial, the journalistic tradition may still be dominated by a commercially oriented press. Criteria used in the radio and television systems will then be largely those of the commercial media. The concentration on form rather than content is quite noticeable in non-commercial media systems.

In many countries, there are, however, examples of intensive use of the media for adult education in general. Some programmes exist which make use of television and radio for environmental education. Conservation educators have made very good use of television. Several Latin American programmes make entensive use of radio. Although radios are much more common than television sets in many parts of the world, it is clear that the educationally underprivileged are difficult to reach with this method in many countries. The use of radio and television in organized programmes of education is not the subject of this chapter. It should, however, be noted that the use of news media is possible and is often used as a complement to other methods. Examples of such programmes appear in the reports of Unesco consultant missions on environmental education.[23]

Environmental action

It is a well-recognized pedagogic principle that participation in concrete action directed towards a given goal greatly enhances learning. This is true whether the action is field work, laboratory work or participation in direct efforts for environmental change through official, private or other groups. This in itself is hardly controversial. For the present discussion, the question is: can such action be a substitute for formal education? There seem to be several reasons why this may not be so although this opinion depends largely on what degree of educational depth is aimed at.

In the many types of action taken by environmental groups, the educational limitations of some are evident. The time/space constraints on a teach-in, seminar, demonstration, etc., obviously make it difficult to achieve in-depth analysis of a problem, which can lead to fundamental knowledge. It is usual for either a large number of topics to be covered superficially or for discussion to be concentrated on a very isolated issue. In both cases, the educational goals of knowledge and skills training are usually fairly peripheral. The emotional and simplistic nature of the message in various environmental handbooks is also contrary to the principles of environmental education.[24] They may likewise give rise to the problem pointed out by Swan, namely that

21. The Swedish experiences with mercury contamination of fish may serve as a useful illustration of this. The problems which received great press coverage were exclusively related to mercury in fresh-water fish (particularly in the aquatic environment—there had already been intensive coverage of the effects of mercurial fungicides on wildlife and certain foods such as eggs). A large proportion of the press coverage dealt with differences of opinion between scientists involved, related to the Japanese Minamata case, etc. The National Institute of Public Health issued recommendations both on maximum allowable concentrations and on what species to avoid or to consume in limited amounts. In spite of a press coverage that included front page position in most Swedish dailies, subsequent investigation revealed an almost general ignorance of the exact content of the recommendations. A temporary drop in the sale of all sorts of fish—including frozen cod from the North Atlantic—was the most noticeable effect of this educational effort.
22. Russel D. Linke, *Environmental Education in Australia*, Part I, p. 87 (mimeo.).
23. Examples that emerge through the Unesco consultant missions are, for example, from Senegal, Zaire, the Ivory Coast, the Latin American Association for Radiofonic Education (ALER), programmes previously run in Chile in which more than 16,000 students and teachers participated, the Mexican Center for Eco-Development radio programmes, etc.
24. An example of this category is Garret de Bell (ed)., *The Environmental Handbook*, New York, N.Y., Ballantine, 1970. See also Linke, op. cit., p. 82.
25. James A. Swan, 'Some Human Objectives for Environmental Education', in J. A. Swan and W. B. Stapp (eds.), *Environmental Education—Strategies Towards a More Livable Future*, New York, N.Y., Wiley, 1974.

'telling people what to believe may delay or even undermine any movement directed toward the improvement of environmental quality'.[25]

A further factor diminishing the educational value of certain types of action is the necessary symbiotic relationship with the media. Phenomena such as 'Earth Day', 'Whale Day', 'Bird Day', 'Forest Week',[26] etc., may be excellent mechanisms for focusing attention on problems and processes which otherwise get little attention due to their continuous nature, but their educational limitations are obvious.

None of this means that action by citizens to bring about environmental change is useless. The observations have merely been made to substantiate the claim that such action is of limited value as sustained education for a large sector of the public. Since adult education on the environment is a voluntary undertaking by the individual, citizen action on specific problems is undoubtedly of great educational value since it creates awareness, a political climate in which funds for education become available, and stimulation of educators. In interviews with participants in particular projects, it is not uncommon to hear variations on the theme 'we reached a point where we had to go back to school in order to get on with the project'. This is an ideal situation for the educator to operate in. It is the belief of the author that the system of adult education—or as often the lack of such a system—is grossly failing to meet the needs of citizens aware of the problems and in search of more knowledge.

The possibility for sustained learning seems much greater in cases where action is a planned part of an over-all educational effort. Such activity can be found, for example, in Cuba where campaigns form an integral part of the larger movement to save electricity and raw materials. The situation in Cuba is special in this respect since a well-organized network of local citizen groups exists in which action can be taken and continuity ensured. In literacy and health campaigns, the same mechanism has been provided by government bodies of a military or para-military nature.[27]

In some industrialized nations, the impulses for environmental action have come from above. (The rule in these countries normally being that environmental action groups are very much a grass-roots phenomenon.) The standpoint in such instances has been that 'a radical environmental policy requires the backing of a large and well-informed public opinion'.[28] The object then has been for governments to enlist support for appropriate measures—often legislation.[29]

Participation in planning and management of the environment

Participation in planning of the environment is a special case of environmental action which has great educational potential apart from the obvious fact that it is environmentally desirable. In practice in the industrialized nations, it is most often tried in urban planning. (The discussion here deals only with direct participation, not influence via democratic institutions which is a problem beyond the scope of this paper.)

The educational importance of participation may frequently be greater than the inputs into the planning process.[30]

A particularly instructive example of participation in environmental management is offered by the work of the Institutio de Desarrollo de los Resources Naturales Renovables (INDERENA)

26. K. H. P. Mirimanian and N. A. Gladkov, 'Conservation Education in Rural Districts in the USSR', *Proceedings of IUCN Eleventh Technical Meeting, New Delhi, India*, Morges, Switzerland. IUCN 1971 (IUCN Publications New Series no. 20).
27. Lowe, op. cit., p. 102.
28. L. Emmelin, 'Informing Public Opinion', *Environmental Planning in Sweden 16*, January 1971 (Royal Ministry for Foreign Affairs).
29. Many interests have also seen education as a means of meeting demands for action. It is one of the major problems of competent environmental education that it shows the complexities of most problems. Legitimately, it may thus be used to demonstrate the deficiencies of many simple remedies advocated.
30. 'People today may also have far more information available and possess far more knowledge than their predecessors. But this knowledge often obscures a person's perception and understanding of reality rather than shedding more light on it. The real reins of political power which most constitutions confer on the peoples, with sincerity or at any rate with great pomp and circumstance, are slipping more and more out of their grasp. Their participation in the decision-making process is beset with obstacles.' From Edgar Faure *et al.*, *Learning to Be*, Paris, Unesco, 1972.

in Colombia.[31] A comprehensive programme with many highly developed features is devoted to environmental education and management and aimed at peasants, fishermen, forest workers and other rural groups. The aim of the programme is specific—to introduce conservation of natural resources, stop overfishing, erosion, over-exploitation of forests and so forth. Among the important features are the direct involvement of the people themselves, the direct links between theory and practice, and the exchange of information in both directions. Examples worth mentioning are the decisions on fishing seasons taken by the fishermen's co-operatives. Since no scientific data was available on the economically important fish species, the fishermen themselves provided this information. In a two-way communication process, their first-hand knowledge was developed through education into an understanding of the basic ecological principles and a willingness to apply the knowledge to their own benefit in conservation measures. The code for natural resources that has been formulated has a measure of support through involvement.

An important principle which is stressed in the Colombian example is that alternatives to present practices should always be offered if the argument for changes is to have any effect. This may seem a rather self-evident truth but it is often disregarded in environmental education. Similar examples from developing nations suggest interesting possibilities for the development of education and simple practical research that would have great promise if universities, for instance, systematically entered into the kind of dialogue about what adult-education programmes can be. (The idea is by no means new. Farm extension services all over the world, when functioning properly, have used the principle of interaction between research and traditional knowledge.) Environmental education in a directly relevant and user-oriented setting should have great potential for devising appropriate technology for developing regions.

Working with illiterate or semi-illiterate groups makes it imperative that the education be practical and user-oriented. Thus, a great deal of thought and effort must be put into making the education relevant to a specific area or target group. It appears that more knowledge and experience in this area exists in the developing regions than in the industrial nations as regards adult education. An urgent task for developing adult education so as to encourage involvement of the people in managing their own environment would seem to be the collection and careful analysis of experience gained from various environmental education programmes that have been in operation for some time.

Relevance to the community and the individual

It is obvious that teaching environmentally sound development methods is only useful in a context where students have a reasonable measure of control over their own environment on both a macro and micro scale. Present efforts to prevent peasants from over-exploiting forests for fuel are likely to become ineffective in areas where large-scale, highly exploitative lumber operations are carried out. Innumerable examples could obviously be given. For the purpose of this chapter, it would seem sufficient to point out that environmental education is a tool for analysing exploitation of natural resources of all kinds.[32]

From the educational point of view, environmental education can and should be used to motivate people for all forms of education. Illich[33] notes that 'any adult can begin to read in a matter of forty hours if the first words he deciphers are charged with political meaning'. An interesting example of the importance of this type of relevance is provided by an example from the Latin American experience. A programme of education using the key words 'waste' and 'pharmacy' failed to attract popular interest and support. When the same programme was based on

31. J. Santander at the 1975 Unesco-UNEP Belgrade Workshop on Environmental Education. The Latin American group at the Belgrade workshop provided several examples illustrating the points made in this section and the next.
32. See, for example, the United Nations Declaration on the Human Environment, para 1.
33. Illich, op. cit.

the concepts 'responsibility of local authority for removing garbage' and 'exploitation by patent medicines', the relevance problem was cleared up and the programme achieved support and participation.[34]

In the industrialized nations, it is obvious that the relevance problem has not been tackled to any significant degree in respect of large sectors of the public (if indeed it has even been recognized) by organizers of adult education.[35] Problems of occupational health and safety would seem to be the most obvious channel for environmental education in the near future, especially in the industrialized nations. Integrated teaching on the environment is important here since there would seem to be some risk that different areas of environmental concern may otherwise end up in conflict. There is a latent conflict between pollution control and protection of the quality of the environment in a factory.[36]

In developing countries, the relevance of environmental education to the individual must surely lie in the sector of adult education that deals with health, welfare and family planning. The integration of environmental concepts into education aimed at vocational, technical and professional competence would seem to be the area of greatest relevance to the community. In the words of the United Nations declaration: 'Therefore, the developing countries must direct their efforts to development, bearing in mind their priorities and the need to safeguard and improve the environment.'[37] Looking over the literature on education as regards these needs, one is struck by the virtual absence of the environmental aspect in the sense of the latter half of the quotation. The emerging literature on the environmental effects of uncontrolled or exploitative or unplanned development is beginning to be substantial.[38] Translating this knowledge into educational materials and activities is an urgent task. The need for integration of this knowledge into development activities is equally urgent. However, only by simultaneous education on the means of achieving development can environmental education be credible in the developing nations.[39]

Environmental education for adults has an important role to play in the recreation of a cultural identity for many minority groups and in cultural efforts at the post-colonial stage. The intricate balance between man and nature that has existed for centuries in many areas until destroyed by more intensive, exploitative systems has recently been given a new cultural significance in this movement.[40]

34. This is just one of several examples given at the Belgrade Workshop on Environmental Education which illustrate the importance of the semantic relevance even when the relevance regarding content is quite clear to the organizers of a programme.
35. This may be one of the reasons why so much of the adult education on the environment is in the fifth category of Lowe's classification—self-fulfilment (cf. 'Much of the Conservation Education').
36. The playing off of environment protection and pollution control against labour market considerations by some industries is another factor.
37. As an example, it is interesting to note that a recent World Bank publication, P. H. Coombs, *Attacking Rural Poverty—How Non-formal Education Can Help*, by Baltimore, The Johns Hopkins University Press, 1974, does not contain, for example, the concepts or words 'environment', 'pollution', 'ecology', 'erosion', 'pesticide' in its index.
38. Farvar and Milton (eds.), *The Careless Technology*, New York, N.Y., Natural History Press, 1972.
39. Since there is an increasing awareness that some environmental problems of developing nations come from the uncritical application of technology, for example overdoses of pesticides or use of agricultural methods suited for the temperate latitudes in the tropics, it is interesting to speculate on whether environmental education should not emphasize the need for a consideration of local, traditional methods of production. The student should be encouraged to inquire into the ecological bases for traditional methods and how this knowledge can be applied to development.

    For a brief discussion of one aspect of integration, see C. W. Chang, 'The Role of Agriculture Extension in Conservation Education', *Conservation Education and Training*, Morges, Switzerland, IUCN 1968 (IUCN Publications New Series Supplementary Paper no. 11).
40. This is particularly apparent in some indigenous populations—often nomadic and in a minority position—which live in marginal environments. This was clearly demonstrated at the Environment Forum of the United Nations conference in Stockholm in 1972. One example was the Lapp group that held up their own harmony with nature as a contrast to the exploitation practices of the majority groups around them. Without wanting to romanticize on the harsh conditions of marginal environments, one can observe that such ecological viewpoints strengthen pride in a cultural heritage and serve as motivation for fighting to keep the environment intact and productive to their way of life.

Non-formal education

The relevance problem, together with such quantitative aspects as those mentioned in the section on organizational problems, indicates the urgent need for developing non-formal adult education in the environmental sector. Some Latin American examples have been given. In conservation education, the non-formal element has been well developed as has the necessary task of reaching people through the media, at parks, zoos and in the lower-school levels.

The role of non-formal education for development has long been recognized.[41] It has already been pointed out that environmental and non-formal education must join forces. However, the prospects do not look hopeful. Environmental education has its roots in environmental concerns largely founded in scientific research. The distance between science and non-formal education in most countries is great. The involvement of universities in the developing countries in environmental education presupposes an interpretation of academic freedom and responsibility that is unfortunately far removed from the elitist attitudes of many such institutions.[42]

Using the term non-formal education to denote non-traditional methods of learning, one may note the wide variety of pedagogic methods used in adult-education programmes.[43] The use of non-traditional materials and methods often serves two functions. First, it may be dictated by pedagogic necessity (the need to reach a largely illiterate group) or financial constraints. Second, many methods—poems, puppet shows, environmental action such as planting trees, etc.—serve to make environmental education competitive with other social activities and to introduce emotional elements which motivate and reinforce learning.

Conservation education for adults

Since the conservation movement is quite old in many countries and reasonably well organized and financed in several, it is natural that this sector should have the best documented evidence as to co-operation between action-oriented groups and educational efforts. A number of publications from the International Union for the Conservation of Nature and Natural Resources (IUCN) give examples of conservation education on a world-wide basis.[44]

Among the innovative functions performed by conservation education, the single most important is perhaps the pioneering of combinations of field work. Developments along this especially significant line are the British Field Studies Centres and the emerging urban counterparts.[45] It is also clear that adult education on conservation has had spin-off effects on university education and that a gradual widening of the concept of conservation has led to a transformation of the content of much education now given by conservation societies.[46]

University-type courses

For various reasons, adult education on environmental problems seems to be dominated by courses which in some ways are connected to a university or college. A major reason for this is

41. Coombs, op. cit.
42. Involvement does occur. In developing countries, examples can be found in Thailand and several Latin American countries. In the industrial nations, the most important examples seem to occur in the United States; see also Emmelin, *Environmental Education at University Level*, op. cit.
43. See the paper on methodologies by David Wolsk.
44. For example the IUCN Eleventh Technical Meeting: *Environmental Conservation Education Among Populations of Rural and Woodland Areas* (IUCN Publications New Series no. 20). *Final Report of the European Working Conference on Environmental Conservation Education* (IUCN Publications New Series no. 34). *Environmental Education in an Urban Society* (IUCN Publications New Series, Supplementary Paper no. 37). *Conservation Education and Training* (IUCN Publications New Series Supplementary Paper no. 11). *Conservation Education* (IUCN Publications New Series Supplementary Paper no. 12).
45. See the paper on instructional resources by Jan Čeřovský.
46. On the concepts of conservation, see A. Warren and F. B. Goldsmith, 'An Introduction to Conservation in the Natural Environment', in Warren and Goldsmith (eds.), *Conservation in Practice*, London, Wiley, 1974.

probably that there has been pressure on these institutions to provide environmental education. Unlike many other organizations, they have the competence with regard to subject matter while a number of factors such as declining student numbers have stimulated them to enter the area. Clayton[47] has also suggested that a research base is a prerequisite for sound environmental education which would give a further advantage to universities.

Pratt[48] has given a catalogue of many United States post-secondary institutions which operate programmes of varying length as part of their offerings in adult education. In most cases, these courses and programmes can be characterized as undergraduate-level courses and have much in common with these as regards both content and method. It has been argued that the most important aspect of some of these programmes is that they bring ordinary college students into contact with a wider variety of people and that the effect of this is to sharply increase the amount of 'teaching within the group'. In several European institutions of higher education, the mixing of undergraduate teaching with adult education is promoting community ties which these institutions have traditionally lacked.[49]

The open university

The United Kingdom's Open University is probably among the most significant developments in modern adult education. The innovations in method, dissemination of education, combination of traditional and non-traditional media, etc., are outside the scope of this chapter. In the field of environmental education, the offerings of the Open University at present are very limited,[50] a fact which may seem somewhat surprising in view of the lack of academic tradition, the stated aims of interdisciplinarity and the social relevance of the Open University.

Examining the synopsis for the undergraduate course on environment, one is struck by the fact that it resembles traditional environmental survey courses such as are given by most university science faculties. However, any analysis of the content and method of this course is impossible without access to the material broadcast over radio and television.

In the absence of any hard evidence, only a few speculations can be made as to the reason for the very limited contribution to environmental education made by the Open University. In traditional universities, a combination of student pressure, faculty involvement and decreasing numbers of students for certain types of courses have combined to promote environmental education.[51] None of these forces would seem to operate with the same strength in the Open University.[52] Devotion to traditional academic excellence[53] and the fact that so far the Open University has to a large extent educated people in the teaching professions[54] may in part explain the limited offerings in environmental education. The members of the teaching profession who are enrolled in Open University are not likely to be in search of environmental education until it becomes a more prominent component of the school curriculum.

47. K. Clayton, 'Environmental Education at East Anglia', *Environmental Education at Post-Secondary Level*, Vol. 1, Paris, Ceri: OECD, 1974.
48. A. L. Pratt, 'North American Institutional Organization for Post-Secondary Environmental Studies', Document CERI/HE/CP/74.04.
49. L. Emmelin, 'The Environmental Studies Programme', *Environmental Education at Post-Secondary Level*, Paris, OECD, 1974.
50. *Courses Handbook 1974* and *Post Experience Courses Prospectus 1975*. The courses listed for 1975 are an undergraduate course 'Environment' ($\frac{1}{2}$ credit) and a post-experience course 'Environmental Control and Public Health'. A number of undergraduate courses are also of direct environmental relevance ('Regional Analysis and Development', 'Urban Development', 'The Earth's Physical Resources', 'Ecology', 'The Man-made World').
51. Emmelin, *Environmental Education at University Level*, op. cit., Section 2.2, 'The Origin of Programmes'.
52. The *Report of the Vice Chancellor*, 1972, does, however, reflect discussions of this nature but the results do not as yet appear in the catalogue of offered courses.
53. *Report of the Vice Chancellor*, op. cit., p. 43–4.
54. In 1973 teachers constituted 29.5 per cent, housewives 12.9 per cent, professions and the arts 11.7 per cent, technical personnel 11.2 per cent, clerical and office workers 9.7 per cent. *What is the Open University?*, Milton Keynes, The Open University Press, 1974.

The University Without Walls

This programme, which is carried out by the Union for Experimenting Colleges and Universities, a union of thirty-four United States institutions of higher education, is similar to the Open University in aiming at reducing the time/space barriers against higher education.

A comparison between the teaching methods of the Open University and the University Without Walls (UWW) indicates that the great flexibility of the UWW may be more conducive to environmental education. In the undergraduate field, the Open University is offering a set of courses backed up by an impressive logistics system including television, radio, regional study centres, production facilities which ensure that the material received by students is of high quality, reviewing boards, external examiners ensuring high academic standards, and so forth. The careful structuring of the Open University has led to very good results with drop-out rates apparently in the range of 25 to 30 per cent and high standards of performance among students completing courses.[55] On the other hand, the UWW has a very loose structure, being based upon learning contracts, i.e. 'written plans of study drawn up between you and faculty sponsors which specify clearly stated educational objectives, methods of study, resources, evaluation procedures and credits'.[56] Since a learning contract may contain internship, field and job experiences, independent study and research, individual and group project activities, seminars, tele-lectures, programmed-learning facilities and travel,[57] the freedom exists to build into the education those components of a practical nature that the Open University construction may have difficulties in accommodating but that are central to environmental education.[58]

Although at present their contribution to the environmental education of the adult population may be small, the potential of structures such as the Open University and the University Without Walls would seem good. Their limitations may be that they are active only in what is called 'creaming' the educationally disadvantaged.[59] In relation to environmental problems, the groups that can be reached are those already involved professionally, in civic organizations or otherwise. The major advantage is the possibility of getting them far beyond the level of knowledge and skills training possible in most other types of adult education efforts so far discussed.

Other examples

Both the Open University and the UWW involve several innovations necessary for effective education, which they have in common with such varieties of successful university-type formal education as the Cornell University conservation correspondence courses.[60] The latter, along with the course 'Man and the Environment' developed by Miami-Dade Junior College and the series entitled 'The Environment and the Citizen' developed by the University of Michigan, are perhaps the most significant examples of correspondence education in the United States.[61]

The production method for the University of Michigan course is interesting in that it comprised a sequential process in which production and evaluation alternated, and in that responsible agencies outside the university were heavily involved. Nowak[62] states the general criteria that must be met if an educational programme is to be successful:

55. The term 'apparent drop-out rate' is used since the Open University system of guaranteed registration makes it possible for students to make a pause in their studies. cf the American 'statute of limitations' which creates problems for recurrent education particularly for women.
56. From brochure *The University Without Walls—an Alternative Approach to a Degree at the University of Wisconsin-Green Bay.*
57. ibid.
58. For a discussion on the value of practical work, laboratory work, etc., in undergraduate education, see, for example, Weidner, *Environmental Education at Post-Secondary Level,* Vol. 1, Paris, Ceri: OECD, In Press, or Emmelin, op. cit.
59. S. M. Miller, 'Demand for Recurrent Education', in S. J. Mushkin (ed.), *Recurrent Education,* Washington, D.C., National Institute of Education, 1973.
60. R. J. McNeil, 'Studying the Environment by Mail', *The Journal of Environmental Education,* Vol. 3, No. 2, p. 36.
61. Roth, op. cit., note 12.
62. Nowak, op. cit.

One, the program must be built around a core of minimal knowledge necessary for informed citizen action because of the differences in formal education, the wide individual variations in casual information obtained and the changes which are occurring in our culture. Two, the educational materials must be easily disseminated to all who would like to participate, not just those who can easily reach an educational institution. This is true in urban as well as rural areas. Finally, the program must be made relevant to the learner.

The University of Michigan course is not unique in being designed to meet these criteria. Its major innovative aspect is the use of the student's own immediate environment for experiment and study. In the assignments which go with each of the units that comprise the course, there are special activities which include active exploration of the student's own environment.[63] Another interesting aspect of independent study through correspondence is that adult study groups can be involved in taking the course, thereby facilitating an exchange of information and experiences.

Institutional problems

It has been stressed several times in this chapter that there is a serious lack of organization for adult education. This is substantiated by Lowe.[64] The remedy may not, however, be the creation of new organizations competent to deal with the entire complex of adult education. In the opinion of the author, the integration of environmental matters into the programmes of education and the integration of educational efforts into the work of environmental agencies is likely to be more effective. In environmental policy statements, it is quite evident that the adult-education sector is added as an afterthought or is there not because anybody knows what to do about it, but because of a vague feeling that something ought to be done. Other recommendations are specific and aimed at identified agencies or public organizations but those on adult education have no clearly designated recipients.[65]

The organizations that do exist in many countries are either—as in the case of conservation organizations—too limited by finance or competence or specialized in marketing vocationally oriented education—as in the case of most correspondence institutes and community colleges. Funding procedures for developing a major educational effort tend to give institutions of higher education a distinct advantage. As has already been pointed out, these have been in a position, with regard to available competence and manpower, to exploit the increased interest in environmental education. Many organizations dealing with adult education do not have the means of producing sufficiently well-prepared grant proposals to get a programme going.

One possibility for increased environmental education would be to introduce more sophisticated material into organizations which have distribution facilities such as trade unions and some large organizations normally concerned with aspects of adult education, e.g. some of the major correspondence institutes and the armed forces.

The responsibility of individual government agencies in environmental education for adults has been largely neglected. The exceptions are normally either those agencies concerned with conservation or specialized agencies which have responded to criticism by environmental groups. If citizen participation in planning is to develop,

63. Nowak unfortunately does not go deeply into the implications of this method. It would be useful to examine the quality of both the answers to questions like 'make a statement about noise pollution in your community' and the comments made by tutors on such statements. Many of the questions asked are of a very general nature. One problem with this type of activity would seem to be that in order to evaluate the answers a rather detailed knowledge of the environment which is under investigation is needed in the teacher. It would also be useful to have information on the nature of the continued exchange of information between the tutor and the student that occurred as a result of specific answers to questions—whether a renewed effort, aided by specific reference to sources of knowledge, was in fact made by students who produced unsatisfactory responses. Correctly used, the method must be a powerful tool to enhance learning but if insufficient attention is paid to tutoring after the initial round, the method will produce both incorrect knowledge and inadequate skills training. The number of questions asked in each assignment seems to be so large that a considerable amount of staff time must be available if the number of students is at all large.

64. Lowe, op. cit.

65. See footnote 17, above.

the educational responsibilities of many agencies must be recognized. There is, however, a need for some kind of co-ordination of this effort and the lack of institutional organization in most countries is quite clear.[66]

The special characteristic of the adult learner is a further complication in environmental education. Motives for participating in most adult-education programmes are related either to career improvement, due to increased knowledge and/or certification, or to hobby interests. This may be the reason for the failure of environmental education to expand parallel with adult education, as noted earlier.[67] At present, job expectations will bring only a small proportion of the adult population to environmental education. The importance of conservation education, which broadens to environmental education, has been pointed out and is relevant in respect of hobby interests.

Conclusion

In conclusion, it seems important to point out that although this chapter deals largely with deficiencies in the environmental education of adults, there are encouraging examples of progress in all regions of the world.

In developing adult education on environmental problems and in seeking to integrate it with other educational work, it is necessary to recognize the enormous needs for adult education and the fact that systems must build on active participation, individual enthusiasm and the hope that the effort spent on education will give concrete results in the form of a better environment. All systems—whatever their organizational structure or financial status—are conditioned by these factors.

66. The recently conducted second stage of the national Swedish physical planning may be an example of relevance to this discussion. After the Swedish parliament had decided upon the principles and some of the basic data for the national physical planning, the stage in which the individual municipalities decided on how to implement these began. During this work, most municipalities presented the national physical planning work to the citizens, showed plans for the local implementation of this planning regarding land use, urban development, service, etc. The people were asked to contribute towards this process both with comments on the municipal plans and with concrete alternatives. The political parties engaged in this, as did many environmental action groups. Hearings, seminars, demonstrations in schools and to groups of adults took place. The free access to information that Swedish law gives every citizen is one feature that many environmentalists consider more important than educational activity by government agencies as a means of achieving citizen involvement in planning.
67. Roth, op. cit.

Part IV

Policies for environmental education

12. The evaluation of environmental education learning

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How is your cow?' the farmer was asked. Compared to what?' he replied.

Within this simple exchange of words lie many of the elements of evaluation. For evaluation is something we practise every day of our lives. The individual who queried the farmer had decided that information was needed and proceeded to collect it by a question. The farmer's answer implies that he wonders why the question was asked and what criteria will be used to judge his cow. An essential element of evaluation is to provide information for decision-making. Did the questioner wish to buy the cow? Did he want to drink the cow's milk? Perhaps he had a real concern for the farmer's welfare and wanted to help assess the health of the cow upon which the farmer depended. The farmer's answer shows that evaluation is not a simple process. The right question must be asked. The response elicited from the farmer might well have been a judgement in itself, such as good or bad, which would leave our cow evaluator still without information for his decision.

The purpose of this chapter is to present as logically and simply as possible the complex object of evaluation and the vital role it must play if environmental education is to achieve its potential as a major influence in helping the people of the world achieve a quality of life. It covers the significant events which bear upon the status of evaluation in environmental education. Specifically, it examines the evaluation of student learning in cognitive, affective and skill areas at primary, secondary and tertiary levels. The effects of both classroom and non-classroom activities are also investigated. The analysis is presented in the context of current thinking in educational evaluation and the status of environmental education. During its preparation over one hundred papers, studies and books were reviewed which represented, in so far as possible, a world view. The author fully recognizes that due to constraints of time and communication many valuable sources were either not known or not readily available for inclusion in this paper.

What is educational evaluation?

A brief examination of the current concept of educational evaluation provides a framework for the following analysis and discussion.

One of the most recent definitions has been advanced by Popham: 'Systematic educational evaluation consists of a formal assessment of the worth of educational phenomena.'[1] This succinct statement captures the key elements described by modern evaluation theorists and practising evaluators. First, unlike our earlier informal en-

1. W. James Popham, *Educational Evaluation*, p. 8, New Jersey, Prentice-Hall Inc., 1975.

counter with the farmer, educational evaluation is a systematic and formal process of gathering information. A second, and most important, point is that this information is used to assess the merit or judge the worth of educational phenomena. This includes all aspects of the educational process and resulting products such as goals and objectives. The idea that the central aspect of educational evaluation involves using collected data to make educational decisions has been documented by many authors. Indeed, there is widespread agreement that the importance of the decisions defines the importance of the evaluation.

The increased recognition of the need to make decisions has also played a major role in the new-found interest in educational evaluation. Of particular importance in this respect has been the effect of limited or shrinking financial resources available to education. This common situation has contributed to the need to assess and compare alternative methods of curriculum and instruction. Other factors include general dissatisfaction with education, increasing accountability requirements of school administrative agencies and funding organizations, and increasing involvement and interest among citizens.

Decisions also reveal the purposes of evaluation. Although many decisions are made in the evaluative process, a fundamental decision concerns the value of the educational programme and the extent to which it meets identified needs. The programme's goals and objectives are the standards or criteria which determine in which direction and to what degree needs are to be met. Goals are considered to be more idealistic expectations giving over-all direction to the programme. Objectives establish more specific levels of achievement leading to the attainment of goals. A second important set of decisions involves the adequacy of the educational instructional process or programme. The decisions are based on comparison of the programme's outcomes with the goals and objectives which were established to meet identified needs. These decisions and the collection of information upon which they are based should occur not only at the end of a programme but throughout its process of development and implementation.

Several models have been developed by evaluation theorists to identify and clarify the data-gathering and decision-making steps relative to the various phases of the educational process. Essentially, these stress either: (a) the evaluator making judgements on the effects of the programme by using standards to compare observations with intents, or (b) the evaluator collecting data and presenting information for other decision-makers who determine the merit or worth of the programme. Those interested in detailed and summary descriptions of common models may refer to any of several books surveying educational evaluation. Figure 1 is a synthesis of these models and is included here to illustrate their common educational elements, and to describe processes and explain terminology.

As shown, the evaluation process is an integral part of the education process. One cannot be carried out properly without the other. For example, following through the programme components of Figure 1, starting with the shaded box at the lower left, a desired condition or need is perceived. This leads to a formal assessment to make a knowledgeable judgement or decision on what needs are to be met. From this, the degree to which the programme intends to meet the determined needs (goals and objectives) is decided as shown in the shaded box at the lower right. Then, a programme to improve conditions and meet needs is designed, implemented and observed in operation (centre shaded boxes).

The results of the programme are actua improved conditions (shaded boxes on the right) These are measured and decisions are made, base on the goals and objectives, to determine th extent to which conditions have been improve (upper-right shaded box). The results of eac evaluation effort is fed back (dashed lines) to: (a readjust perceptions of actual condition (antecedents or resource inputs—see botton brackets); (b) improve the programm (transactions or process); (c) refine the goals an objectives (desired outcomes or outputs); and (d improve the total evaluation effort.

Two kinds of evaluation processes are illu trated by the model—formative and summativ Formative evaluation is designed to improve th programme while it is being developed an operated in its formative stages. This not onl

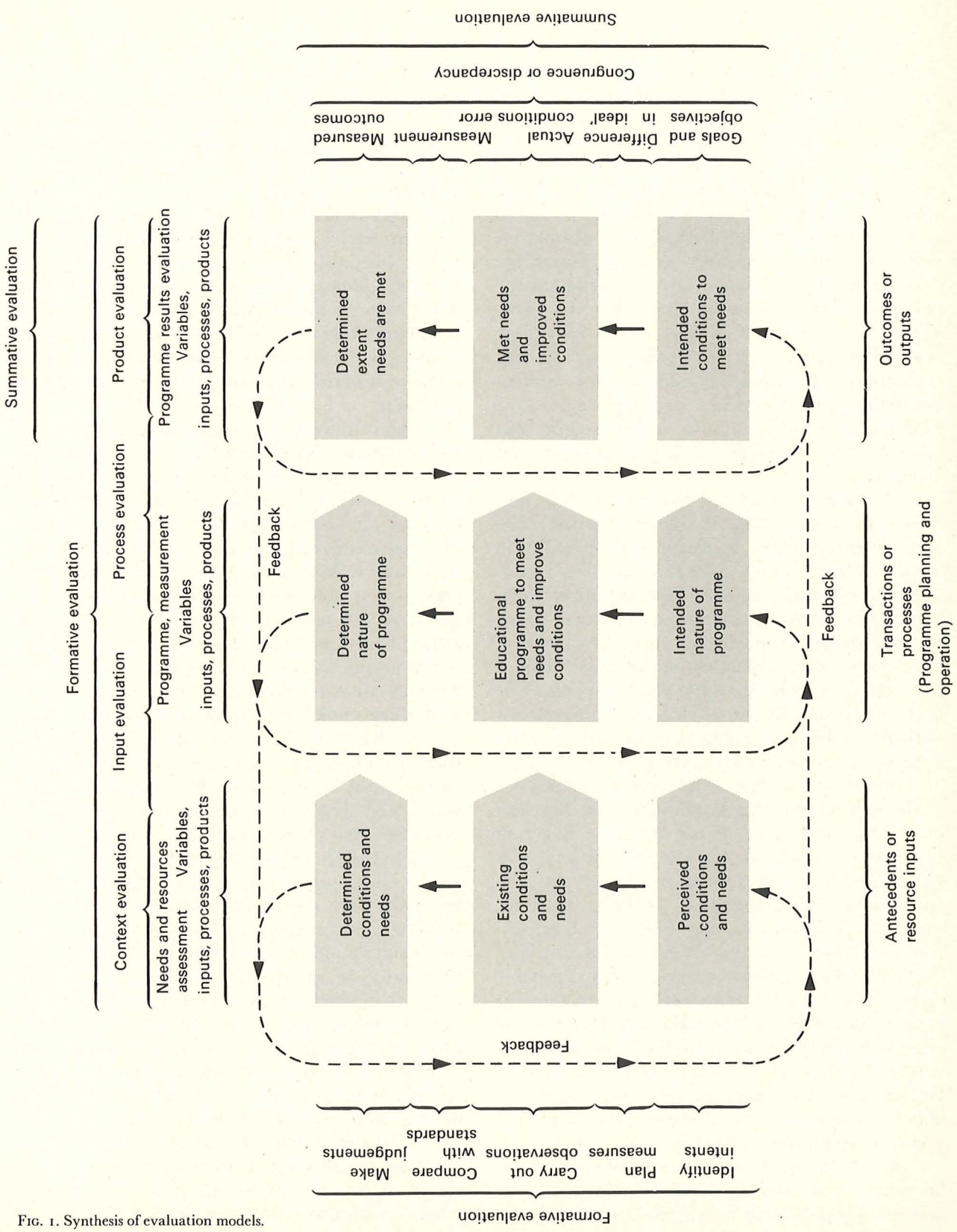

FIG. 1. Synthesis of evaluation models.

involves the assessment of participants in a programme but evaluation data are typically used by personnel who make programme improvement decisions. The brackets to the left of the diagram show that formative evaluation for each of the three stages in the programme (input, process and output) consists of identifying intents, planning measurement methods, collecting data, comparing with standards and making decisions. Formative evaluation is also illustrated by the brackets at the top of the diagram which show that the three stages are sometimes broken down into four evaluation phases by evaluators: (a) context evaluation; (b) input evaluation, (c) process evaluation; and (d) product evaluation. Formative evaluation at each of the three stages also considers the variables of input, process and product.

Evaluation measures the change in, and influence of, variables. Variables that influence and are manipulated in order to determine the degree of influence are called independent variables—for example, amount of programme time, educational media and learning activities. Those that are studied to determine status or degree of change are called dependent variables, for example, student knowledge and skills. This paper is concerned primarily with evaluating the dependent variables, student learning outcomes or products at primary, secondary and tertiary levels.

Summative or final evaluation is carried out at the end of programme development. Brackets at the top and right of the diagram illustrate summative evaluation. On the right it is shown that summative evaluation is concerned with the congruence and discrepancy between goals-objectives and measured achievement of objectives. Also illustrated are the effects of human factors—the difference between the goal 'ideal' (lower-right shaded box) and the actual outcome (centre-right shaded box) and the difference between the test results (upper-right shaded box), and the actual outcome (centre-right shaded box). These two factors affect the accuracy of the judgement about congruence and illustrate the need for accurate summative evaluation.

As can be seen, the judgement of congruence between intents and outcomes requires the most accurate measurement and assessment techniques possible. This means that techniques should be valid and reliable. Validity refers to the degree to which the measurement techniques actually measure the variable being studied. Reliability refers to how consistently the measurement techniques measure the variable in the same way. Measurement techniques should also be appropriate to the task in order to ensure high validity and reliability. Generally, they may be grouped as follows: (a) observation of processes and products in which those being evaluated are aware that they are being evaluated; (b) formal pencil-and-paper testing; (c) unobtrusive observation with those being evaluated unaware that they are being evaluated.

Before the best technique or combination or techniques can be selected, the research questions to be investigated must be identified. Here we come up against the difficulty of distinguishing between the terms 'research' and 'evaluation'. Both are concerned with questions of when, what, who, where, how, and particularly, why. Generally, it is felt that research answers factual questions to learn truths, whereas evaluation answers questions of merit or worth. Research also results in conclusions, whereas evaluation results in decisions. It is on this point that overlap can be seen since evaluative decisions are often made on the basis of facts and conclusions derived from research. In particular, new programme development incorporates both elements of research and evaluation since an entire programme may often be a research project in itself.

Regardless of the differences between research and evaluation, the synthesized model presented here is a decision-making one. It is a composite of the elements and processes of many models. It should be noted that any model actually used must be composed of elements and processes that reflect the decisions to be made and the processes required for such decisions. For example, there is a trend today towards the use of more participant-oriented, internal evaluation models. While the model presented in Figure 1 is derived from models which are oriented towards the external evaluator, it may also be used as the basis for developing a participant-oriented internal evaluation model. In particular, its formative evaluation processes lend themselves to

student/teacher involvement in evaluation. The role of the evaluator in this kind of model is to assist participants, provide information, facilitate communication between participants, interpret data, clarify decisions to be made and so on.

The model also presents an evaluation process which is goal-oriented. This means that the evaluator identifies the goals of a project or programme and then seeks data to determine if they are met. Another approach, not illustrated by the model, is called goal-free evaluation. In this, the evaluator looks for all kinds of effects of the programme without prior knowledge of the goals. The process is thought to increase the likelihood of detecting unexpected outcomes and side effects. Another related aspect not shown by the model is the presence of extraneous variables. These are those events outside the programme's control—influence of the home, unplanned school programmes, etc.—which affect the outcomes.

Before leaving this discussion it should be pointed out that any evaluation model is based upon inherent and often unexpressed assumptions about the nature and role of evaluation. For example, is there an assumption that evaluation should be directed primarily at making participants more accountable? Or is there an assumption that evaluation must depend upon an outside evaluator who is not involved in internal decisions in order that bias be eliminated from data? It is important that the basic assumptions be made clear regarding any model.

Finally, several terms have been used here, such as measurement, accountability, assessment and appraisal. These and other related terms have been defined in the glossary at the end of this chapter.

What is the relationship of evaluation to environmental education?

As stated earlier, this paper is concerned with determining the state of the art of evaluation of student learning in environmental education. Meaningful judgements as to the status and needs in this area require that the analysis be framed within the context of the most desirable evaluation and environmental education processes. In the previous section, a model was presented to illustrate the current concepts of educational evaluation theory and practice and to show the place and role of the evaluation of student learning in the total process. In this section the model is presented in a way which is designed to illustrate the role of evaluation in environmental education. It specifically clarifies the importance and function of student learning evaluation. The intent is to provide a clearer understanding of what evaluation of student learning should consist of, how it should be done, where it should occur, who should do it, who will use the results and in what way, and perhaps most important, why it is done. It is against the background of understanding provided by the two introductory sections of this paper that the available world-wide literature on evaluation will be examined.

What follows is a description of the combined environmental education and evaluation processes as illustrated in Figure 2. It is pointed out that the same warnings given previously concerning the synthesized model in Figure 1 apply here. However, whatever the kind of educational programme being developed, the major components and steps (shown by the shaded boxes) will be included. How the model is adapted to meet a variety of needs will vary from one situation to another. For example, environmental education has certain unique characteristics which must be accommodated by the model selected, e.g. interdisciplinary, problem-focused, value-clarifying, community-oriented, formal as well as non-formal, and aimed at long-term outcomes.

In Figure 2, the shaded boxes in the centre of the diagram represent the major steps in developing, implementing and evaluating an environmental education programme as commonly described in the literature. The first phase involves the identification of needs or antecedent conditions to which the programme is addressed. Environmental education evolved from the recognition of broad needs which include: (a) the need for environmental quality; (b) the need for motivated, informed and active people to work for envi-

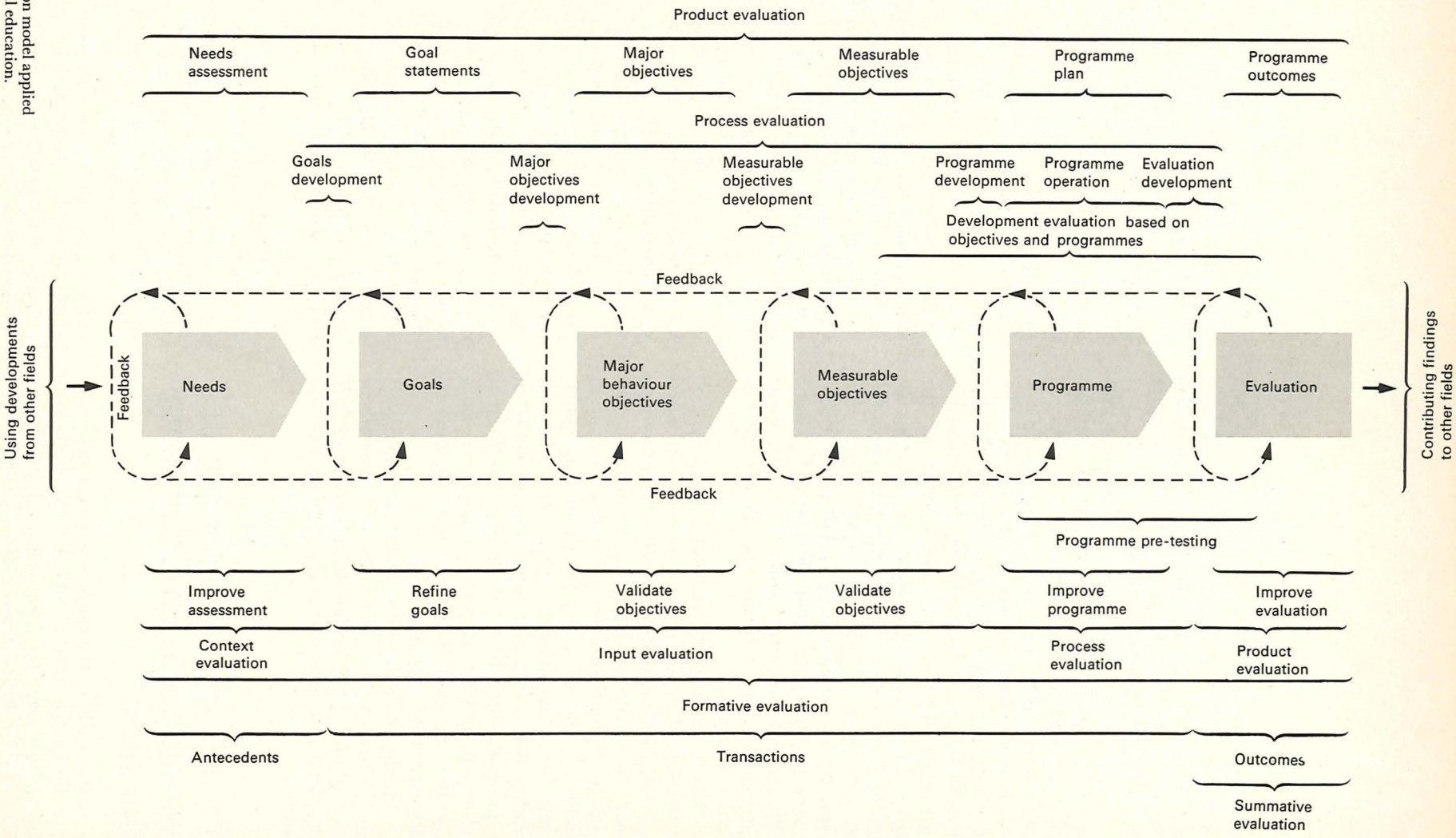

Fig. 2. Evaluation model applied to environmental education.

ronmental quality; and (c) the need for improved methods of teaching. There appears to be much agreement that these are valid needs which environmental education should aim to meet. It is important to note that even at this early stage of needs identification, direction is already being given to the kinds of student learning outcomes desired, i.e. motivated, informed and active people. It is also important that needs assessment investigate the motivation, knowledge and skills people possess. Such information can provide baseline data for programme evaluation as well as the rationale and direction for programme development.

The second phase involves the translation of needs into goals. Of particular interest here are the cognitive (knowledge), affective (including motivation) and skill aspects of goals. An example of an affective goal is as follows: *To help individuals acquire strong feelings fundamental to developing a concern for the environment and a motivation to participate in activities for maintaining and improving the quality of the environment.*

The third phase consists of translating goals into major behavioural objectives which may be used as a basis for developing a wide variety of programmes. These objectives are general in nature and indicate what individuals should do to achieve the goals. The following is an example of an affective objective showing a positive feeling towards the role of people in solving problems: *The student will increasingly identify existing and potential environmental issues and problems and choose, plan and help carry out solutions which place people in the role of stewards and creators of a quality environment.*

A listing of general objectives and performance indicators has been published by the Maryland State Department of Education.[2]

The fourth phase involves defining major behavioural objectives as measurable objectives. These not only indicate what the student will do but to what extent and under what conditions. These are specific for an educational programme and form the basis for developing programme activities and evaluation instruments. They provide for identifying the student outcomes (dependent variables). They allow the degree of achievement of the dependent variables to be observed and provide a means of assessing the effectiveness of the instructional programme. An example is given below of how the affective objective is developed to guide programme activities: *The student will select and complete an optional assignment requiring the listing of three problems on the school site, choosing one and describing how it could be solved according to the six common problem-solving steps.*

The following is an example of how the same affective objective could also be developed to form the basis for developing evaluation test items: *The student will, given a series of slides, select environmental problems and choose alternative solutions with appropriate rationales which demonstrate the high value of man as a steward and creator of a quality environment.*

It should be pointed out that several measurable objectives may be developed for one major objective. Objectives with this specificity provide for the development of test items which are, in effect, criteria for measuring the extent to which the objectives have been achieved. These are referred to as criterion-referenced (CR) tests which allow students to be assessed individually according to performance standards specified in the objectives. Further examples are given by Bennett[3] and Instructional Objectives Exchange.[4] CR tests are contrasted by norm-referenced (NR) tests which are often constructed from more general objectives and provide for results to be compared with a reference group. Both may be used in different ways to assess the educational programme according to the kind of decisions to be made.

The fifth phase is the development of the programme resources, content and activities and identification of student and teacher roles. These are based upon the measurable objectives.

The final phase is the development of the evaluation plan. As shown by the diagram, the

2. Maryland State Department of Education, *Environmental Education. A Maryland Approach*, Baltimore, Md, Maryland State Department of Education, 1974.
3. Dean B. Bennett, 'Evaluating Environmental Education Programs', in James A. Swan and William B. Stapp (eds.), *Environmental Education*, p. 113–64, New York, N.Y., Halsted Press, 1974.
4. 'Instructional Objectives Exchange', *Environmental Education Grades 4–9*, p. 5–138, Los Angeles, Calif., Instructional Objectives Exchange, 1974.

evaluation instruments should be developed from the measurable objectives and should reflect the programme content and activities. The use of instruments for pre-testing is also indicated.

In formative evaluation, during developmental stages, a major purpose of evaluation is to improve the educational methodology. This was a recommendation of the IUCN European Conference.[5] Another major use of data involves decisions on the extent to which objectives have been achieved. Other data, and uses of feedback information, may relate to the roles of participants and decision-makers themselves. It is important to realize that, in order to select the kind of measurements and data needed, one needs to know the precise types of decisions which educators, students and others need to make. However, the evaluator should not ignore opportunities to gather data which might indicate the presence of worthwhile side effects.

Finally, the diagram indicates that the educational and evaluation processes should make use of methods and theories from other fields. Likewise, the findings from research and evaluation studies may contribute to knowledge in other fields.

As can be seen, the environmental education programme should be developed and operated in conjunction with, and simultaneously with, an evaluation programme. Both consist of inputs, processes and products which should be subject to continual assessment.

What is the state of the art of evaluating student learning in environmental education?

Cognitive, affective, and psychomotor growth is the goal toward which the educational effort is directed. This is the student outcome that should serve as the criteria by which renewal and reform is ultimately evaluated.[6]

This statement, taken from a recent major report dealing with educational reform and improvement in the United States, attests to the importance of evaluating student learning in environmental education. In addition, from the standpoint of goals of environmental education, the assessment of such growth is necessary in order to predict the effects of student learning on environmental quality.

In this chapter an attempt is made to assess the state of the art in evaluating student learning. Specifically, the status of the evaluation of cognitive, affective and skill (psychomotor) variables will be examined. The cognitive variable involves knowledge and understanding of concepts and facts as well as the ability to apply abstractions, analyse, synthesize and evaluate. The affective variable involves feelings or emotions and has to do with likes and dislikes and evaluation of 'goodness' and 'badness'. It consists of attitudes and values towards objects. The psychomotor variable involves skills in carrying out physical and mentally co-ordinated activities such as investigative skills requiring the use of equipment or artistic skills needed to beautify an area, or problem-solving skills essential in helping to resolve an environmental issue. In addition to surveying the status of the evaluation of these three variables in environmental education, attention will be given to what has been done at primary, secondary and tertiary levels in these areas.

Overview of student learning evaluation research

Activities

Educational evaluation for the purposes of improving education has received increased attention within the past ten years. In the United States

5. 'Conclusions of the European Working Conference on Environmental Education', Special Supplement to *IUCN Bulletin*, No 3, February 1972.
6. 'Basic Studies National Field Task Force on the Improvement and Reform of American Education, Report of the Task Force' *Working Together*, p. 34, Washington, D.C., United States Government Printing Office, 1974.

for example, it was around 1967 that many new theories and methods began to emerge. In fact, the past decade has seen the development of both curriculum evaluation and educational systems evaluation models. From the standpoint of evaluating student learning the field is young.

Similarly, environmental education is in a fledgling stage. For example, it was also around 1967 that the term 'environmental education' was first coined in the United States. Environmental education was an outgrowth of conservation education. With the field still in its early stages of development, most of the evaluation efforts have been broadly descriptive—an effort to define its characteristics rather than to analyse its elements, research its components and evaluate its effects. Passineau who recently completed a review of literature pursuant to his doctoral study has written:

> Currently the state of the art of EE evaluation is more characterised by rambling thoughts and half-hearted attempts than by rigorous systematic philosophy and sophisticated application.[7]

Helgeson and others also have voiced similar conclusions stating that from their observations very few schools had 'hard' data about the effects of their programme. They also report that although many programmes have stated specific objectives in the cognitive, affective and behavioural domains, few have followed through and measured them.[8] These observations have also been borne out by the fact that, out of a great many federally funded environmental education projects in the United States, only a few have so far passed the U.S. Office of Education's Dissemination Review Panel. Projects successively submitting evidence of effectiveness to this panel are approved for national dissemination. Criteria for approval includes meaningful pre-post test gains, adequate sample sizes, replicable results and gains attributable to the project.

Donaldson reports that empirical studies comparing methods of outdoor education with traditional teaching are rare. The few which have been made could be criticized for inadequate research design and study of populations.[9] It is not surprising therefore that little is known about what educational approaches are best for skill, attitude and knowledge development.

It might be argued here, however, that the lack of programmes successfully evaluated on the basis of the models being advocated suggests the use of different models or adaptations which better accommodate the goals and characteristics of environmental education.

In other countries outside of the United States, the situation appears to be much the same. A publication from Africa, for example, states:

> In Africa today, the need for evaluation is especially urgent since the countries are grappling with the task of evolving new and truly relevant systems of educational development. It is essential that continuous mechanisms for the evaluation of curriculum projects and other educational innovation be established in order to aid decision making.[10]

The author also received a report from the United Kingdom stating that in that country evaluation methods are in a state of flux, reflecting the lack of consensus regarding the definition and purposes of environmental education. It is too early at this time, the report goes on, to define objectives and test criteria. Instead, it suggests that illuminating case studies and intrinsic analysis of materials be carried out.[11]

To gain a first-hand view of the status and trends in the evaluation of student learning, the author reviewed a total of 104 books, unpublished and published papers, journal articles and a variety of other studies. Literature from over seven countries was studied including the United States, Africa, Mexico, Israel, the United Kingdom, Australia and Canada. Dates of publications

7. Joseph F. Passineau, 'Walking the "Tightrope" of Environmental Education Evaluation', in Noel McInnis and Don Albrecht (eds.), *What Makes Education Environmental?*, p. 402, Louisville, Ky, Environmental Educators Inc. and Data Courier Inc., 1975.
8. Stanley L. Helgeson *et al.*, *A Review of Environmental Education for School Administrators*, Washington, D.C., United States Department of Health Education and Welfare, Office of Education, 1971.
9. George W. Donaldson 'Research in Outdoor Education', *The Journal of Environmental Education*, Vol. 3, No. 4, Summer 1972, p. 10.
10. International Center for Educational Evaluation, *Information Brochure*, p. 1, Nigeria, The Ibadan University Press, 1974.
11. R. W. West, 'The Evaluation of Environmental Education Materials and Learning (Environmental Education Study)', Sussex, University of Sussex, 1975 (unpublished manuscript).

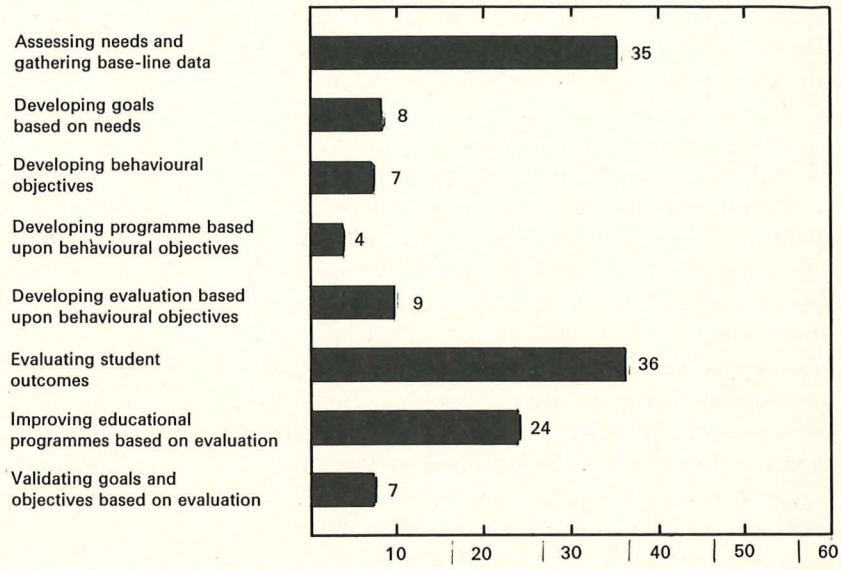

FIG. 3. Number of studies giving attention to key evaluation processes.

ranged from 1960 to 1975 with most published in the early seventies. Approximately three-quarters of the writings dealt directly with environmental education. The others were indirectly related or had implications for the field. Most of them were science related. There appeared to be no studies dealing with social sciences and environmental education. Overall, the papers were about evenly divided between the primary, secondary and tertiary levels.

Sixty-two of the reports were evaluation-research studies; these were evenly divided between the various levels. Twenty-eight dealt with measuring cognitive variables, fifty-two with affective variables, thirteen with skills and twenty-two with other areas, ten of which were directed at evaluation methods. Based upon the model described in the previous section, one important analysis conducted by the author determined the number of studies giving attention to key programme and evaluation development processes. Figure 3 gives the results of this analysis. It will be seen that the studies were almost equally divided between needs assessment and programme evaluation, some dealing with both. Of the thirty-five needs-assessment studies, nineteen were general studies of the population while the remainder were concerned with gathering baseline data for specific programmes. Only a very few were involved in basing assessment or evaluation techniques on a process of developing test items from objectives and conceptualizing objectives from goals. Indeed, few studies gave information on how test items were derived. Little was reported concerning the relationships of evaluation techniques with the needs, goals, objectives and programme of instruction. Of those studies which evaluated programmes, two-thirds indicated the use of results to improve the programme. However, only seven mentioned changing and refining objectives and goals based on evaluation.

Of the 104 literature sources reviewed, twenty-six related to evaluation methods. Another sixteen related to general curriculum topics with some reference to evaluation. It may be noted that there is little research on the roles of participants in internal evaluation, on evaluation in the non-formal educational setting, on the effective use of evaluation results and on many other aspects of the evaluation process itself.

Thirty-four of the evaluation-research studies were reviewed in depth. It was found that most related to classroom learning and only nine were concerned with out-of-class learning. About two-

thirds gave no report on the validity and reliability of the measuring instruments used. Most used formal pencil-and-paper techniques while only four used observation and two used unobtrusive methods. The author found that many of the journal reports were unclear, lacked information and detail, were overly technical, and were weak in suggesting use of the results. Good reporting is essential to clear identification of areas of research need and encouragement of further work.

An examination of rationales revealed that only about one-third had implications for programme development. Two were aimed at developing evaluation methods; two sought information to decide on programme adoption; and one was carried out to secure programme support.

Evaluation activities in cognitive areas

There is today a large amount of cognitive information related to environmental education. This includes concrete facts and more abstract concepts and conceptual schemes or structures. Doran has observed that '. . . surprisingly few tests have been developed to measure these outcomes.'[12] Helgeson and Roth point out that while concept definition has been proceeding for some time, there is a need to validate recent concept lists and research the effect of teaching methods for conveying concepts.[13] It should be mentioned, however, that in the cognitive area, as well as in other areas, much might be learned from work done in other fields.

Comprehension of concepts is at a lower cognitive level than thinking skills such as analysis and synthesis. Power notes that in Australia little concern has been shown for levels of cognitive development in the science classroom.[14] Lack of studies in this area has also been observed in the United States. The author found in the studies he reviewed that less than half were cognitively oriented and, of these, only a very few dealt with thinking skills.

Evaluation activities in affective areas

In the area of assessing and evaluating attitudes and values there appears to be much activity. In the United States, Wheatley noted this increased interest in his study.[15] Of the sixty-two studies reviewed by the author, fifty-two dealt with the affective domain. These included assessing attitudes and values towards the natural and human environment, problems and issues, problem-solving practices, social responsibility (who should make decisions, etc.), environmental studies, and self concept. It may be noted that many of these studies produced divergent conclusions concerning the effect of programmes on attitude development and the relationships between affective, cognitive and skill domains. Little information was given as to how affective variables were translated into test items.

Knapp, who has done much work in this area, concludes that better attitude measurements for elementary and secondary school students are critically needed and that the application of attitude research findings to programmes is still in its infancy.[16] Writing of educational evaluation generally, Popham found that, 'There are relatively few measuring devices in the affective area that have been developed specifically for purposes of educational evaluation.'[17] However, it should be noted that many of the large science curriculum improvement projects in the United States and elsewhere have developed affective measures.

12. Rodney L. Doran, *State of the Art on Measurement and Evaluation of Environmental Education Objectives*, p. 2, Buffalo, N.Y., 1975 (mimeo.).
13. Robert E. Roth and Stanley L. Helgeson, *A Review of Research Related to Environmental Education*, Columbus, Ohio, ERIC Center for Science, Mathematics and Environmental Education, The Ohio State University, 1972 (Research Review Series, paper).
14. C. N. Power, 'A Review of Current Research in Science Education in Australia', *The Australian Science Teachers Journal*, Vol. 16, No. 2, August 1970, p. 52.
15. John H. Wheatley, 'Affective Instruments in Environmental Education', in Noel McInnis and Don Albrecht (eds.), *What Makes Education Environmental?*, Louisville, Ky, Environmental Educators Inc. and Data Courier Inc., 1975.
16. Clifford E. Knapp, 'Attitudes and Values in Environmental Education', *The Journal of Environmental Education*, Vol. 3, No. 4, Summer 1972, p. 29.
17. Popham, op. cit., p. 174.

Evaluation activities in skill areas

Of the three areas discussed, skill variables have been least investigated. Almost no studies were reviewed that dealt with related psychomotor outcomes. There is also a definite lack of definition of variables in this area. It is somewhat paradoxical when one considers that of the three areas, psychomotor behaviours are most directly observable.

What are current problems in evaluating student learning?

This section discusses evaluation problems which have been identified from a review and analysis of the literature. The problems are considered for the most part in a sequence approximating the evaluation process previously described.

Establishing evaluation as an integral part of the educational process

All too frequently evaluation is seen as occurring only at the end of the programme implementation process. Increasingly it is being recognized that evaluation must be an on-going process if its full benefits are to be realized. As an example, Bjorndal and Lieberg have described a conceptual educational model which demonstrates how evaluation is interrelated with the teaching process. The model was applied in a Norwegian environmental education project in which evaluation was seen as a major category along with objectives, content, frame factors and learning activities.[18]

Establishing evaluation priorities and formulating research questions

Donaldson observed that,[19]

> Research appears to have been done (in outdoor education) on things easiest to grasp rather than in terms of what is needed to be known.

Likewise, Combs wrote:

> Measuring what we know how to measure is no satisfactory substitute for measuring what we *need* to measure.[20]

To avoid problems of this kind priorities for evaluation should be established. These should be determined by thinking through the kinds of decisions to be made regarding the programme and its future.

Another related set of problems occurs when evaluators do not ask research questions which will provide information necessary to make the right decision. For an example of an evaluation plan utilizing research questions, the reader is referred to a report from the University of Georgia.[21] Meyer has produced another report giving examples of decisions on courses in developing countries towards which summative evaluation can contribute.[22]

Identifying and defining the independent variables.

In education it is often difficult to define adequately the independent variables at work which produce the desired outcomes. The consequence of failing to identify all programme activities and events is an inability to assign causes to the effects—to know what programme elements to keep, modify or remove. Charters and Jones have addressed this problem and suggest that there are four levels of reality in an educational programme which should be investigated and described: (a) the institutional commitment; (b) the formal

3. Bjarne Bjorndal and Sigmund Lieberg, 'Environmental Education in Primary School. A Presentation of a Norwegian Curriculum Development Project', *Scandinavian Journal of Educational Research*, Vol. 19, p. 131–51.
19. Donaldson, op. cit., p. 9.
20. Arthur W. Combs, *Educational Accountability Beyond Behavioral Objectives*, p. 12, Washington, D.C., Association for Supervisors and Curriculum Development, 1972.
21. Horace C. Hawn, *Initial Report of the Committee on Program Research and Evaluation*, Athens, Ga, Elementary Education Division, College of Education, University of Georgia, April 1975.
22. G. R. Meyer, 'Problems in the Summative Evaluation of Experimental Science Curricula in Developing Countries', *The Australian Science Education Research Association Journal (1971)*, p. 119–34.

arrangements and physical conditions; (c) the role of staff behaviour, and (d) the learner activities.[23] This problem is particularly relevant to environmental education due to its interdisciplinary nature and the resulting integration throughout the curriculum.

Identifying and operationalizing dependent variables

There must also be clear, precise, definitions of the dependent variables to be measured. Psychomotor variables which are directly observable behaviours are the easiest to identify. Cognitive and affective variables, however, must be described in terms of the observable behaviours that will result from them. In the cognitive area such a description should define what the student is able to do. The affective area, however, presents special problems. For example, it means that the description should define what the student will do. This requires the evaluator to identify measurement situations which will cause the student to respond in a way which would be normal or typical. To sharpen the observed response, the evaluator may also develop situations where the respondent must choose between distinct differences in behaviour. A problem related to the use of behavioural objectives is that they are sometimes neglected by educators who feel constrained by them.

Establishing relationships

As shown in Figure 3, few studies clearly indicated that consideration was given to the consistency which should exist between needs, philosophy, goals, objectives, learning theory, programmes and evaluation methods. This fundamental requirement of validity requires that both the programme developer and the evaluator continually check for consistency. For example, evaluators may look at congruence between pre-programme goals and post-programme goals as perceived by programme participants.

Developing the research design

Many evaluation problems originate with the research design. To avoid some of the more common, the following questions may be asked:

1. Does the research design take into account the characteristics of environmental education?
   For example, because of environmental education's interdisciplinary character, does the design provide for the participation of many teachers with differing methods and varying degrees of acceptance of goals?
2. Does the research design involve both external and internal evaluation?
   The roles of the evaluator, teachers, students, and others should be defined.
3. Is the research design potentially capable of answering research questions and providng information for decision-making?
   In essence, the design must provide for the collection of valid and reliable data.
4. Is the research design applicable or appropriate to the situation?
   Important considerations include length of time available, formal or non-formal settings and resources including available manpower, money and control groups.
5. Is the research design reproducible or replicable?
   This may be important for purposes of assessing reliability of the design and providing additional information for decision-making. The replication of the teaching process and evaluation during the formative stages also increases the stability or reliability of the results.
6. Is the sample design adequate?
   The sample sizes depend upon the size of the population being sampled and the size of the population to which the results are to be generalized. General guidelines sometimes suggest that from 10 to 20 per cent of the population be sampled. Sampling requires much common sense and often the use of formulas. A problem frequently encountered by local programmes is the availability of only small sample sizes. Often the entire population is used in these cases. Testing may also be repeated several times over a period to check the consistency of results.
7. What are pre-test/post-test considerations?
   Generally, evaluation results following an instructional treatment should be compared with baseline

23. W. W. Charters, Jr and John E. Jones, 'On the Risk of Appraising Non-Events in Program Evaluation', *Educational Researcher*, Vol. 2, November 1973, p. 5–7.

data if gains are to be assessed. A pre-test allows this to be done. A problem which sometimes occurs is contamination of the post-test by the pre-test. Research designs which give the pre-test to half the experimental and control groups and the post-test to all participants provide for this influence to be measured.

8. What are experimental and control group considerations?
   Control groups allow for assessing the effects of extraneous variables affecting the results. They also help in deciding if gains are attributable to a programme. Problems arise when groups are not matched to the variables being measured and the instructional treatment of the control group is not known and possibly contaminates the control group results.
9. What are the considerations regarding longitudinal studies?
   Longitudinal studies provide information on the stability or strength of the results. They are usually desirable if time and resources permit.
10. What are grade level considerations?
    Because of developmental differences, e.g. ability to write and attention span, testing and data collection may take much longer at primary levels than at secondary and tertiary levels. Data collection instruments must be appropriate to the grade level.

Developing evaluation techniques

Evaluation techniques should be appropriate to the variables being measured and to the testing situation in order to contribute to the validity and reliability of the results. Consideration should also be given to developing tests based on conceptualized objectives as an alternative to the often used 'expert-empirical' method. Tests based on measurable objectives allow comparisons between instruments. Open-ended techniques of observation should also be used to detect unplanned results. As described earlier, evaluation techniques can be pencil-and-paper, observation of behaviour and unobtrusive (indirect). The latter is particularly useful in looking for evidence of the achievement of the major goal of environmental education—improvement of the environment. Almost no studies have been carried out using change in the environment as an indicator of student learning. The difficulty lies in attributing gains to a particular programme or instructional treatment.

Evaluation techniques should also be appropriate to the data required and to a variety of users—evaluators, teachers, students, etc. In the latter case where participants are involved, techniques should be easy to apply without sacrificing validity of data. Consideration also needs to be given to special techniques for such problems as goal-free evaluation, the assessment of side effects, the detection of extraneous variables and evaluation in non-formal educational settings.

Determining the validity of results

This is a critical problem area since, unless the evaluation results represent true information about the variables being investigated, the information is meaningless. Validity of data in the affective area is particularly difficult to assess. Techniques which may increase validity include:

1. Using several kinds of measures to 'triangulate' on the variables, including unobtrusive measures where participants are unaware of being observed.
2. Limiting the focus of study to a single attitude or aspect of an attitude.
3. Checking items against measurable behavioural objectives which translate a detailed description of the domain into observable behaviour.
4. Eliminating the tendency to respond in socially desirable ways by using measuring instruments which incorporate filler items, which ask about past behaviour and how most other people feel, and which are masked in intent.

As a final point on validity, many evaluators believe that instruments may be used for educational group assessment that are not valid enough for individual appraisal.

Determining the reliability of results

Reliability is another critical problem area and refers to the consistency of scores. It is important to note that a valid test must be reliable but a

reliable test is not necessarily valid. Techniques should be used which are appropriate to the test according to whether it is norm-referenced or criteria-referenced.

Collecting data

Data collection procedures may influence both validity and reliability. For example, the appearance or tone of voice of the test administrator may influence the response. It is also important that, in pre- and post-testing, the administrator be the same person, interruptions be avoided and all aspects of the setting be duplicated as nearly as possible. In addition, consideration should be given as to whether or not the test should be a self-evaluation instrument or involve an outside recorder.

Analysing and interpreting data

Analysis and interpretation should search for success and failure among the data. Comparison may be made between scores of pre- and post-tests, between experimental and control groups and between scores and national norms. The evaluator, in particular, should be alert to evidence what will help in determining whether failure is due to programme failure or evaluation failure. In comparing data between programmes, a variety of factors should be considered, including the philosophies and intents of programmes. Gains should be statistically reliable and large enough to be meaningful. The sophistication of the statistical analysis should be dictated by the decisions to be made. Analysis should search out patterns as well as extremes, averages and the influence of factors. In some areas, computor capability and the availability of statisticians will also present problems.

Reporting and using data

Data should be reported in a form which will both facilitate programme decision-making and contribute to the total body of knowledge in the field and other fields. Coping with information overload frequently calls for clear, concise, and complete synthesized summaries.

Dealing with the 'threat' of evaluation

Frequently, evaluation is looked on as a threat by those being evaluated or affected by decisions. Designs may be used that involve those affected in the process and protect evaluators, administrators and participants. Formative evaluation and participant-oriented internal evaluation designs and methods can significantly assist in removing the threat of evaluation. Clear and honest communication to participants regarding the use of evaluation results is also important. In addition, research reports should describe successes and failures in human terms respecting the situations and feelings of those affected.

Managing the evaluation process

Some general management problems and considerations include: stage of development of the school system, i.e. untrained, inexperienced teachers or trained, experienced teachers, political interests in learning outcomes, availability of qualified evaluators, use of external versus internal evaluators, linking of services, costs and results, and testing of the evaluation design itself. Cost effectiveness is especially important in most situations. Usually evaluation need priorities must be set and methods selected in the light of their cost as well as their effectiveness and other characteristics. Another important factor, especially in participant-oriented evaluation designs, is the availability of checklists, guidelines and other aids which will encourage the active involvement of all programme personnel.

Finally, consideration should be given to the influence of cultural differences. For example, Yoloye suggested that, when materials are used from other countries, a start should be made with those that are theoretically and philosophically valid and that field tests should then be made to modify goals and continuously adapt the programme to the country.[24]

24. E. Ayotunde Yoloye, *Evaluation for Innovation*, p. 36–7, Newton, Mass., Education Development Center, African Primary Science Program, 1971.

Establishing evaluation policies

Evaluation should be governed by policies which encourage and provide for its use as well as ensure its effectiveness. Foskett and Young warn about two problems associated with such policies: (a) the act of superficial compliance to avoid responsibility; and (b) the attitude that evaluation intrudes on civil liberty.[25] In addition, policies should also have built-in safeguards against unethical uses of the results of evaluation.

Summary and needs

Beginning with an analysis of the current concept of educational evaluation and its role in environmental education, this article has attempted to survey and analyse the current world-wide evaluation research effort related to student learning in environmental education. It was discovered that the field of educational evaluation is undergoing a process of new thinking which began within the past decade. As a curriculum area, environmental education is also still in its infancy having evolved in the same time period. Because of lack of consensus on definition, clear conceptualization of purpose and diverse stages of development, the field is not ready to take full advantage and apply the newer concepts of evaluation on a wide scale. Hence, the survey revealed several gaps in the evaluation-research activities which have been undertaken.

Few programmes have gathered the kind and quality of summative evidence that will help in widespread comparative adoption decisions. Emphasis has been placed on description rather than analysis and evaluation. At this time, when decisions are being faced, research needs to focus on what makes environmental education unique. Other research question areas include comparisons with alternatives, side effects, and characteristics of the learning process independent variables. It is also imperative that answers to research questions be communicated to decision-makers.

Formative evaluation efforts have been notably weak in producing and using data relative to improving processes, for developing and refining goals and objectives, instructional programmes and the evaluation design itself.

The advantages and disadvantages of both external evaluation and internal participant-oriented models appear not to have been fully explored.

Attention has not been given equally to assessing cognitive, affective and skill variables, particularly the latter. Although a great deal of work had been done in the affective area, inconsistent results indicated that more rigorous efforts were needed. More also needs to be done to evaluate the higher cognitive levels.

As for the field in general, the different stages of development of environmental education and the variety of formal and non-formal settings in the countries call for the use of a range of techniques varying in sophistication from description to analysis to evaluation. Where well-developed objectives do not exist, evaluation can clarify the means and ends of a project. At this time, too, formative evaluation in programme development is needed to determine the effect of teaching on student learning and to refine the teaching process.

Concerning the evaluation-research process, the needs may be summarized as follows:

1. Evaluation should become an integral part of the educational process.
2. Evaluation models should be explored which are based upon a variety of assumptions, which are both internally and externally oriented, which are useful in both formal and non-formal situations and which are appropriate for a variety of decision-making needs.
3. Increased attention should be given to establishing evaluation priorities and formulating research questions.
4. The environmental education independent variables should be identified and defined.
5. Student learning variables should be defined

25. William Foskett and Joseph Young, *Search for Success Toward Policy on Educational Evaluation*, p. 33, Washington, D.C., National Advisory Council on Education Professions Development, 1974.

and translated into test items in clear, concise and valid terms which encourage their use.

6. Clear and functional relationships should be established between needs, goals, objectives, programme and evaluation methods.
7. Research designs appropriate to the characteristics of environmental education, to formal and non-formal settings and to the research questions should be developed and used to yield effective data.
8. The needs and roles of evaluators, programme participants and decision-makers must be defined.
9. Evaluation standards, methods, assessment techniques and instruments which meet a variety of decision-making needs and which are valid and reliable should be developed.
10. Data collection methods should be selected which preserve the validity and reliability of the testing.
11. Data analysis and interpretation should be consistent with the use of the data.
12. Data reporting should facilitate decision-making, contribute to development of the field and provide for widespread innovation.
13. The 'threatening' image of evaluation should be replaced with one that is supportive and helpful.
14. The total evaluation process should be effectively managed to meet the needs unique to the cultural setting.
15. Qualified evaluators are needed effectively to carry out and report on studies.
16. A symbiosis between environmental education and other fields is needed to improve evaluation efforts and share results of studies.
17. Evaluation policies should be established which will guide evaluation to its highest effectiveness, gain support and make educators and others aware of its importance.

In conclusion, the importance of evaluation cannot be over-stressed.[26] The field of environmental education is young, the need for the evaluation of learner outcomes is clear and the methodology is at hand. The right questions must now be asked. For the field of environmental education to realize its full potential perhaps the best question we can ask is what the farmer answered, 'Compared to what?'

Glossary of evaluation terms

Accountability. Accountability involves demands external to a programme and for evaluative evidence. In particular, it is often evaluation directed towards people to determine the degree to which they fulfil their responsibilities.

Appraisal. Considered here as a synonym for evaluation. In some fields, appraisal refers to a total process of which evaluation is the final step.

Assessment. Considered as a synonym for evaluation, such as a needs assessment.

Congruence. The situation when intended outcomes become observed outcomes.

Dependent Variable. Refers here to programme effects or outcomes which result from educational activities. Includes knowledge, thinking skills, feelings towards self, others and the environment, and psychomotor skills.

Discrepancy. The situation when intended outcomes do not become observed outcomes.

Evaluation. The systematic and formal determination of decisions to be made, the selection, collection and analysis of data and their use in making decisions concerning educational inputs, processes and products.

Feedback. The information acquired through evaluation of programme inputs, processes and products to make decisions relative to the improvement and use of those inputs, processes and products.

Goal. That which a programme aims to achieve. Usually establishes ideal standards and gives direction. Broader than objectives.

Grading. Assessment of individual merit or worth on the basis of some attribute.

Independent variable. Refers here to the educational programme of teaching/learning activities and the educational setting in which the activities take place. The independent variable is manipulated and controlled to affect and produce the programme outcomes, called dependent variables.

Interdisciplinary. An educational activity which relates to several disciplines and involves them in developing a total understanding of a subject under study, such as an environmental problem.

Measurement. The act of determining the degree which an educational input, process or product possesses a certain attribute.

Multidisciplinary. Refers here to an activity or subject which is taught in several disciplines.

Objective. A standard of achievement which is attainable. Usually contributes towards the achievement of a goal, which is a broader aim.

26. It is well to keep in mind, however, that not everything that is significant to environmental learning can be 'measured' while not everything that can be measured is necessarily 'significant'. —Ed.

Annotated bibliography

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Summarizes 117 doctoral dissertations in the outdoor education and environmental education areas.

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Provides a model for evaluation based on the goals of environmental education and psychological theory of the cognitive, affective and psychomotor domains. Uses the criteria-referenced behavioural objective approach to provide a basis for developing test items appropriate to three kinds of evaluation—formal pencil-and-paper, observation and unobtrusive. Describes a research design and evaluation techniques used to apply the model in an assessment of a secondary school environmental education instructional unit.

Eiss, A. F.; Harbeck, M. B. *Behavioral Objectives in the Affective Domain.* Washington, D.C., National Science Teachers Association, 1969.

Covers aspects of the affective domain, relationship to the learning process, indicator behaviours for affective and evaluation strategies for measuring affective outcomes. Provides examples of affective behavioural objectives, test items and instruments.

Foskett, W.; Young, J. *Search for Success Toward Policy on Educational Evaluation.* Washington, D.C., National Advisory Council on Education Profession's Development, 1974.

Discusses the need for evaluation policy and the issues, problems and conditions for improvement which should be dealt with in a general policy on programme evaluation. Focus is at the national levels of government.

Houston, W. R. (ed.). *Competency Assessment, Research and Evaluation. A Report of a National Conference.* Washington, D.C., Department of Health, Education and Welfare, 1974.

Presents a series of informative papers dealing with research, assessing professional competence, programme effectiveness, effectiveness of instructional strategies, social context and institutional change. Several papers discuss evaluation strategies and issues directly.

Instructional Objectives Exchange. *Environmental Education Grades 4–9.* Los Angeles, Calif., Instructional Objectives Exchange, 1974.

Contains set of criteria-referenced objectives with a variety of items and measures relating to the natural ecosystem, the human environment and environmental problems. Both cognitive and affective measure are included.

International Centre for Educational Evaluation. *Information Brochure.* Ibadan, The Ibadan University Press, 1974.

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Passineau, J. F. Walking the 'Tightrope' of Environmental Education Evaluation. In: Noel McInnis and Don Albrecht (eds.), *What Makes Education Environmental?* Louisville, Ky., Environmental Educators Inc. and Data Courier Inc., 1975.

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Roth, R. E.; Helgeson, S. L. *A Review of Research Related to Environmental Education.* Columbus, Ohio, ERIC Center for Science, Mathematics, and Environmental Education, The Ohio State University, 1972. (Research Review Series.)

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Stufflebeam, D. L.; Foley, W. J.; Gephart, W. J.; Guba, E. G.; Hammond, R. L.; Merriman, H. O.; Provus, M. M. *Educational Evaluation and Decision Making.* Bloomington, Ind., Phi Delta Kappa Inc., 1971.

Deals with five problem areas in educational evaluation, synthesizes a definition and methodology of evaluation and provides guidelines for implementation.

Tyler, R. W.; Gagne, R. M.; Scriven, M. *Perspectives of Curriculum Evaluation.* Chicago, Ill., Rand McNally, 1967.

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Reviews current affective instruments in environmental education and some test data procedures by these instruments. Comments made regarding relative strengths and weaknesses. Additional sources of information given.

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3. National procedures for implementing environmental education: a comparative study

Keith Wheeler
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his chapter seeks to identify the major national ganizational and institutional processes bring- g about, or 'implementing', environmental edu- tion. It is therefore concerned with tentatively swering the question: what kinds of institutional d organization structures are required for vironmental education to take place?

A study of this kind is a study in the chanism of educational innovation which, ause of the nature of environmental education, ends over the complete education spectrum m formal to informal, and involves both the ng and adults. Furthermore, environmental cation is not only concerned with imparting rmation and skills, but also with introducing ple to greater environmental awareness, and means of taking part in the decision-making esses affecting their environment. As a result, implementation of environmental education hes upon many different aspects of a nation's ical, social and educational structure. It is rent in this respect from other less far- ing educational innovations, and there are fore no precedents to refer to as a basis of this .

Clearly, no one country can serve as a 'model ple' for others; nations with different cul- and political systems will set about the task of mentation in different ways. However, are national procedures that are transfe- from one country to another. Conse- quently, this chapter proceeds by describing selected case studies drawn from the developing and the advanced industrial countries. Where possible, comparisons are made between the different styles of implementation, and then the chapter concludes by considering the 'common features' existing between them. A major limitation on the scope of the paper is the scarcity of relevant documentation describing implementation procedures. This is no doubt due to the fact that environmental education is, for most countries, a very recent educational development, in many cases dating from the United Nations Conference on the Human Environment in 1972.

Republic of Venezuela

Venezuela[1] provides an interesting example of the complex factors found in an early stage of implementation. In that country a national policy towards environmental education is emerging because of enlightened institutions and individuals campaigning for greater environmental awareness, and as a result of several Presidential

1. Based on information received from Professor Arturo Eichler, Universidad de los Andes, and Professor Francisco Pannier, Universidad Central de Venezuela (direct interview).

Decrees, particularly Number 108 of 26 May 1974, requiring the Ministry of Education to give special consideration to the teaching of environmental conservation, and the scientific organizations to take up the study of Venezuelan environmental problems. In all, this directive concerns a wide range of organizations and institutions. For example, the Consejo Nacional de Investigaciones Cientificas y Tecnológicas (CONICIT), one of the President's two environmental consultant Councils, has a department developing new approaches to secondary school environmental education. CONICIT also advises the Ministry of Education, which has begun work on introducing environmental education programmes as part of the general reform of the school curriculum. Other, but autonomous, government organizations concerned with aspects of environmental education are the Instituto Nacional de Cooperación Educacional charged with preparing literacy programmes for adults; and the Corpoturismo which has been instructed by the President to educate its executives in the environmental implications of the tourist industry. There are also many non-governmental organizations with an interest in environmental education, such as the Sociedad Venezolana de Ciencias Naturales, the Fundacion La Salle, and the Consejo de Bienestar Rural.

Generally speaking, public opinion does not give a high priority to environmental considerations, and there are many influential groups which believe that conservationists oppose progress by preventing the economic exploitation of the country's resources. For example, farmers' unions demand the right to use virgin tropical forest for agricultural development.

At present, the scarcity of suitably trained teachers is a brake on the development of environmental curricula; and as a result, for example, units on ecology and conservation included in the secondary biology syllabus are invaribaly taught inadequately. In an effort to augment the work of teachers, several universities have prepared visual aid resources for use in formal and informal situations, but further development of these materials is hampered by lack of funds.

An interesting development in informal education arises from the work of Youth and Conservation groups which have set up regional 'science centres' to encourage environmental understanding among local people. Groups of students go out into the villages and talk informally to the people in their own cultural and linguistic setting about the way environmental matters, such as soil erosion and water pollution, relate to their own lives.

The government does not allocate funds directly for the development of environmental education programmes, although money is available for research into environmental problems. In this case, success in application for funds depend greatly on the skill by which the applications ar presented to meet the requirements of the fundin agency. However, there are interesting example of self-help in funding which could be applied t finding funds for environmental education. Fo example, several societies provide education courses for teachers and the general public, an the people attending the course subscribe to th course expenses. Another case is that of th proposed 'Bank of Science and Technology', s up by the government and business organizatio which contribute money to the bank thus formi a pool of capital to be drawn on for furtheri research.

So far, moves towards implementing en ronmental education in Venezuela are unplan and unsupported by legislation or funding fr central government. Neither is there any evide of environmental education programmes be initiated by international agencies, such as IU Initiatives arising from government and n government sources are in need of co-ordinat and the majority of politicians and the public h yet to be more responsive to the danger environmental ignorance.

Republic of Zambia

Zambia does not have a national policy implementing environmental education, bu many English-speaking African countries it a positive approach to the conservation of w

through the establishment of important national parks and game management reserves. Wildlife conservation thus plays a large part in the maintenance of environmental quality in Zambia. In particular, Zambia provides an important example of an attempt to implement a comprehensive programme of environmental (conservation) education through the auspices of an international agency.

Luangwa Valley Conservation and Development Project

The Zambian Government, in association with the United Nations Development Programme (Special Fund), and the Food and Agricultural Organization of the United Nations (FAO), appointed an Education and Public Relations Officer to the Luangwa Valley Conservation and Development Project.[2] He was later joined by two assistants to make a team, and in early 1971 the team began a nation-wide effort to introduce conservation education programmes. The team was able to work in conjunction with the Wild Life Conservation Society of Zambia(WCSZ) that has campaigned since 1957 to draw the attention of Zambians to the importance of the country's wildlife. The team started secondary school wildlife clubs based on the idea first developed in Kenya, and by 1973 had established about thirty clubs. Meanwhile, efforts were made to introduce environmental education ideas into teacher training, and in-service courses were held that enabled many teachers to visit a national park for the first time.

About this time, too, WCSZ conceived the idea of setting up conservation groups, called Chongololo Clubs, in the primary schools. The movement spread rapidly, aided by the distribution of a quarterly publication, *Chongololo*, issued as a supplement to the *WCSZ Journal*; and the appointment of a national co-ordinator who produced a variety of teaching aids to help schools devise their own conservation projects.

Wildlife schools, originally started by WCSZ, were reopened by the team, and conservation courses organized for schools, colleges, administrators and local chiefs. Another contribution to the programme was the production by the Ministry of Education of two primary-school readers based on conservation of wildlife themes. Using facilities provided by Zambian Airways, and the Zambian Tourist Bureau, many means were found to disseminate wildlife information to the wider public. Exhibitions were set up at the Muta Wanga Botanical Garden, and at agricultural shows. The Zambian Television Service and the Zambian Education Broadcasting Service included educational programmes dealing with conservation. The team also operated an audio-visual resource unit producing films, slides and posters for use at public talks, and mobile exhibitions.

The biggest problem was found in communicating conservation ideas to rural communities with low standards of literacy. This was attempted by using an especially equipped vehicle to take around special slide programmes and poster displays illustrating the disadvantages of uncontrolled hunting.

> Although such programmes never failed to attract large audiences, it was felt that to a large extent this was due to their 'entertainment' value. To be really effective, involvement of local personnel, using local dialects, is necessary to follow-up such programmes.[3]

The whole of the development project's educational programme depended on very slender resources of money and equipment, and suffered from lack of enough staff. Indeed, only by calling on voluntary aid in many directions could the programme have survived in its entirety; and for the want of one person, or one vehicle, the fate of some part of the programme was frequently poised in a delicate balance between stopping and continuing. The project commitment terminated in 1973, although by that time several Zambians had been trained to carry on the educational work, and others had been found to continue more specialized functions of the project, such as the work of the audio-visual resources unit.

2. Mark N. Boulton, *Luangwa Valley Conservation and Development Project, Zambia: Conservation Education in Zambia*, Rome, United Nations Development Programme, Food and Agricultural Organization of the United Nations, 1973.
3. Mark N. Boulton 'Conservation on the move in Zambia', *African Wildlife Leadership Foundation of Washington, D.C. News*, Vol. 8, No. 2, Fall 1973, p. 12–15.

In 1974, based on the valuable experience gained in Zambia, another conservation education project was carried out by UNDP and FAO in Nepal.[4]

The formal school curriculum

In the primary schools' social studies course there are references to Zambian geography and wildlife conservation, and the environmental science course also introduces some simple ecological concepts. Both these syllabuses are influenced by the forward thinking of the Science Education Programme for Africa (SEPA), and the African Social Studies Programme (ASSP). However, instruction in Zambian schools is largely carried out by formal teaching methods closely geared to an examination system which places more emphasis on rote learning than on individual inquiry. In fact, some of the best introductory work in environmental education is done through the maintenance of school gardens and through practical hygiene lessons.

The Curriculum Development Centre at Lusaka provides the main avenue for the implementation of new approaches to teaching through syllabus development and the dissemination of methods and teaching content through the distribution of relevant teachers' handbooks. In many cases, the application of these methods is too rigidly interpreted by the practising teachers who may be insufficiently trained in modern activity methods and inadequately supplied with resources such as simple apparatus or books that would help in the identification of local plant and animal species. The result is that the interdisciplinary use of the local environment as a learning resource is insufficiently developed.[5]

Other developments

Many government agencies, such as the Ministry of Land and Natural Resources, have overlapping interest in environmental education, and there are a number of environmental and educational organizations with an interest in the development of such education. At a conservation teach-in[6] held in 1973, a move was made to co-ordinate the work of these various interests by making an 'active working-party of expertise for the provision of specific educational material'. But as yet there is no government-organized co-ordination of the environmental work of government, research, conservation and educational organizations. Currently, the Zambian Government is preparing the Third National Plan which includes a re-thinking of the educational system so as to link it more closely to the needs of the local community. This could provide the opportunity for the further development of environmental education.

Republic of Kenya

Kenya has also followed an energetic policy of wildlife conservation, and has established an important system of national parks. In particular, Kenya has made valuable progress towards setting up a nation-wide programme of informal conservation education for youth, and is now in the process of establishing a more organized approach to the solution of environmental problems and the preparation of environmental education programmes. Indeed, 'the stage has been reached where concern for the quality of the environment must be put on an equal footing with the existing concern for its exploitation'.[7]

Conservation education

Since 1964, the Kenya National Parks have operated a Conservation Education Centre at

4. Food and Agriculture Organization, 'National Parks and Wildlife Conservation, Nepal', *Conservation Education*, based on the work of M. N. Boulton; Rome United Nations Development Programme, Food and Agricultural Organization of the United Nations, 1974.
5. Based on information received from M. Bingham, *Curriculum Report of a Conference*, February 1973.
6. Wildlife Conservation Society of Zambia, *Conservation Teach-In. Report of a Conference*, February 1973.
7. Republic of Kenya, *Kenya's National Report to the United Nations on the Human Environment*, May 1972.

Nairobi National Park, and a second centre is being set up in Tsvavo National Park. Funding comes from government sources, and from such organizations as the World Wildlife Fund. The centres provide an educational service, and special facilities for school and student groups visiting the parks.[8]

In 1968, a group of high school pupils decided to form a wildlife club in their school. The Ministry of Tourism and Wildlife took the idea further by obtaining an organizer who established the Wildlife Clubs of Kenya Association (WCKA) with assistance from the staff of the National Museum, and funds from the Elsa Wild Animal Appeal, the African Wildlife Leadership Foundation, and the Ministry of Tourism and Wildlife. The association is a non-governmental, non-political charity and association of clubs governed by a council on which the consituent organizations are represented plus the Ministry of Education and the Ministry of National Resources. A staff of six carries out the policy of the council which comprises: the distribution of a newsletter; the award to members of a wildlife badge; the organization of various competitions, and most important the Annual Wildlife Club Seminar. In addition, the staff prepare relevant publications; present a regular radio programme on *Voice of Kenya* School Broadcasting Service; organize free visits to the National Parks, and take films and lectures into schools. (The Frankfurt Zoological Society donated a vehicle and equipment for this.) So successful are the clubs in engaging the interests of young people that the idea has been copied in Zambia, and may be adopted by the United Republic of Tanzania, Uganda, Mauritius and India.[9]

The Educational Section of the National Museum contributes significantly to the development of environmental education by providing staff, creating environmental exhibitions in the museums, preparing environmental publicity material, and encouraging school visits to the museum. Also involved in conservation education is the African Wildlife Leadership Foundation, a voluntary organization, which acts as a catalyst in getting conservation activities started and then handing them over to the constituted bodies to carry on. In addition to supporting WCKA it has, for example, established a college of wildlife and game.

The formal school curriculum: environmental science

Kenyan educationists closely participate in the work of SEPA, and the workshops and conferences it has organized to propagate the teaching of environmental science. These are supported by Unesco, and financed by organizations such as UNEP and Unicef. An important example was a workshop seminar on environmental science education as it relates to the education of future teachers in Africa. This meeting was held during the summer of 1974 in Nairobi as a part of SEPA's on-going programme. Participants in the workshop included teacher educators, teachers-in-training, science educators and African scientists from sixteen African countries. The purpose of the workshop was to examine teacher preparatory programmes within a context of indigenous African structures and customs with the aim of establishing some pilot projects in the teaching of environmental education.

SEPA was also involved in the Pilot Seminar on Environment Education Methodology in East Africa. This meeting was held in Mombasa (Kenya) in September 1974 and was organized by UNEP, IUCN and the World Confederation of Organizations of the Teaching Profession (WCOTP). The seminar was designed to field test, in the context of East Africa, the environmental education methodology developed by TETE (Total Education in the Total Environment), a non-governmental, United States based education project. It brought together teacher educators, teacher organization representatives, participants from ministries of education, and environmental specialists, drawn from Ethiopia, Uganda, Kenya, and the United Republic of Tanzania with consultants from ATEA and TETE. The seminar reviewed existing science

8. Based on information received from Miss Elisabeth Wangari, Education Warden, Conservation Education Centre, Kenya National Parks (direct interview).
9. Based on information received from Miss Sandy Price, Project Coordinator, Wildlife Clubs of Kenya Associations (direct interview).

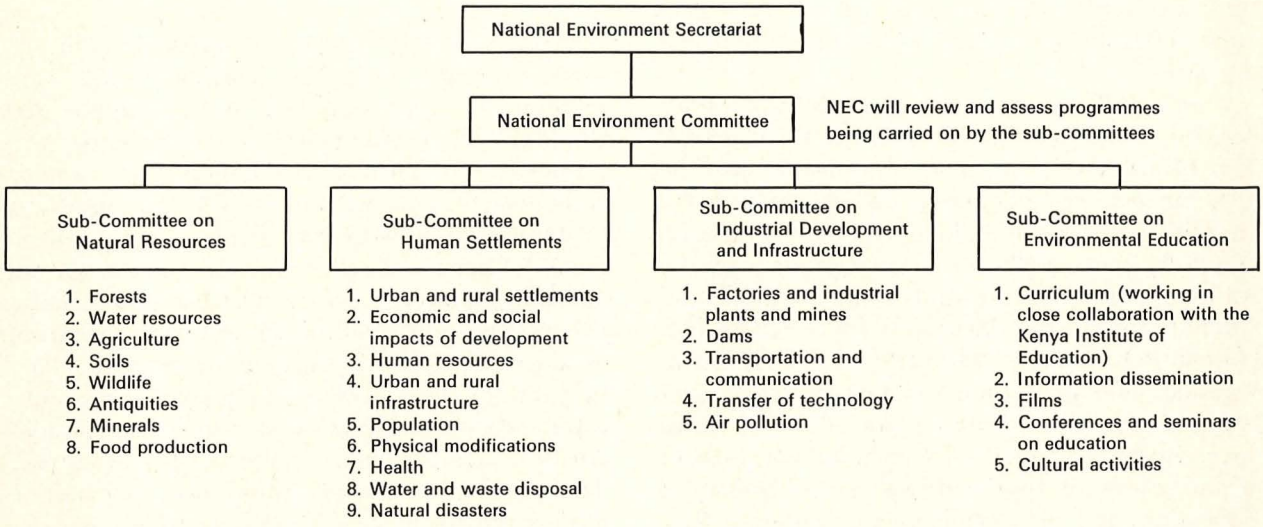


FIG. 1. Organizational structure of the Kenya National Secretariat.

curricula from the countries attending and noted the following constraints: the overemphasis placed on examinations leading to too great an emphasis on the rote learning of abstract data; the lack of flexibility in teacher-training programmes which do not teach the student how to make use of real-life experiences in the learning process; the lack of textbooks produced by Africans for Africans, and over-dependence on foreign experts when an African is available.

A major conclusion of the seminar was that if an enlightened approach to environmental education is to be implemented then there is a need for an environmental education research and teaching unit which would prepare relevant local resource materials, devise teaching methods, and advise on training programmes for teachers. A proposal to set up such a centre was made by the Faculty of Education, Kenyatta University College, which is also preparing an environmental education handbook for teachers.[10]

Kenya National Environment Secretariat

In 1972, alerted by the forthcoming UN Conference on the Human Environment held later that year, Kenya demonstrated a keen awareness of its own environmental problems in the publication, Kenya's National Report to the United Nations.[11] The report recommended the 'setting up of some form of permanent national commission or council charged with the task of monitoring, in all its aspects, the whole environment of Kenya'. The report also noted how the natural resources of Kenya were managed under a variety of separate acts of the National Assembly, and observed that 'The wide-spread absence of an educated public opinion which might express its intolerance of abuses of the nation's resources is

10. Kenyatta University College, Faculty of Education, *Proposals for the establishment of an Environmental Sciences Research and Teaching Unit at Kenyatta University College*, September 1974 (draft manuscript).
11. Republic of Kenya . . ., op. cit.

also a serious constraint on the fullest exercise of the powers available to Government'.

Further stimulated by the location of UNEP headquarters at Nairobi in 1973, a Kenya National Environment Secretariat was established in February 1974 as part of the civil service organization in the Office of the President. The secretariat role is a co-ordinating one, and is made up of four major sub-committees, one of which is concerned with environmental education (see Figure 1). The chairperson of this subcommittee is a member of all the other subcommittees, thus facilitating communication between the different groups. At present, the education subcommittee is surveying environmental education material in Kenya and will prepare visual aids and other resources for dissemination through the mass media and teachers' workshops. It will also distribute brochures and newsletters for use in formal and informal educational situations. The subcommittee is particularly concerned to overcome the problem of how to develop environmental awareness among the rural population where the standard of literacy is low. It is also overseeing the development of a model school in Kiambu which will be opened in 1976 to demonstrate environmental education methods.[12]

Further examples of national environmental co-ordinating

The 'state of the art' of environmental education implementation in three different countries having been considered, a further useful insight into implementation procedures may be sought in the examples of Ghana and Thailand from the single aspect of the environmental co-ordinating organizations which have been established in these countries.

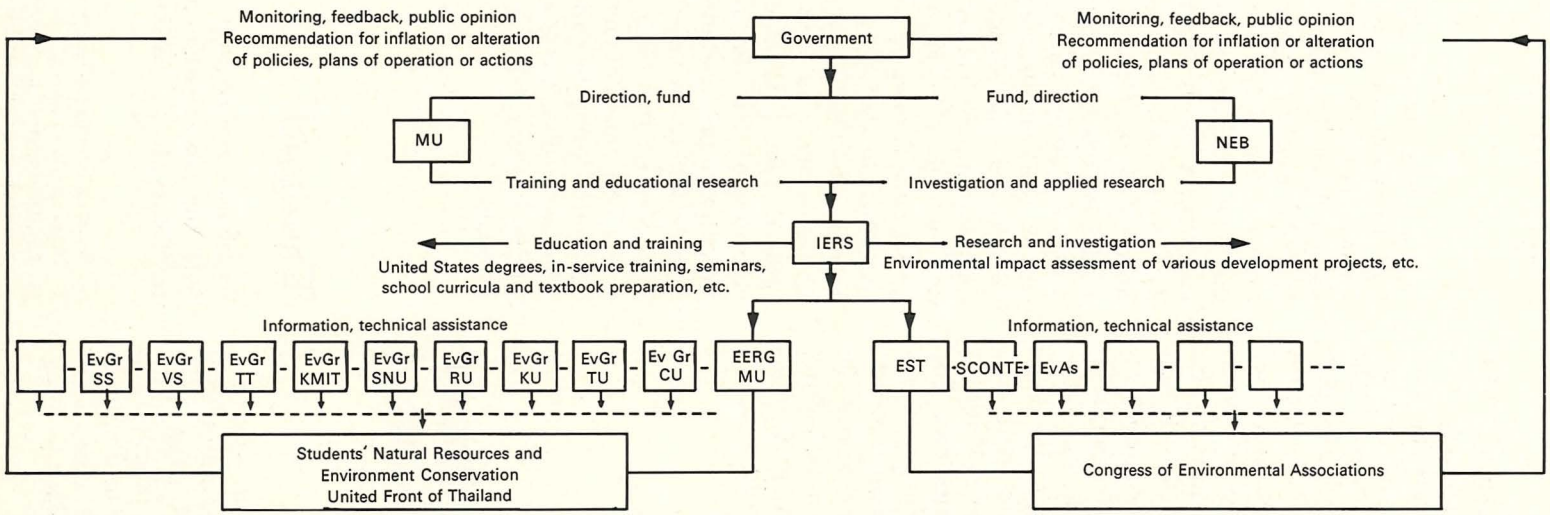
Republic of Ghana

Ghana is beginning to formulate a national policy for environmental education at informal and formal levels. In January 1974, the Environmental Protection Council (EPC) was established by NRC Decree 239 for the purpose of bringing together, 'for the first time under one national body, all activities and efforts aimed at protecting and improving the quality of the environment'. The present fifteen members are drawn from the universities, the Council for Scientific and Industrial Research, the ministries of lands and mineral resources, foreign affairs, health, industries, agriculture, works and housing, the Attorney-General's Department, the Ghana Water and Sewerage Corporation, the Tourist Control Board, and the Meteorological Services Department, plus two distinguished citizens with an interest in environmental matters. The council operates through committees with the power of co-optation, and has an important educational function which is, 'to embark upon general environmental education programmes for the purpose of creating an enlightened public opinion regarding the environment and an awareness of the public's individual and collective role in its protection and improvement'. The council is empowered to discharge this function by 'using the radio and television, the press, films, instructional material, campaigns, formal and informal education, symposia, conferences and seminars'.[13]

Thailand

Thailand's constitution includes articles dealing with the conservation of natural resources and environment. In early 1975, the government

12. Based on information received from the Director of the Kenya National Environmental Secretariat.
13. Based on information received from the Secretary of the Ghana Environmental Protection Council.



NEB National Environment Board
IERS Institute for Environment and Resource Studies (Environmental Education and Research Project)
EST Ecological Society of Thailand
EERG Environmental Education and Research Group
SCONTE Society for the Conservation of National Treasure and Environment
EvAs Various environmental associations
EvGr Environment, ecology, conservation or resource student activist group

MU Mahidol University
CU Chulalongkorn University
TU Thamasart University
KU Koselsart University
RU Ramkamhang University
SNU Srinakrintawlrot University
KMIT King Mongkul's Institute of Technology
TT Teacher training college
VS Vocational school
SS Secondary school

FIG. 2. Organization chart: Institute for Environment and Resource Studies.

promulgated the National Environmental Quality Act. Such a high level of national environmental awareness is attributable to the campaigning of student and other activist groups with the result that a vigorous environmental movement is an accepted ingredient of political life in Thailand.[14]

Among the three environmental co-ordinating organizations considered so far, the educational function is only one of several concerns. Thailand, however, has developed a system whereby the educational function resides in an Environmental Education and Research Project (EERP) which, as Figure 2 shows, is part of a wider organization interrelating the work of government, research, environmental activist groups and educational institutions. For example, the National Environment Board responsible for advising the government on environmental matters does not subsume environmental education within its functions, but is interlinked within the system to the work of EERP. Furthermore, this system, through the mediating role of EERP, allows for a flow of public opinion to be channelled to government policy-makers. The EERP also works closely with the *Ecological Society of Thailand* which is an important non-government scientific society able to evaluate environmental problems independently of the government and the university.

The EERP, established in 1973 at Mahidol University, Bangkok, is likely to become an institute for environment and resource studies within the university. The students follow a post-graduate, interdisciplinary course after taking first degrees in a wide range of specialist subjects, such as law, architecture, medicine, etc. Their skills are put to multiple use during the course by giving them experience in environmental management of various kinds as well as enabling them to contribute to the solution of Thailand's environmental problems. In addition, they participate in the activities of school and college environmental groups by acting as scientific advisers and helping in many other ways. After qualifying, EERP students enter government, administration, business or research. They are also wanted particularly in teaching to help fulfil the Thai Government's policy of providing environmental education at all levels.

Union of Soviet Socialist Republics

In the U.S.S.R., a highly developed system of environmental legislation is based on the Constitution of the U.S.S.R. which declares that, 'Natural resources belong to the people, and all citizens should maintain them in good state.'[15] At the highest level, such as the Council of Ministers of the U.S.S.R., resolutions and documents have been issued specifically referring to the need for conservation education.

Each of the fifteen Soviet republics have nature conservation acts which make it obligatory for all relevant institutions to implement environmental education measures. The Ministry of Higher Education also issues more detailed regulations concerning environmental education at the tertiary level, and other regulations have established special university chairs of conservation.

Environmental education in the U.S.S.R. is well developed and supported, but is largely concerned with nature conservation education. There are no special funding difficulties. At present, the further development of environmental education and its broadening of scope are undergoing investigation by various relevant organizations.[16]

Informal environmental education

Nature conservation societies are present throughout the Soviet Union, and possess wide powers in all matters concerned with the conservation of nature. The oldest and largest of these important

14. Dr Nart Tantawiroon, *Development Plan for Environmental Education and Research Project*, Bangkok, Mahidol University, July 1972.
15. Ministry of Agriculture of the U.S.S.R., Chief Administration for Nature Conservation, Game Management and Sanctuaries, *Conservation of Nature in the Soviet Union: Some Problems and Solutions. Reports and Papers to the XIth General Assembly and XIIth Technical Meeting of the International Union for the Conservation of Nature and Natural Resources*, Moscow, 1972.
16. Based on information received from Professor I. P. Laptev, Tomsk University, U.S.S.R.

societies is the All-Russian Society of Nature Conservation founded in 1924.[17]

Wide sections of the population participate in its work. The agencies of the Society are set up in districts, cities, and settlements, in all regions, territories, and autonomous Republics of the Russian Federation. There are over one hundred and fifty thousand branches of the Society at factories, schools, collective farms, and large residential blocks, with a total membership of nineteen million people.

These societies may submit proposals for the improvement of nature conservation to the Supreme Soviet and the Council of Ministers. In particular, the societies act as 'environmental watchdogs' by checking on the local observance of conservation laws and by monitoring the way in which decisions concerning nature conservation are being carried out.[18]

These measures are performed under wide publicity, the course and results of the reviews being dealt with in the press and discussed at the meetings of Regional Soviets or in Trade Union bodies.

The societies also perform an important role through environmental publicity campaigns to make people conservation conscious by distributing information and holding competitions. Under the leadership of the societies, school and students groups participate in conservation activities of various practical kinds.

Formal school environmental education

In 1970, the U.S.S.R. Ministry of Education decided to make nature conservation a compulsory course to be taken by all teachers in training. Furthermore, each administrative region has an institute for in-service teacher training which secondary school teachers are obliged to attend each year, and where they receive some instruction in nature conservation.

In the schools, both primary and secondary, conservation principles are introduced into the curriculum where appropriate. At the U.S.S.R. Academy of Pedagogical Sciences there is a special Council on Environmental Education co-ordinating secondary school environmental education, and it is beginning the task of co-ordinating environmental education at the tertiary level.

United Kingdom

In the United Kingdom, there are many laws protecting the natural environment and controlling the use of natural resources. In addition, there is very comprehensive planning legislation governing the development of the urban and rural environment. A government Department of the Environment was established in 1970. Environmental education is not supported by central government policy or legislation.[19]

The Council of Environmental Education (CEE) was established in 1965 to co-ordinate the work of over forty organizations and professional bodies concerned with environmental education. The structure and membership of the council is shown in Figure 3. In addition to its co-ordinating role, CEE also provides an information service through its regular newsletter, *REED*, and other publications. However, the council is not a government agency, and is curtailed in its work by lack of sufficient funds and staff.

The mainstream of implementation is ocurring through the following channels:

The provisions of non-governmental and voluntary organizations with an environmental education interest.

The enthusiastic campaigning of teachers' organizations, notably the National Association for Environmental Education and the Society for Environmental Education.

The introduction of new subject areas such as 'environmental science', or 'environmental studies', associated with the development of new examinations. The most important so far are those offered by three Advanced Level (sixth form) examinations, five Ordinary

17. See Note 15, above.
18. See Note 15, above.
19. For the general background to environmental education in the United Kingdom, see George C. Martin and Keith Wheeler (eds.), *Insights into Environmental Education*, Edinburgh, Oliver & Boyd, 1975.

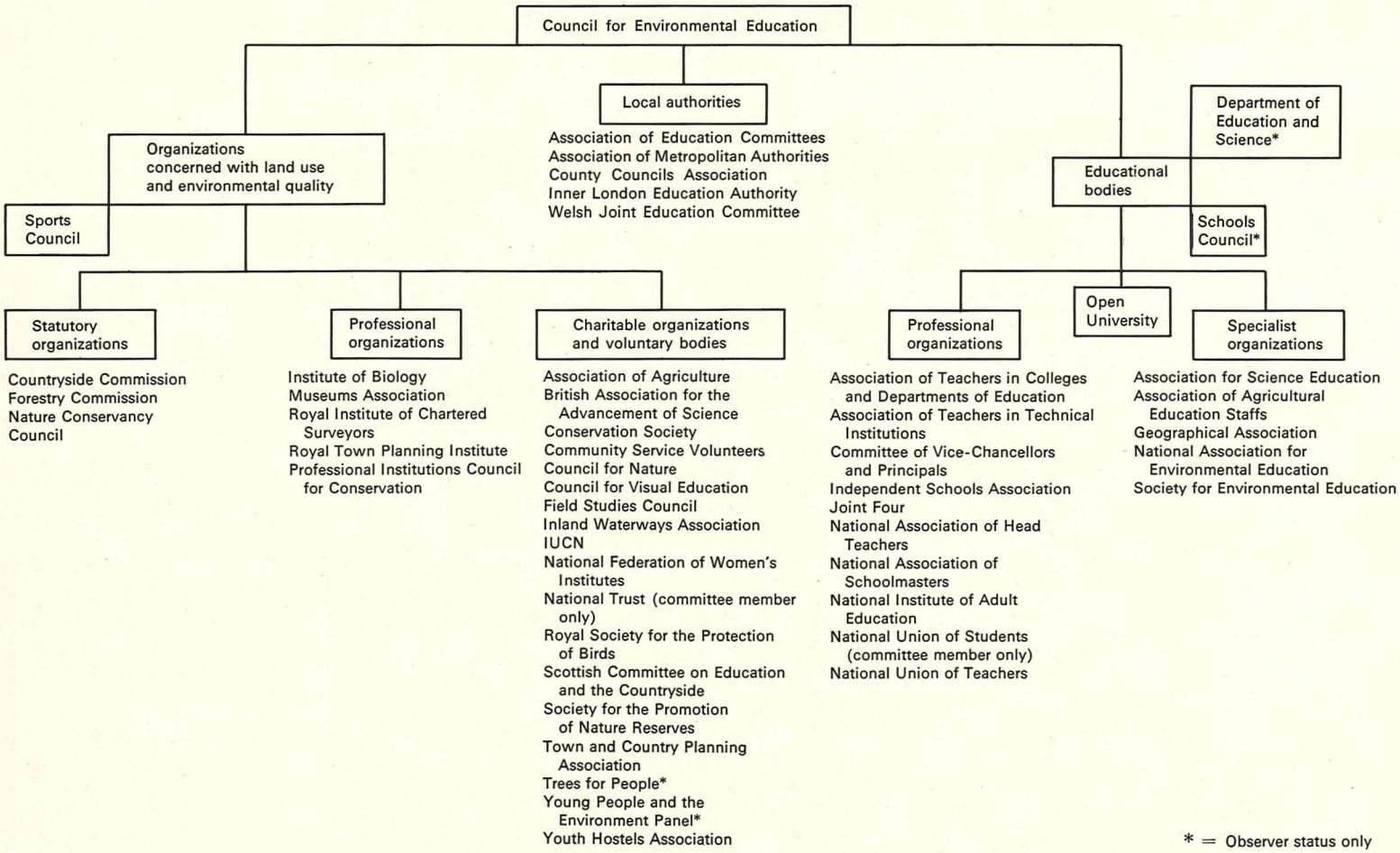


FIG. 3. Organizational Structure of the Council for Environmental Education (United Kingdom).

level examinations, and five Certificate of Secondary Education examinations beside a wide number of school-based CSEs Mode 3.

The modification of existing subject areas of the curriculum to include environmental education objectives, e.g. the Conservation Education Project conducted by the Centre for Science Education.[20]

The work of the Schools Council, the national body for curriculum development. The council lists twenty-two projects in environmental education which it is currently supporting. A Schools Council Working Party in Environmental Education was set up in 1973.[21]

Schools and colleges are able to use an extensive network of field study centres. These are provided by local education authorities, or by the Field Studies Council which is a non-government organization. Urban fieldwork, or 'streetwork', is now rapidly increasing, and in 1973 the Council for Urban Studies Centres was established under the aegis of the Town and Country Planning Association (TCPA) to obtain study centres for urban environmental education.[22]

The introduction of environmentally orientated curricula into teacher-training programmes. At present there are seventy-four such courses available in colleges of education, some of them leading to a degree. In addition, subject departments, such as geography, have modified their courses to achieve environmental education objectives. New degree courses in environmental science have been introduced into a few universities.

Local education authorities increasingly employ environmental education advisers.

Implementation procedures by way of voluntary organizations

Voluntary associations play such a large part in initiating the implementation of environmental education in the United Kingdom that it is relevant to outline briefly how they operate by reference to one of them, and the TCPA provides an important example. The association has, for many years, been the United Kingdom's leading environmental organization, pressing for the improvement of rural and urban planning. During the late 1960s, teachers were increasingly asking the association for information about many things concerned with urban planning to use in their lessons.[23] About this time, too, concern was growing in the country as a whole about the increasing alienation of ordinary people from the decision-making processes of planning which affected their lives. The government set up an inquiry into this problem which resulted in the report, *People and Planning*.[24] The report recommended, amongst other things, that education about planning should be included in the secondary-school curriculum, and in the training of teachers. The TCPA responded by setting up an environmental education unit staffed by two education officers. They edit and distribute a monthly *Bulletin of Environmental Education* (*BEE*) advocating a problem-solving, issue-based approach to urban environmental education. Furthermore, the TCPA has also instituted the Council for Urban Studies Centres. This voluntary association is therefore of more than national importance as it is the only known organization in the world actively campaigning for, and implementing, urban environmental education projects. The funds for TCPA's environmental education activities come from the Elmgrant Trust, and in the period 1969–74 amounted to a total of £22,000. The sum of money may not be large, yet the impact of the work of the education unit and the council has been of considerable importance in pioneering urban environmental education.

The pattern of procedure exemplified by the TCPA is common to many voluntary organizations, and may be summed up as follows:

To formulate an educational policy consistent with the aims of the organizations.

20. Peter Kelly (ed.), *People and Resources*, London, Evans, 1975.
21. Schools Council, *Curriculum Research and Development in Environmental Education*, London, March 1975.
22. Council for Urban Studies Centres, *First Report*, Town and Country Planning Association, 1974.
23. Colin Ward, 'The TCPA's Venture in Environmental Education', *Journal of the International Housing and Planning Association*, 1974, p. 11–12.
24. Department of the Environment, 'Report on the Committee on Public Participation in Planning', *People and Planning*, London, HMSO, 1969.

To identify and convince a funding agency to support the policy, and/or obtain subscriptions from members of the environmental organization.
To employ education officers to carry out the policy.
To distribute a bulletin or journal.
To supply relevant resource lists and other data.
To hold in-service workshops, etc.
To set up environmental education centres.

Non-formal environmental education

A considerable amount of uncoordinated informal environmental education takes place through the mass media, the activities of special organizations interested in promoting conservation education, and the work of several government agencies, such as the Nature Conservancy Council. In particular, local government planning departments are obliged to inform and educate the public concerning their plans for an area, and various methods are used to encourage participation by local people in the planning process. However, there is no systematic strategy for educating the public for civic environmental awareness.

Funding and research

Environmental education is vastly underfunded. Implementation has proceeded with emphasis on the development of curriculum tools and educational methodology rather than reliance on fiscal or legislative support, and is characterized by 'a diversity and lack of cohesion rather than any systematic integration of aims and content'.[25] However, a start has been made on research into the aims and methods of school environmental education and the evaluation of successful programmes. The Council for Environmental Education, acting on a proposal by the National Association for Environmental Education, made a joint application with Sussex University to the Leverhulme Trust, and was awarded a grant of £40,000 to finance a three-year Environmental Education Research Project commencing in 1975.

United States of America

The 1960s in the United States was a decade of increasing environmental concern, when 'ecology' and 'environmental quality' became household words, and legislative action was taken by the United States Government at federal and state level.[26] One of the most far-reaching of these laws was the National Environmental Policy Act of 1969 (PL91–190). Its purpose was to eliminate or reduce environmental problems resulting from the planning or development of any federally sponsored activity lacking both long-range and short-range consideration of the environmental effects of these actions, and to require consideration of alternative activities that could have less harmful effects on the environment. In particular, it made provision for public participation in the decision-making process, and established a Council on Environmental Quality in the Office of the President. A whole cluster of regulatory acts were subsequently passed, some of which were accompanied by the setting up of new federal agencies and organizations to carry out the necessary policy planning and enforcement tasks.

Legislation for environmental education

Mounting pressure on behalf of the environment finally came to a head in the campaign to celebrate Earth Day, 22 April 1970. On 30 October 1970, the Environmental Education Act (PL91–516) became law, and is a key component in the national drive to improve environmental education programmes.

Essentially the act provides for[27]

25. R. W. West, 'The Evaluation of Environmental Materials and Learning', *Environmental Education Study*, Sussex, 1975 (manuscript).
26. Information concerning the working of the Environmental Education Act based on information supplied by Walter Bogan, Director of the Office of Environmental Education, Office of Education, Washington, D.C.
27. Walter E. Steidle, 'The Environmental Education Act', *Science and Children*, 8 March 1971, p. 21–2.

making grants to and contracts with State Departments of Education, local school districts, organizations and institutions to support research demonstrations and conduct pilot projects designed to educate the public about the problems of environment.

Money received through these grants or contracts may be used to: 1) develop curricula which may involve several disciplines and are directed to preserving and enhancing environmental quality and ecological balance; 2) disseminate information relating to curricula and environmental education; 3) support environmental education programmes at the elementary and secondary education level; 4) permit pre-service and in-service training programmes including fellowship programmes, institutes, workshops, symposia and seminars on the teaching of environmental education; 5) plan for outdoor ecological centres; 6) produce community education programmes focusing on environmental quality; 7) prepare and distribute materials to the mass media on topics relating to environmental quality.

The act also required other federal agencies to provide support and technical assistance to the wide spectrum of government organizations and institutions which are 'deemed to play a role in preserving and enhancing environmental quality and maintaining ecological balance'.

Dr Sidney P. Marland, Jr, former United States Commissioner of Education, characterized these provisions of the act as[28]

> a catalyst activating the diffusion of environmental education not only through every subject in the school curriculum but throughout every educational mechanism and institution of our society . . . the responsibility is not merely that of Federal government, of the State and local system, but it is shared by church, professional associations, civic organizations, voluntary agencies, and the family. Each of the several elements of our society provides learning experiences in the vital areas of environmental attitudes and in helping individuals to learn personal responsibility and weight of personal decision-making.

The act is administered by an Office of Environmental Education assisted by an Advisory Council on Environmental Education whose responsibility is to assist in establishing guide-lines and regulations for evaluating the potential of project proposals, and it has the authority to evaluate programmes and publicize its results. In fact, the environmental education scheme began operating in spring 1971 and the first competition for grants involved an appropriation of $2 million. The results of the grant competitions for the years 1971–1975 are shown in Table 1.

The act also advocates environmental education programmes in other federal agencies that are relevant to the particular mission of each agency. During the 1972 fiscal year, for example, federal assistance programmes provided approximately $24 million to a range of environmental activities. Of this money $9 million was channelled by the Office of Education through other major spending agencies. In all, some forty-two programmes have been identified, operating without much degree of co-ordination.[29] In 1974 the Federal Interagency Committee on Education (FICE) set up a subcommittee on environmental education to improve interagency co-ordination. This committee has also been concerned with defining the needs and concepts of environmental education in order to iron out inconsistencies between various federally sponsored inputs.

Implementation of environmental education does not rest solely on support from federal or state sources of finance. In addition, there is a wide range of funding available from grant-awarding foundations, environmental organizations and businesses. The problem for the educationist is to know which source is likely to support his project, and how the application should be made out. One solution might be offered by 'grantmanship centres' which provide the necessary training in this kind of fund raising.[30]

TABLE 1. Office of Environmental Education Grants 1971–75

Year	Proposals	Grants	Granted $
1971	1925	74	1,725,000
1972	1650	162	2,999,040
1973	1130	54	1,143,000
1974	1300	106	2,200,000
1975	1300	75	1,500,000

Source: Walter Bogan, Director of Environmental Education, Office of Education, United States Department of Health Education and Welfare and Conservation Foundation.

28. Sydney P. Marland, Jr, 'A Catalyst in Washington', *Compact*, Vol. 5, No. 2, June 1971.
29. James L. Aldrich, 'Environmental Education and the Federal Agencies', June 1975 (unpublished manuscript).
30. Jonathan M. Wert, *Writing Environmental Education Grant Proposals*, Environmental Education Section, Division of Personnel, Tennessee Valley Authority, May 1974.

State environmental education masterplans

Another important effect of the Environmental Education Act has been the impetus given to the drawing up of state-wide environmental education programmes described in 'state masterplans'.[31] These masterplans contain detailed proposals for involving the whole State organization in working towards the achievement of environmental education objectives by school, college and community. Studied together, they provide a unique insight into the organizational dynamics of environmental education implementation.[32]

Under the terms of the act, twelve states were originally funded as a pilot scheme to develop masterplans. Colorado's planning programme was designated a national demonstration project. The following guide-lines were set out to assist in the preparation of the masterplans:[33]

A state plan should be dynamic and flexible enough to respond continuously to the needs of the people in the state, responsive to all age levels.

It should document and make use of the existing potential resources in the state, including curriculum materials, facilities, funds, personnel and information concerning the environment.

It should be an over-all education plan utilizing both formal and non-formal educational systems.

It should describe the needs and priorities in implementing the plan.

It should be useful to a variety of agencies and organizations in identifying their best means of providing assistance.

The planning group should involve a task force composed of representatives of statewide constituencies in elementary and secondary education, higher education, conservation, health and environmental protection agencies, private educational and environmental organizations, broadcasting, business, labor, industry and should therein reflect the educational and environmental resources of the state.

The masterplan is thus an important 'tool' in establishing an effective structure for implementing environmental education by co-ordinating and catalysing the work of already interested agencies, organizations, and individuals in the state. In short, a masterplan provides a carefully worked out 'blueprint' suitable for modification and revision. At present, thirty-seven states, plus the District of Columbia and the Tennessee Valley Authority, are preparing or implementing a masterplan.

Most of the masterplans are constructed by means of a goal-referenced system which is described as[34]

> the collection and study of data concerning the problems and needs. This information is translated into general goals, which are then spelled out in terms of measurable objectives or outcomes expected to be attained. Strategies are developed to achieve these objectives. Built-in programme specific evaluation instruments and measurement techniques are employed to provide (1) continuous assessment of progress, (2) a feedback mechanism for self-correcting improvement, and (3) comparison of objectives achievement with the baseline date.
>
> This systematic process insures that the functions of planning, implementation, and evaluation become an integrating structure leading to successful achievement of programme goals.

Special considerations common to all countries

The following special considerations in the implementation of environmental education apply to most countries' efforts to develop environmental education programmes. Much more needs to be known about their operation, and their methods of achieving success. However, all that can be done here is to note three aspects which have great potential importance in the development of environmental education.

Mass media

A large number of countries report the use of the mass media to encourage environmental awareness. Indeed, a responsive television or newspaper

31. See for instance: *Maine State Plan for Environmental Education*, Maine State Department of Educational and Cultural Services, 1974; and *Michigan's Environmental Future: a Master Plan for Environmental Education*, Governor's Environmental Education Task Force, 1973.
32. Richard Rocchio and Eve Lee, *On being a Master Planner . . . A Step by Step Guide from a Nationwide Study of Environmental Education Planning*, ERIC Information Analysis Centre for Science, Mathematics and Environmental Education, 1974.
33. ibid.
34. ibid.

coverage is often a means of awakening public opinion to environmental problems. An example of planned use of the mass media to teach environmental education comes from Chile where a course is organized by the Forestal Sciences Faculty in co-operation with the National Television Service and the Ministry of Education. It is designed for use by students of various levels of attainment, including illiterates. At the end of the course, a certificate is awarded to those passing a final examination. In 1974, some 14,000 people took the course.[35]

Environmental education at community level

An important aspect of environmental education in all countries involves the education of the community outside the channels of formal education. Activities in this field range from disseminating environmental information and codes of behaviour among rural communities with low literacy levels to, say, involving an urban community in the planning of its neighbourhood.

Also important in this connexion is the opening up of the school to make more contacts with the community. This is bringing about changes in the organizational structure of schooling which ranges, for example, from the new types of education centres in Peru, the *nucleos escolares campesinos,*[36] to the open urban community education being pioneered in Liverpool (United Kingdom).[37] The *comites de defensa de la revolución* established in Cuba also provide an example of how the community may be mobilized for environmental and educational action, such as health campaigns, raw material recycling, and cleaning up the neighbourhood.

Environmental campaigns

Many countries conduct national campaigns to encourage an interest in environmental causes. These campaigns may be mounted to celebrate a particular day or theme designated for this purpose. Notable examples are Earth Day (22 April), celebrated in the United States; Gausovitch Days set aside in some republics of the U.S.S.R.,[38] and World Environment Day (5 June) introduced by UNEP. In other instances, campaigns may extend over a whole year, such as European Architectural Heritage Year 1975[39] conducted by member countries of the Council of Europe. Environmental competitions are also very effective ways of stimulating interest, an example being the 'For Leninist Love of Nature' competitions in the U.S.S.R.

Comparative overview

Despite the cultural, social and political differences existing between them, and the differences in scale of supply of funds and resources, it is possible to suggest certain common features of environmental education implementation occurring frequently among the countries studied in this chapter. These are:

Co-ordination. Many countries have set up new institutions or agencies, often termed 'councils', for co-ordinating the work of their many environmental organizations, government and non-government. This brings a more unified approach to the solution of complex environmental problems, and allows better lines of communication to be opened between research, administration, and environmental law-enforcing bodies. It also assists in the reallocation of resources for environmental matters. Frequently, the co-ordinating body has a subcommittee concerned with informing the public about the environment, and with instigating programmes in environmental education. The status of the co-ordinating body varies from country to country according to the political and administrative structure of the country and the extent to which the co-ordinating body is empowered by legislation to carry out its work. In addition to those already de-

35. Report of Unesco Environmental Education Consultant, 1975.
36. Judithe Bizot, *Educational Reform in Peru*, Paris, the Unesco Press, 1975 (Experiments and Innovations in Education, No. 16).
37. Eric Midwinter, *Education and the Community.* London, George Unwin, 1975.
38. Borcho Shushmanov, 'Recent Programme Developments in the U.S.S.R. and Eastern European Socialist Countries', *Peabody Journal of Education*, Vol. 51, No. 1, October 1973, p. 12–19.
39. See for example: *Heritage Year News*, United Kingdom Secretariat, European Architectural Heritage Year, 1975.

scribed, the following countries also report the institution of co-ordinating machinery.[40] The Central African Republic has a National Commission for Environment which co-ordinates the national policy in environmental education, and is composed of members from various ministries. A similar commission exists in the People's Republic of Benin, supervised by the Minister of Planning. In the Ivory Coast, an organization exists for the co-ordination of environmental education. In Columbia, the Ministry of Education has established a committee to co-ordinate research into the national environment, and to develop an environmental education programme with first priority being given to a revision of the primary school curriculum.

Legislation. Countries with comprehensive environmental legislation, such as acts concerning environmental quality, etc., tend to support developed programmes of environmental education, particularly when these laws contain provision for carrying out related education programmes. Legislation entirely devoted to environmental education gives impetus to the development of environmental education, and allows for the formulation and implementation of a comprehensive national policy. As far as is known, the United States is the only country with a central government environmental education act. Other countries have important laws, such as the nature conservation acts in the U.S.S.R., which lead to the implementation of aspects of environmental education; and some countries have environmental considerations written into their constitutions.

Policy planning. National planning to develop a comprehensive policy for environmental education exists, as far as is known, only in a rudimentary form, or may be implicit in environmental legislation. Many countries appear to have recently started through their environmental co-ordinating bodies to prepare an environmental education policy. The state masterplans in the United States are the only known examples of comprehensive planning for environmental education.

Funding. The supply of funds to support environmental education programmes is a constant factor in the implementation of environmental education, and reference has been made to the role of funding as a critical agent in many of the studies in this chapter. The general impression is of serious underfunding of most projects although information about the details of funding is not easy to discover. Certainly, there is a good case for an international agency to set up an index of funding sources available for use in environmental projects, and to provide advice on how these funds may be obtained. The massive need for funds is confirmed by the 1975 Unesco *World Survey of Environmental Education*[41] which has found that at the world-wide level one of the three dominant environmental education needs is for funds to support innovations in environmental education.

Educational institutions. A country with an established curriculum development centre is able to use this to promote new approaches to environmental teaching; for example, the work of KEDI in Korea,[42] and of the Australian Curriculum Development Centre.[43] However, the need to make environmental teaching flexible, and able to use the environment as a resource, also means the growth of new types of institutions catering to environmental learning, such as field study centres, urban studies centres, model schools, and resource centres. In order to use these new approaches, teacher-training institutions must change the preparation of teachers accordingly.

40. Report of Unesco Environmental Education Consultant, 1975.
41. William B. Stapp *et al., Environmental Education Needs and Priorities: A Preliminary World Survey*, Environmental Education Unit, Paris, Unesco, September 1975 (first draft).
42. KEDI is the Korean Educational Development Institute which has prepared an integrated curriculum for primary and secondary environmental education as a component part of population education.
43. C. J. Spring (ed.), *A Proposal for the Support of Environmental Education in Australia (Final Report of the Curriculum Development Centre Environmental Education Committee)*, Woden, ACT, Curriculum Development Centre, August 1975.

Voluntary associations. All countries have voluntary non-governmental environmental organizations, and they act as highly influential agents in bringing about environmental awareness, and often play an active part in promoting informal environmental education. They may also stimulate government action towards the solution of environmental problems by their constructive criticism of national environmental policy, or by acting as pressure groups for such change. Voluntary teachers' environmental education associations are similarly important by campaigning for environmental education objectives to be included in the curriculum. The Alliance for Environmental Education in the United States is an example of a consortium made up of both types of organization.

International agencies. The role of IUCN, and other international and regional agencies in organizing environmental conferences and workshops is of prime importance in the development of environmental education. (See Chapter 14.) But comprehensive environmental education projects like those supported by FAO in Zambia and Nepal are rarely mounted although these projects should be considered as pioneering schemes by an international agency worthy of further consideration elsewhere.[44]

Conclusion

This brief survey of national procedures leading to the implementation of environmental education can only provide a broad indication of the 'state of the art'. Much more needs to be known about the organizational and institutional means of bringing about the desired changes in education concerning the environment. However, there are strong growth points in different countries of the world which indicate the direction in which to move in order to achieve environmental education objectives. These require a detailed monograph surveying what is happening, and what is proposed, so that a fuller understanding of the organizational mechanism producing the necessary innovations in education can be acquired. An example of the methods involved in such a study might be drawn from the work of the OECD/CERI project, International Management Training for Educational Change.[45] Certainly, there is insufficient knowledge about how environmental education may best be implemented, and it is only by drawing on the experience of many countries that guide-lines for the implementation of environmental education may be indicated.

44. See for example: *World Wildlife Project 1180: Special Project for the Promotion of Conservation Education.*

45. IMTEC (International Management Training for Educational Change) is a decentralized project of the Centre for Educational Research and Innovation (CERI) set up by the Organization for Economic Co-operation and Development (OECD) and is concerned with understanding the initiation and management of educational innovation.

14. International and regional co-operation in environmental education

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Introduction

International intervention in education has generally brought about constructive changes in educational practice. Very often, however, these changes have been ephemeral and wholesale reversion to old patterns has been common once the intervening agency has ceased to function. Thus, educational programming at the international level has frequently failed to bring about lasting changes.

Admittedly, the causes of failure are varied; but among the contributory factors might be the nature of relationships in international co-operation, the kinds of co-operation activity involved, and contextual problems. International and regional co-operation in environmental education will have to pay particular attention to these factors, and to many others, in order to be successful.

As a contribution towards that goal, this chapter makes a survey of international and regional organizations involved in general environmental education, or in education and training in relation to the environment. It should be stated that there are many more non-governmental organizations than those discussed. Illustrative methods of co-operation as well as strategies of co-operation are also described. Finally, the relationship between international and regional co-operation on the one hand, and integrated activities at the national level on the other, is presented as a critical factor in successful programming.

The survey

International or global level

Prior to the United Nations Conference on the Human Environment (Stockholm, 1972), a number of the United Nations Specialized Agencies included aspects of environmental education in their training programmes. The fifteenth session of the Food and Agriculture Organization (FAO) Conference (1969), for example, stressed the need to develop a strengthened and co-ordinated programme of action on conserving and developing natural resources.[1] Currently, the furthering of environmental education through agricultural education (including animal husbandry, forestry and fisheries) is carried out through an Inter-Divisional Working

1. *Environmental Education in Agriculture, a Tentative Approach for FAO,* Rome, Food and Agriculture Organization, n.d. (mimeo.).

Group on Education and Training which represents a suitable mechanism for discussing and providing general guidelines in the co-ordination of environmental education activities. One of the future FAO activities in this field is the development of environmentally oriented curricula for intermediate level agricultural education institutions; and a project proposal is now under consideration by the United Nations Environment Programme (UNEP). It is expected that Unesco and the International Labour Organization (ILO) will co-operate in the execution of the project.[2]

Existing projects relating to education and training with particular reference to the environment carried out by ILO are occupational safety and health (in the Work Environment Department); workers' education, including social problems such as housing, sanitation, and vocational training; as well as projects in environmental management.[3]

Within the World Health Organization (WHO), environmental education projects presumably deal with environmental health.[4]

Relevant education and training carried out by the World Meteorological Organization (WMO) are in the fields of atmospheric chemistry and atmospheric pollution. These interdisciplinary specializations require the collaboration of meteorologists, chemists, engineers, health officials, agronomists, land-use planners, sociologists and economists. The educational components at the cross-disciplinary level consist of a basic course on air pollution for all meteorologists, an intensive course for meteorologists who will be air pollution specialists, and a basic course in meteorological aspects of air pollution designed for specialists in non-meteorological fields.[5] At the general environmental education level, WMO plans to establish activities to encourage minimal understanding of atmospheric conditions by the population at large.

The stated goal of development, according to the United Nations Development Programme (UNDP), is to improve the total environment.[6] UNDP education and training programmes seek to improve the mental environment and to provide instruction relevant to economic and human growth needs.

The United Nations Children's Fund (UNICEF) is concerned largely with basic environmental education relating especially to home economics, health, nutrition, and childrearing. An emphasis on the role of non-formal education in helping people interact with their environment in mutually constructive ways is expected to bring education within reach of most people.[7] Environmental education showing how the environment affects the lives of women, children, and youth in rural areas, and the manner in which people affect the environment to the detriment of these groups, is therefore of paramount importance.

Unesco, as the United Nations Specialized Agency with the broadest mandate in education, necessarily plays a key role both in general environmental education in all its aspects (out-of-school as well as all levels of formal education) and in certain of its specialized forms (i.e. in the training of various specialists). This role was recognized by the 1972 United Nations Conference on the Human Environment[8] which, in Recommendation 96, singled out Unesco for mention in connexion with needed inter-agency consultations to develop a co-operative international programme in environmental education and training. Efforts in the first area, environmental education for all citizens, had existed for a considerable time on a modest scale.[9] Since 1973, with funds both

2. ibid. Supplementary information also furnished by Bogdan Sestan of FAO, Rome, October 1975.
3. Unesco, *Minutes of the Pre-Planning Meeting for the Belgrade Workshop on Environmental Education, Paris, France. March 12–14, 1975.*
4. ibid.
5. Information furnished to the author by James B. L. Breslin of the Education and Training Co-ordination Division of WMO, October 1975.
6. United Nations Development Programme, *Beyond Conflict or Compromise—Human Progress, Environmental Protection and the United Nations Development Programme*, New York, N.Y., n.d.
7. Unicef, *Basic Education in Eastern Africa—Report of a Seminar*, Nairobi, 1974.
8. United Nations Conference on the Human Environment, *Recommendations for Action*, New York, N.Y., 18 February 1972 (A/CONF.48/INF.2).
9. Information to this effect is contained in a Council of Europe document entitled 'Progress Report of the International Organisations [in Europe]', *Information Bulletin*, Vol. 2, No. 76, Strasbourg, Centre for Education in Europe.

from the Unesco regular budget and from extra-budgetary sources (particularly the United Nations Environment Programme), these efforts have been considerably expanded into a long-term programme whose purposes are to:

Facilitate the co-ordination, joint planning and pre-programming activities essential to the development of an international programme in environmental education.

Promote the international exchange of ideas and information pertaining to environmental education.

Co-ordinate research to ensure a better understanding of the various phenomena involved in teaching and learning.

Design and evaluate new methods, materials and programmes (both in-school and out-of-school, for youth and adults) in environmental education.

Train and retrain personnel to adequately staff environmental education programmes.

Provide advisory services to Unesco Member States relating to environmental education.[10]

Concern for the second aspect of environmental, education, i.e. for the training of environmental specialists, or for an environmental component of specialists in other fields, affects many elements of Unesco's programme. Particular mention might be made of the Man and Biosphere (MAB) Programme which includes activities requiring the training of many types of specialists.[11]

Within the United Nations Environment Programme (UNEP), environmental education is one of four 'supporting measures' for environment programmes (the other three being training, technical assistance, and information). The major objective is to bring about a rapid and systematic development of environmental education on a global basis. The establishment of an international institutional network receiving contributions from strong national and regional institutions is seen as essential for the carrying out of agreed measures.[12] UNEP plans to develop a 'balanced long-range programme' which will encompass: (a) Mechanisms for the acquisition, analysis and dissemination of ideas and information about environmental education; (b) experimentation with new methods and materials; and (c) provision of training programmes relating to environmental problems and designed for all educational levels including recurrent education, training activities, and research programmes.

Global as UNEP's programme seems, its basic thrust is 'the creation and enhancement of indigenous capabilities and capacities' in environmental education to enable all countries to participate, in all appropriate parts, 'in an informed manner as equal partners'.[13]

Although not directly involved in environmental education, the International Bank for Reconstruction and Development (IBRD) through its Economic Development Institute, includes references to environment and development in its curriculum materials.[14] Also available to its members are handbooks and associated printed materials on environmental aspects of economic development. Its affiliated international Development Association contributes to environmental education through its curriculum projects on a bilateral basis.

The Organization for Economic Co-operation and Development (OECD), which groups together European and some other industrialized nations, includes environmental education and training programmes in the activities of its centre responsible for curriculum reform in higher education.

Non-governmental organizations

Specialist organizations. The International Council of Scientific Unions (ICSU), a federation of international non-governmental scientific organizations each of which conducts a variety of

10. From 'Background to the Unesco/UNEP Project on Environmental Education', a circular issued by the Unesco Environmental Education Section in March 1975.
11. See Unesco, *Expert Panel on Educational Activities under the Man and Biosphere Programme (MAB)*, Paris, 5–8 December 1972 (MAB Report Series No. 7). The information was also furnished by Dr Harold A. Foecke, Director of the Division of Pre-University Science and Technology Education, Paris, Unesco, October 1975.
12. United Nations Environment Programme, Nairobi, 15 November 1973 (UNEP/GC/15).
13. United Nations Environment Programme, Nairobi, Africa, 11 February 1975 (UNEP/GC/31).
14. Personal communication from the International Bank for Reconstruction and Development, 24 February 1975.

international activities within its particular discipline, is a mechanism for the organization and conduct of multidisciplinary international programmes.[15] Some of these programmes relate to the environment, problems of developing countries, and the teaching of science. Three ICSU committees which have overlapping concerns in these fields are the Scientific Committee on Problems of the Environment (SCOPE), the Committee on Science and Technology in Developing Countries (COSTED) and the Committee on the Teaching of Science (CTS).

The broad objective of the International Union for the Conservation of Nature and Natural Resources (IUCN) is the conservation of nature throughout the world—treating this as an essential element in the wise use and development of natural resources.[16] Within IUCN, environmental education is the responsibility of the Commission on Education. The major emphasis is on 'creating public awareness of conservation values and action to support ecosystem conservation objectives, including promoting the use of ecological guidelines and related topics'.[17]

Inter-disciplinary. The Threshold International Center for Environmental Renewal is an association of specialists in education, ecology and in the social sciences. The centre provides consultant services throughout the world in a variety of educative activities related to environmental renewal.

Teacher and school organizations. The World Confederation of Organizations of the Teaching Profession (WCOTP) is involved in furthering programmes in environmental education methodology at the school level. Through its world-wide linkages with national teacher organizations, the WCOTP hopes to promote teacher education and curriculum development programmes which focus on environmental studies.

Formed in 1973 as a federation of science teachers' associations and science education associations, the International Council of Associations of Science Education (ICASE) contributes to environmental education through science curricula and out-of-school science education activities. Individual member associations teach at community levels while the council facilitates interaction at the international and regional levels.

The International Council on Education for Teaching (ICET) is a world-wide federation of colleges of education. Its aims include the integration of the education of teachers with local community needs and the development of teacher training curricula based on environmental considerations.

Youth and adult groups. Prominent among several organizations in this category are the World Wildlife Fund (WWF) and the International Youth Federation for Environmental Studies and Conservation. These organizations involve youth directly in action programmes focusing particularly on conservation education. The World Scouts Bureau is also involved in conservation education in co-operation with these two organizations and the IUCN.

Regional level

Intergovernmental

To co-ordinate and help implement programmes at the regional level, most of the United Nations agencies have regional offices. Except in the case of Unesco, none of them deals directly with environmental education except in the context of education and training for development. The Unesco Regional Offices for Education (Santiago, Chile; Dakar, Senegal; Beirut, Lebanon; and Bangkok, Thailand), however, are directly involved in the environmental education activities of groups in their respective regions.

15. Personal communication from Dr Albert V. Baez of the Lawrence Hall of Science, University of California, Berkeley, October 1975.
16. International Union for Conservation of Nature and Natural Resources, *Report of the Programme and Budget Committee of the 12th General Assembly*, Morges, IUCN, September 1975 (mimeo.).
17. Jan Čeřovsky, The Commission on Education of IUCN, with Special Emphasis on Projects and the Role of the North-West Europe Committee'. *Environmental Education in an Urban Society*, Morges, IUCN, 1972.

In the Arab States region, the Arab Educational, Cultural and Scientific Organization (ALECSO) is developing a long-term project on 'Environment in Educational Programmes' for general and university education, and the general public.[18] ALECSO's project is carried out in co-operation with UNEP and the individual Arab States.

The South-East Asian Ministers of Education Organization (SEAMEO) carries out environmental education activities through its Regional Centre for Education in Science and Mathematics (RECSAM). Environmental education is, therefore, included in the science education programmes. RECSAM facilitates co-operation with the Malaysian Government, the individual states of South-East Asia, and other countries.[19]

The Council of Europe[20] constitutes a framework for co-operation in environmental education among the European countries. A Council for Cultural Co-operation exists and has one operational committee each for higher education and research, general and technical education, and out-of-school education. The council helps create conditions which make appropriate educational opportunities available to young Europeans and facilitates their adjustment to changing political and social conditions. Attention is paid to all influences bearing on the acquisition of knowledge. For some of the European countries, however, the Education Committee of the European Economic Community[21] is another body responsible for co-operation at the primary- and secondary-school levels. It is also expected to assist universities and institutes in research in environmental disciplines.

The educational activities of the Secretariat for Nordic Cultural Co-operation[22] have been strengthened by a treaty 'to increase the combined effect of the countries' investment in education, research and other cultural activities'. Environmental education is included in the co-operative activities among the five Nordic countries.

Through its activities in science education, the Organization of American States incorporated environmental education and training in its programmes.

There are several bilateral and subregional programmes in environmental education and training. Afghanistan and Iran, for example, have a bilateral agreement for the training of environmental and conservation education functionaries. At the sub-regional level, the Comité Inter-état de Lutte Contre la Sécheresse dans le Sahel (Inter-state Committee to Combat Drought in the Sahel) will play an important role in environmental education in the Sahel region.

Non-governmental

The global organizations such as IUCN, WWF, the World Scouts Bureau, WCOTP, and the International Youth Federation for Environmental Studies carry out most of their work at regional level in almost all regions. The World Council of Churches is also now beginning programming activities in environmental education at the regional level.

The African Wildlife Leadership Foundation co-operates with non-governmental organizations, the United Nations Environment Programme, and with individual countries in Africa, especially in out-of-school environmental education activities. Also in Africa, the African Social Studies Programme (ASSP) aims 'to create an awareness and an understanding of the evolving social and physical environment as a whole, its natural, man-made, cultural, and spiritual resources, together with the rational use and conservation of these resources for development'.[23] Recently, the ASSP has incorporated population education activities in its programmes. The Science Education Programme for Africa (SEPA) incorporates environmental education in its environmental science education programmes from primary to

18. The Arab League Educational, Cultural and Scientific Organization, 'Environment in Educational Programmes', *Report of the Preparatory Committee, First Session*, Cairo, ALECSO, 1974.
19. American Council on Education, Overseas Liaison Committee, *International Directory for Education Liaison*, Washington, D.C., American Council on Education, 1973.
20. Council of Europe Activities Relating to the Environment, Strasbourg, Council of Europe, 20 May 1974 (CE/NAT/Centre (74) 8).
21. Resolution of the Environment Ministers, 1973, Brussels, Commission of the European Community, 20 December 1973.
22. Secretariat for Nordic Cultural Co-operation, *Nordic Educational Co-operation*, Copenhagen, Nordic Cultural Co-operation, 1975.
23. African Social Studies Programme, *Report of a Conference of African Educators, EDC and CREDO on Social Studies, Mombasa 19–30 August 1968* (reprinted by ASSP, 1975).

teacher-training levels. The fundamental theme of SEPA's environmental science education activities is the ecological and cultural aspects of science.

Environmental education is also an aspect of the work of specialized organizations in Asia such as the Asian Association for Biology Education and the Asian Centre for Education Innovation Development.

Co-operative activities

A few case studies will illustrate some of the strategies for co-operation which have been adopted. The selection has been determined by the availability of documentation.

Individual or small group planning

The International Youth Federation for Environmental Studies and Conservation (IYF)

The IYF started holding international youth camps on environmental studies in 1953.[24] Since that time, training courses, meetings and annual assemblies have also been held. In serving all regions of the world, the IYF has functioned as a co-ordinating body and has expanded its activities beyond environmental education. One of its distinctive activities is the annual action campaign on specific environmental protection themes. Its integrative capacity in international co-operation can be judged by its mobilization of support from other organizations, e.g. IUCN, the Environic Foundation International, the World Wildlife Fund and the Environmental Action, Inc. Other organizations co-operating with the IYF are the World Federation of Democratic Youth, the League of Red Cross Youth, the International Union of Studies, and the World Assembly of Youth. The IYF involves local youth organizations in leadership roles.

The International Union for the Conservation of Nature and Natural Resources (IUCN)

For a long time, IUCN has been holding general assemblies at the international level. As in all assemblies, the outcomes have been mainly resolutions and plans for action. On the basis of these, follow-up activities have been carried out through regional committees of the Commission on Education. The commission's principal activities have been conferences, meetings, seminars, workshops, and the publication of papers, records of working discussions, resolutions and recommendations as well as a news-letter.[25] The conferences are aimed at bringing together specialists to exchange experiences and encouraging environmental conservation education at the regional and national levels.

Co-operation has also been facilitated through cross-national research studies and surveys. Some of the surveys have direct practical application, e.g. papers on teaching methodology, and surveys of environmental education practice in specific regions. At the practical level, IUCN has co-operated with national institutions to run workshops and to offer special courses to enable practitioners to examine approaches, forms and methods of environmental studies in particular ecological contexts.[26] Another form of co-operation provided by IUCN has consisted of serving as a reference organization for global activities in environmental conservation education. Thus, the Man and Biosphere Programme, the Committee of Ministers of the Council of Europe, the Secretariat of the United Nations (Stockholm) Conference on the Human Environment, and the World Boy Scouts Bureau, for example, have had occasion to utilize the IUCN in its areas of competence.

The Arab Educational, Cultural, and Scientific Organization (ALECSO)

To expand its activities in environmental education, ALECSO set up a working committee drawn from its Member States, Unesco, ALECSO and from advisory groups.[27] The committee has held consultative and working meetings on the theme of 'Environment in Educational Programmes' as a

24. Personal communication from David Withrington, 5 June 1975. Various reports of IYF describe these activities in detail.
25. Other publications are: *International Course for Teacher Training in Environmental Conservation and Education,* Morges, IUCN, 1972 and the 'IUCN Publication Series'.
26. ibid.
27. The Arab League Educational, Cultural and Scientific Organization, op. cit.

consequence of which working papers have been prepared on plans for an environmental education encompassing general education, university education and mass media for the public at large.

The following additional activities are envisaged:

Publications: (a) sourcebook for planners and executors of educational programmes; (b) sourcebook on problems of environment, society and development for curricula of environmental sciences; (c) handbooks.

Other activities: (a) formation of social and scientific societies and clubs; (b) scientific study camps; (c) scientific exhibitions; (d) seminars, conferences, and lectures; (e) use of mass media for the diffusion of general environmental education.

The Science Education Programme for Africa (SEPA)

In ten years' work in environmental science education, SEPA, which grew out of the African Primary Science Programme, has conducted a variety of activities.[28] Conferences and seminars have been held only occasionally to survey the state and needs of environmental science education. Workshops for a number of specific purposes have been the mainstay of the programme and have generally been used to translate ideas into concrete instructional materials and to stimulate practitioners. These activities have been carried out jointly with national institutions.[29] Materials emanating from the workshops have included teachers' guides, readers' handbooks, monographs and films.

National science curriculum development centres have been established and supported to orchestrate activities at the national level. They also form rallying points and sources of stimulation, and of *ad hoc* education for local groups. In conjunction with the centres and sometimes quite apart from them, SEPA utilizes task forces drawn from African countries and from outside Africa to foster effective co-operation on specific aspects of programming such as teacher training and educational evaluation.

To help in implementation, short-term exchange programmes have also been established and for longer-term purposes suitable African institutions have been selected and assisted to serve as specialized regional centres in various aspects of environmental science education. The International Centre for Educational Evaluation (Nigeria) and the Regional Centre for Science Education (Sierra Leone) are examples of such centres. Also with regard to implementation, courses planned by national groups are supported through provision of consultant services from other countries.

Co-operation has also been facilitated by the use of the SEPA secretariat for the integration of funds from different international organizations in support of environmental science education projects at the subregional level. This practice has facilitated provision of assistance to national groups at short notice.

The above comments also apply to a greater or lesser extent to the African Social Studies Programme in the field of social studies and to the Association for Teacher Education in Africa in the case of general educational studies and methodology.

Large-scale joint action

One of the major documents prepared for the 1972 Conference on the Human Environment[30] made a far-reaching suggestion that the Secretary-General, the organizations of the United Nations system, especially Unesco, and the other international agencies concerned, should, after consultation and agreement, take the necessary steps to establish an international programme on environmental education. This suggestion became United Nations Recommendation 96. A part of Recommendation 96 which will have significance in the latter part of this chapter urged Unesco to

28. Ralph H. Robins, *Programming for Change in Science Education*, Newton, Mass., Education Development Center, September 1970 (Monograph Series of the African Primary Science Program). Reports on the Science Education Programme for Africa describe these activities in detail.
29. ibid.
30. *United Nations Conference on the Human Environment, Recommendations for Action*, New York, N.Y., United Nations, 1972 (CA/CONF/48/INF.2).

study innovations in general education and specialist training and to 'encourage the institution of courses and training periods at the regional and international levels'.[31]

Unesco has since responded to Recommendation 96 by calling together an international planning group to develop an over-all framework and direction for a co-operative international programme to promote environmental education. As an outcome of this meeting of representatives, Unesco prepared and submitted a three-year project proposal to UNEP, which was approved in January 1975. The programme objectives are to: co-ordinate planning; implement the exchange of ideas and information; provide advisory services; provide, promote and co-ordinate research, and support instructional programmes and education of personnel.

Inter-agency consultations have played a significant part in the evolution and articulation of this environmental education effort. The consultations bring together representatives of the United Nations agencies, and of international and governmental and non-governmental organizations to provide for the exchange of ideas and information and to co-ordinate planning. Thus, these consultations became a continuing process in keeping with the intent of Recommendation 96.

Two sets of task forces have been deployed. A group of authors to review the 'state of the art' in all aspects of environmental education was selected with particular care so that, as far as possible, each region was represented. In addition to preparing the fourteen 'state-of-the-art' papers, the authors, who were specialists in particular aspects of environmental education, also contributed to the planning of the entire international environmental education programme.

The second task force, consisting of consultants, was sent to every Member State of Unesco in the developing regions of the world to determine at the national level each country's needs and priorities in environmental education. Particular attention was paid to instructional materials, physical facilities, programmes, personnel, organizations and associations, funds and legislation. Throughout the consultations, each country identified individuals, organizations, programmes, materials and mechanisms for provision of assistance and dissemination of information, and linkages with the international project.

Information gathered by the authors and the consultants was presented in a world-wide workshop held in October 1975 at Belgrade. Participants represented each region, the United Nations agencies, intergovernmental and non-governmental organizations, plus the authors and the consultants. All of these individuals worked together to develop a balanced programme embodied in practical recommendations. Participants from each region also met as a group and formulated pilot projects which were again discussed with the rest of the Belgrade participants in order to arrive at mutually supportive projects. The regions also decided when to hold regional environmental education meetings in order to facilitate broader participation within each region and subject the outcomes of the world-wide workshop to further scrutiny at the regional and subregional level.

The products of the regional environmental education meeting, the task force, and the inter-agency consultations and joint planning meetings will be presented in a coherent form at an Intergovernmental Conference on Environmental Education convened in 1977. This conference will consist largely of policy-makers from each region. From this conference will emerge policies that Member States should consider for promoting environmental education activities.

To be supported concurrently with the evolution of the other components of the programme are efforts at the regional and national levels for meetings, subregional workshops, seminars, curriculum development, publications, etc.

Also central to the project is the development of a network system linking individuals and organizations in each region of the world. A newsletter[32] will form one mechanism for sharing experiences and for airing ideas and opinions. An information bank on people throughout the world with interest and competence in environmental education will be kept up to date for quick reference. With the passage of time, other elements will be included in the network not only to

31. ibid., p. 25.
32. The newsletter is *CONNECT*.

expedite linkages at all levels but also to mobilize resources at grassroots level where the project will face tests of practicality.

Benefits and limitations of the activities

Apart from the work of the Unesco-UNEP programme, there is an unmistakable similarity in the activities which have been undertaken by the various organizations and agencies; but the convergence has resulted from a diversity of routes and goals. Nevertheless, the value of the activities can be assessed, at one level, independently of these two factors.

Because concern with environmental problems and the need for an effective environmental education is being expressed by all nations, international meetings, conferences, workshops, and publications are important mechanisms for the exchange of information and ideas and for bringing about desirable actions on behalf of the environment. Since the effects of environmental degradation know no national boundaries, actions in one region can affect the environmental quality of another region. Forums where actions of different societies, and objectives and goals of different nations and organizations in environmental education can be examined and clarified are essential. These forums can also facilitate the translation of ideas into action programmes at levels which permit a co-operative search for solutions and a mobilization of financial, material and human energies.

These comments assume co-operation both vertically and laterally. It is not enough for an international or regional organization to plan activities on its own and then invite other organizations and one country (which will be the site rather than the host country) to add their names and support to the activities; nor is it enough to plan only with the leadership; and it is certainly inappropriate to limit activity to the educational sector. When the necessary conditions are not satisfied, the conferences and meetings serve primarily as forums for declarations of interest and not of commitment to action, and publications become the unused possessions of a select few.

Almost all the activities of the international and regional organizations can in fact be carried out at the subregional and national levels. Therein lies the value of national institutions. Unencumbered by restrictions of national sovereignty, the national institutions can serve as cornerstones for building broad-based inter-sectorial programmes.[33] They can also ensure meaningful follow-through and staying power in programming activities. Their efforts, however, are sometimes impaired by activities imposed by regional and international organizations and by the deployment of scarce manpower for activities which are an unnecessary duplication.

One useful activity which is lacking is evaluation workshops as part of planning. This kind of evaluation would explore whether activities reflected the intents of the project and whether they led to desired goals. Being diagnostic, it would also generate adaptive mechanisms to maximize success.

Nor is the human element prominent in the activities. Resolutions, curricula, reports of workshops, and books are not known for bringing about action. Two preconditions for action are a willingness to undertake it and an ability to profit from it. This 'human' element applies to the behaviour of organizations as well and it is in this context that it is viewed in the next section.

Strategies for co-operation

A major source of difficulty in co-operation is the fact that goals are defined in different ways by various groups and different processes thought to be essential for their attainment.[34] This seems to be true at the international level as well as at the national; it applies to organizations and to

33. In almost every Member State of Unesco there is a national environment agency. Also, there are specialized centres, curriculum groups, universities, youth groups, mass media associations, etc., whose activities in environmental education can be co-ordinated by a national agency while ensuring direct participation by each group.

34. This statement is a paraphrase of Jerome S. Bruner's in reference to 'cognitive' difference between children from poor and from rich backgrounds: *Oxford Review of Education,* Vol. 1, No. 1, 1975.

people. If these apparently different perceptions are not to spell doom for environmental education, various processes to enhance co-operation, some of which are already features of the Unesco-UNEP programme, can be adopted.

Co-operation in planning

Some of the longest and most difficult periods in the inter-agency consultation sessions referred to earlier occurred when one or other agency sought a definition of environmental education. Invariably, an impasse was reached. No definition was satisfactory because various representatives looked at the issue from the point of view of their constituency. Eventually, it became clear that the issue was not just environmental education, but the creation of informed constructive environmental action on the part of ordinary people and of specialists whose actions impinged on the quality of the environment. Environmental education could then be perceived as a transaction in which everyone should have a role to play. This perception might not be an exceptional achievement but what was exceptional was its evolution through joint participation. In this way, tremendous amounts of energy could be released. If the initial inter-agency consultations did not achieve this goal across the board, the problem could be traced to the level of professional representation. The process, however, became smoother in subsequent meetings.

Joint planning by agencies was only one dimension; another was the interaction of agencies with regional representatives, and others again were involvement of scholar/practitioners and of national representatives. If these dimensions remained separate, the process would be disjointed and incomplete. Thus, there had to be a forum which took the form of a planning workshop where all the dimensions interacted to produce an agreed view of environmental education and suggestions for action. The next steps would include forums at the regional level to allow participation by a greater number from the grassroots level of each nation and another for policy-makers at the national and global levels.

This process allows for re-assembly at any stage and for continual consultation. It also makes environmental education a public issue—which it is—and it attempts to make responsibility for action internal to every sector. If successful, the process will create conditions for that essential willingness and competence referred to earlier.

Co-operation in funding

Various institutions follow prescribed funding procedures which restrict release of funds to limited spheres of activity. Very often, however, the distinctions between spheres of activities are largely labels with substantive differences only in respect of emphasis and educational cycle. As long as such differences prevent a perception of common purpose, unnecessary duplication of expenditures and insufficient funding of useful programmes will result. Joint funding in such situations would facilitate the deployment of scarce resources to critical points. For joint funding to be a process or a strategy, there must be a deliberate search for common solutions; that implies continual consultations among organizations, and between organizations and practitioners and policy-makers at the national level on the deployment and distribution of financial resources.

Joint funding leads to other benefits which contribute to efficiency at the operational level. The orientation of project staff would be more complete, including as it would relationships of the project to other development activities in a country or region. The selection of project staff would also be improved by inputs from a variety of institutions, especially at the local level where appropriate sensitivity can make the difference between success and failure. Not least among the desirable outcomes of joint funding would be the creation of a meaningful relationship between general environmental education and the education and training of specialists. The decision-making process leading to, and resulting from, joint funding would be a sincere effort to clarify and strengthen mutually beneficial relationships.

Co-operation in execution

It is not uncommon for projects to be funded jointly by a number of organizations and by the host country, and yet be executed by one orga-

nization. A more problematic variation is the participation of staff from different contributing organizations, but working without reference to one another. This variation has only the appearance of joint execution.

Joint execution means a commitment to the project as a whole. All the parties involved should work as a team whose every member perceives his role as unsuccessful unless it is tied intimately to the rest. If one may use evidence from other projects, one essential precondition for the creation of integrated execution is the existence of at least a climate of integration at the national level. Indeed, this chapter and its recommendations are meaningless unless that condition, or a proper preparation for it, exists. The next strategy might help in that respect.

Networking

Networking (the process of a network system) manifests itself in many forms. It can consist of newsletters, journals, pamphlets, and other forms of printed or filmed material; it can be deployed to perform specific tasks on behalf of the project; or it can be a number of institutions engaged in various aspects of the project; or it can be all of these things. Somewhat paradoxically, the existence of these elements does not in itself guarantee networking. There must be a willingness and a capability to share experiences, ideas, and other items by the parties concerned.

There is growing body of evidence from the behavioural sciences that direct participation in the process of finding and using contexts for an activity has a lot to do with the willingness and capability to share experiences. Applying this knowledge to projects would mean that people, institutions and organizations become a network as a result of direct participation. It also means that newsletters, pamphlets, meetings, etc., are avenues for 'intentional, active' communication by the participants in the project.[35] This view of networking has far-reaching implications for linkages between international and regional organizations, on the one hand, and national procedures, on the other.

In the history of international or regional assistance in education, there are numerous examples of the failure of institutions due to a lack of effective networking at the national level.[36] Some lessons from these failures may be noted.

The primary need is to study the work of existing institutions at the national level and to sensitize them to the consequences of their programming activities in respect of environmental education. A system of effective linkages among them and a locus of emphasis for general environmental education would be established and supported as part of an integrated national programme. In most cases, it will be found that there will be a need not so much for the establishment of a new institution as for the judicious re-deployment of existing resources and facilities. International and regional involvement would be useful in as far as it can provide support at critical points and facilitate sharing with other willing nations of the benefits thus created.

Since networking is not a specific descriptive concept, it does not manifest itself in uniform activities. Its significance is evidenced by adaptation to local conditions so that in some places it might take the form of conferences and meetings and in others the use of mass media and theatre. In still other places, it could take completely novel forms and it is in this light that Recommendation 96 charged Unesco with the responsibility for studying current innovative networking at the institutional level. One important role of international and regional organizations in this respect is to retrieve these various forms, facilitate their wide distribution, and to give them proper meaning within the agreed framework of environmental education.

Summary

The survey of international and regional organizations and their activities in environmental education shows that there is co-operation among some organizations. Except in the case of the environmental education programme spearheaded

35. Writing about children, Bruner referred to the 'international, active, egocentric perspective'.
36. Ernest Boesch in his article 'Adapting Education to Society', *Education*, Vol. 1, Tübingen, 1970, gave one example. Numerous examples were given by some of the participants at the Belgrade Workshop on environmental education.

by Unesco and UNEP, there has been virtually no dynamic interaction among the organizations.

Underlying the discussion of strategies of co-operation is the notion of integration of resources and activities at the national no less than at the international level. The ultimate goal is to reach the community level to bring about meaningful implementation, and inter-sectorial co-operation at the national level is a prerequisite.

It is very difficult to define strategies beyond broad categories such as joint planning, joint execution, networking, etc., without getting into theoretical considerations of dynamics of co-operation. It is sufficient to say that direct participation in freely chosen contexts seems to be the essential thread in co-operation, and so far there is little evidence that the organizations have committed themselves to these strategies.

The dynamic view of co-operation recommended in this chapter raises policy issues—technical constraints on direct co-operation between inter-governmental and non-governmental organizations, constraints on direct linkages between national and non-national groups, co-operation among specialist organizations, and the distribution of resources among various regions. In addition, there is the professional issue of developing techniques and instrumentation to evaluate the efficacy of the various strategies.

In conclusion, therefore, it can be stated that for meaningful co-operation at the international and regional level to be realized, a great deal of soul-searching must take place. The various organizations must weigh their allegiances and re-examine their loyalties in the light of the total system that they seek to affect. More importantly, each nation will have to create a climate conducive to co-operation.

Some co-operating organizations in environmental education

A. United Nations group

1. United Nations Environment Programmes (UNEP)
2. Unesco
   a) Environmental Education Section
   b) Man and the Biosphere Programme (MAB)
   c) International Study of the Conceptualization and Methodology of Population Education (ISCOMPE)
3. UNICEF
4. Food and Agriculture Organization (FAO)
5. World Meteorological Organization (WMO)
6. World Health Organization (WHO)
7. International Labour Organisation (ILO)
8. United Nations Development Programme (UNDP)
9. International Bank for Reconstruction and Development (IBRD)
10. United Nations Institute for Training and Research (UNITAR)

B. Other international organizations

1. International Union for the Conservation of Nature and Natural Resources (IUCN)

2. World Wildlife Fund (WWF)
3. International Youth Federation for Environmental Studies and Conservation (IYF)
4. International Council of Scientific Unions (ICSU)
   a) Committee on the Teaching of Sciences (CTS)
   b) Scientific Committee on Problems of the Environment (SCOPE)
   c) Committee on Science and Technology in Developing Countries (COSTED)
5. Environic Foundation International
6. International Coordinating Committee for the Presentation of Science and the Development of Out-of-School Scientific Activities (ICC)
7. International Council on Education for Teaching (ICET)
8. The World Confederation of Organizations of the Teaching Profession (WCOTP)
9. Threshold International Center for Environmental Renewal
10. The Bolton Institute
11. International Assembly of Non-Government Organizations Concerned with the Human Environment
12. The International Clearinghouse on Science and Mathematics Curricular Developments
13. International Council of Associations of Science Education (ICASE)
14. World Scouts Bureau
15. International Consumer Organization
16. World Council of Churches
17. Taraxacum Club (International Association of Environmental Experts)
18. Organization for Economic Co-operation and Development (OECD)

C. Regional Organizations

Africa

1. Institut de Développement Economique et de Planification (IDEP) (sub-division of the UN Economic Commission for Africa)
2. African Wildlife Leadership Foundation (AWLF)
3. African Social Studies Programme (ASSP)
4. Association for Teacher Education in Africa (ATEA)
5. Comité Inter-Etat de lutte contre la sécheresse dans le Sahel (Inter-state Committee to Combat Drought in the Sahel)
6. Science Education Programme for Africa (SEPA)

Arab States

1. Arab League Educational, Cultural and Scientific Organization (ALECSO)
2. Arab Institute for Economic Development and Planning

Asia

1. Asian Centre for Education Innovation Development (ACEID)
2. South East Asia Ministers of Education Organization (SEAMEO)
3. UN Economic Commission for Asia and the Far East (ECAFE)
4. Asian Association for Biological Education

Europe and North America

1. Commission of the European Community
2. Council of Europe
3. The Nordic Council (of Ministers of Education and Culture)
4. Alliance for Environmental Education
5. National Association for Environmental Education

Latin America

1. Organization of American States

For those concerned with preserving or improving the physical world around us, education about the environment is a field of growing importance. In this book, experts from many different countries describe the nature and philosophy of environmental education, methodologies, evaluation, and national procedures in trend papers concerning the state of the art at all its age levels. It is an important source of information for government planners, educators and individuals everywhere.

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