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INTERNATIONAL COMPREHENSION AND PROBLEMS
OF THE CONTEMPORARY ENVIRONMENT:
THE ROLE OF ENVIRONMENTAL EDUCATION

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I. ENVIRONMENT AND INTERNATIONAL COMPREHENSION

Introduction - Existing Background

The environmental question is one of the key issues of our era, and as such is directly and indirectly linked with other important international problems, namely overgrowth of population, hunger, poverty, peace and disarmament, the need for a sustainable and harmonious economic and social development.

Environmental protection, the most characteristic issue of the seventies, still proves a very important matter for the eighties, and the decades to come. The rapidly growing "global" pollution together with the numerous recent major environmental catastrophes, such as Seveso, Bhopal, Chernobyl, etc., produce additional evidence that, despite an increasing investment of funds and efforts, observed in most countries, environmental issues are of vital importance, representing in certain cases an extremely pressing problem. With every year that passes, the environmental agenda becomes heavier.

It has been repeatedly stated that the protection of our environment is a matter of survival of mankind on Earth; as such, it can only be addressed and tackled as an international-global issue. Furthermore, it is clear that in order to face the various problems, so as to effectively protect the environment and secure a sustainable development, more and better focused research is needed, as well as better and more efficient management of the environment and all natural resources.

Research is needed since, as Francis Bacon stated in just one phrase, "Nature to be commanded must be obeyed". That implies a thorough knowledge of natural mechanisms.

The well-known unbreakable connection between research and education on one hand, and on the other, the recognized and well-documented requirement of international cooperation in the field of research, further support the view that environmental education are issues calling for international cooperation.

Furthermore it is of public knowledge that many of the serious environmental problems recorded today are not only largely due to the mismanagement of natural ecosystems and resources by individuals, but also to management based on wrong decisions taken at local, and even national and international levels, without the adequate consideration of crucial environmental parameters. The inadequate implementation of regulations and instructions, due to ignorance, lack of accurate information, sound education and/or appropriate training, lead to the same negative results.

Generation, accumulation and flow of knowledge of the types described above, cannot be understood without reference to experience gained through international cooperation in the field of environmental protection has been recognized by the international community and pointed out in important Declarations.

According to Principle 24 of the Stockholm Declaration of 1972, "...international matters should be handled in a cooperative spirit by all countries, big and small, on an equal footing. Cooperation through multilateral or bilateral arrangements or other

appropriate means is essential to effectively control, prevent, reduce and eliminate adverse environmental effects resulting from activities conducted in all spheres, in such a way that due account is taken of the sovereignty and interests of all states".

It is noteworthy that the idea of international cooperation in this field was understood right from the beginning as concerning not only Governments and intergovernmental or state institutions, but also NGOs and even individuals. In his address at the opening ceremony of the Symposium on "The Environment and the Future" in May 1982, the Executive Director of UNEP, Dr. M. Tolba, commented: "... it was the pressure emanating from NGOs which, more than anything else, stimulated the UN's responses ... Never before have Governments been so encouraged or pushed by NGOs, as in Stockholm."

This international cooperation and solidarity at all levels is absolutely vital for a positive reaction towards the challenges posed by the growth of population, the widespread degradation of resources, the diverse sources of pollution. There are few, if any, environmental problems on the horizon that cannot be solved, although they tend to become more and more complex.

Environmental degradation of large areas of our globe affects wide groups of population in all sectors of society and is clearly international. Borders cannot impede air pollution, river or marine pollution, destruction of forests, desertification or soil erosion, to mention some of the most important environmental problems which, because of their very nature, cannot be treated as national. National borders, moreover, are often unable to hinder the expansion of environmental problems of a different nature, such as the case the use of well-known dangerous substances, the transport - and in some cases uncontrolled disposal - of toxic or radioactive wastes, health problems directly connected with water use or food supply, etc. All the afore-mentioned issues pertain to the international level, since they are directly or indirectly related to national, regional or sectoral policies and priorities either common to a group of countries, regions, etc. or, in certain cases, incompatible.

Mankind today has the unprecedented where-withall to determine its future circumstances for better or worse and face positively, in good will and cooperation and in time, the environmental problems.

Among hundreds of topics of great environmental importance, few were selected to be discussed as examples in the context of this work, as they demand, perhaps more than others, urgent collective action by the international community.

Air Pollution - Acid Rain

Air pollution is not a new environmental issue. Sulphur and nitrogen oxides, particulates and carbon monoxide have been causing smog and damages to human health, vegetation, properties and even monuments and pieces of art in the vicinity of the sources of pollution, since the beginning of the industrial revolution.

Today, however, the situation is far more alarming. Emission sources may be located thousands of kilometers away from the affected areas, so that regulation and implementation of any control measures is no longer a national matter, but an international one.

The atmosphere cannot be regarded any more as the passive receptacle of pollutants, but should be considered as a reactor for an extremely complex system of substances controlled by a large number of physico-chemical and meteorological parameters.

The emissions of sulphur and nitrogen oxides were estimated in 1980, in the northern hemisphere alone, at roughly 115 million and 35 million metric tons respectively. These gases, transported over long distances in the atmosphere, react with water and are transformed into sulphuric and nitric acids, then return to the surface of the Earth either as wet (rain, snow, fog and mist) or dry depositions and cause various damages and acidification of aquatic systems and soils.

This form of transfrontier pollution, popularly known as "acid rain" is already a major environmental issue for Europe and North America and it may become a significant one for Asia. It was recently reported that acid rain had already been recorded in China and Brazil.

In Europe and Eastern North America, about 1/3 of deposited sulphur comes from relatively close-by sources located at distances of less than 200 kms away. Another 1/3 derives from sources at medium distances (200-250 kms) whereas about 1/3 from sources at long distances (more than 500 km). The affected part of Europe, from Normandy to Czechoslovakia, includes more than ten nations and it is obvious that without international cooperation, any attempt to achieve an effective control on "acid rain" is hopeless.

It is difficult to assess globally the exact degree and effects of acidification. In Sweden alone some 4000 lakes and 90.000 kms of streams are already highly acidified; 18.000 lakes are partly acidified and other 20.000 are at risk.

Lakes with a total surface area of 13.000 square kms in Southern Norway support no fish anymore, and stocks have been depleted over an additional 20.000 square kms.

Acidified lakes have been also identified in North America. More than 300 lakes in Ontario and nine rivers in Nova Scotia, Canada, present pH values below 5, and about 48.000 lakes are acid sensitive.

Similarly, 10% of the lakes in the acid-sensitive Adirondack region of the eastern United States and the upper peninsula of Michigan, have pH values below 5, whereas the average number of lakes having pH values below 5 in other sensitive regions, is about 5%.

Aquatic systems are not only ones affected by acidification. Terrestrial systems including soils, crops, forests and man-made structure of the present or previous generations have also been affected. More than 7 million hectares of forests in 15 European countries have been stricken by a disease syndrome dubbed "Waldsterben", thought to be caused by the effects of many

pollutants acting synergetically with biological and physical stresses.

"Waldsterben" affects many tree species and, once its signs are visible, the syndrome progresses with devastating speed. In the last five years the reported "dead" West German forests increased from 8% in 1982 to more than 50%.

The symptoms of damage vary significantly and half a dozen different mechanisms have been proposed, which include not only acid deposition, but also ozone, PPN (peroxy proprionyl nitrate), nitrogen oxides, sulphur dioxide, fluorine or other plant-damaging gases, metals - such as aluminium, magnesium, lead, cadmium, zinc and copper - and excess of available nitrogen or disturbance of growth-regulating organic substances. Other hypotheses suggest viral or non-pollution related causes. However, scientists increasingly agree that the finger should be pointed at air pollution.

International Action to Abate Acid Rain

The problem of acid rain is a perfect example of an international issue where international response has been significant, although not fully comprehensive. Obstacles were raised because of lack of coordinated research between countries, inconsistent and inadequate monitoring methods, generally considering only one or two pollutants (usually SO₂ or NO_x), differences in the interpretation of data and intramural bickering among different scientific camps as to the exact relationship between pollution and environmental damage. Furthermore, the debate which has obvious economic implications, has often been tainted by nationalism.

Despite this unfavourable background, public awareness on environmental issues and initiatives by international organizations managed to indicate a path for international cooperation to combat air pollution.

The progress made to curtail SO₂ emissions is largely due to the Convention on Long Range Transboundary Air Pollution (LRTAP) of the UN Economic Commission for Europe (ECE). Signed in Geneva in 1979, the Convention came to effect in March 1983, but as of April 1985, 30 countries had ratified it (including the USA and the USSR).

Although the LRTAP has been criticized as weak, it has been credited for providing a Europe-wide data gathering network of 88 monitoring stations operating in 23 countries. After the 1982 Conference in Stockholm on Acidification of the Environment, delegates from ten countries gathered in Ottawa in 1984 and created the "30 Percent Club" by agreeing to reduce SO₂ emissions at least by 1993 (using the 1980 emissions as guideline). The number of countries joining the "Club" doubled since and recently (1987) it was announced that the European Communities will join it, too, although there are still large SO₂ emitters within the EEC, who fail to meet the expectations of the majority.

Air Pollution: Greenhouse Effect, Depletion of Ozone

Two global pollution problems are also connected with air pollution: the greenhouse warming and the depletion of stratospheric ozone.

These two problems together with "acid rain" show in the most dramatic way that air and atmosphere are resources shared by the entire planet and call for international cooperation in order to be jointly managed by all nations some day.

Greenhouse Effect

The potential human impact on Earth's climate is one of the major concerns of our days. Human activities release huge and always increasing quantities of carbon dioxide and certain other gases into the atmosphere, that are thought to contribute to global warming. These gases (ozone, methane, chlorofluorocarbons and nitrous oxides) showing a steady increase of their concentrations in the troposphere, accelerate the rate of global warming arising from the greenhouse effect due to CO₂.

The use of fossil fuels and, to a lesser extent, the burning of biomass, as well as deforestation and changes in land use, have increased the amount of carbon dioxide emitted into the atmosphere. Atmosphere concentrations of CO₂ have increased about 25% over the last 100 years, from 275 ppm in the late 19th century to 315 ppm in 1958 and about 343 ppm in 1984.

The estimated increase of the global mean temperature in the past 100 years is consistent with the observed increase in CO₂ and other greenhouse gases. If present trends continue, the global average surface temperature is predicted to rise 1,5° - 4,5° C in less than 50 years, producing noticeable changes in the climate, regional changes in rainfall, a sea level rise and probably severe consequences for people and wildlife.

International Action on the Greenhouse Issue

Despite any scientific or technical uncertainties, and alarmed at the same time by the fact that mankind should learn to live with the idea of a changing climate, scientists are calling upon governments to consider greenhouse impacts as they plan future investments and to start an effective cooperation between researchers and policy-makers, so as to explore alternative solution on energy conservation and renewable sources, which could slow down, prevent or adapt to climate changes induced by the greenhouse effect.

To succeed in these efforts, the international community should come with fresh ideas and a cooperative spirit, as unprecedented as the phenomenon itself.

In October 1985, a conference on the greenhouse question (the second in a series of five years reviews) was organised jointly by UNEP, the World Meteorological Organization and the International Council of Scientific Union. The Conference, held at Villach, Austria, issued at its end an "Assessment of the Role of

Carbon Dioxide and of other Greenhouse Gases in Climate Variations and Associated Impacts", outlining the current international consensus on the matter.

Among the conclusions one reads: "Climate change and sea level rises due to greenhouse are closely linked with other major environmental issues, such as acid deposition and threats to the Earth's ozone shield, mostly due to changes in the composition of the atmosphere by human activity. Reduction of coal and oil use and energy conservation undertaken to reduce acid deposition will also lower concentration of greenhouse gases ... While some warming of climate now appears inevitable due to past actions, the rate and degree of future warming could be profoundly affected by governmental policies on energy conservation, use of fossil fuel and the emission of some greenhouse gases...

The amounts of some trace gases in the troposphere, notably carbon dioxide, nitrous oxide, methane, chlorofluorocarbons and ozone, are increasing ...

If present trends continue, atmospheric carbon dioxide and other greenhouse gases combined would be radiatively equivalent to a doubling of carbon dioxide from pre-industrial levels possibly as early as the 2030s ...

It is estimated on the basis of observed changes since the beginning of this century, that global warming of 1.5 - 4.5° C would lead to a sea level rise of 20-140 centimetres.

Based on evidence of effects of past climatic changes, there is little doubt that future changes in climate on the order of magnitude obtained from climate models for a doubling of the atmospheric CO₂ concentration could have profound effects on global ecosystems, agriculture, water resources and sea ice ..."

The "Assessment" includes also a number of recommendations for governments, regional intergovernmental and funding institutions. Among other recommendations, the following have been stated:

"Major uncertainties remain in predicting changes in global and regional precipitation and temperature patterns. Ecosystem responses are also imperfectly known. Nonetheless, the understanding of the greenhouse question is sufficiently developed, that scientists and policy makers should begin in active collaboration to explore the effectiveness of alternative policies and adjustments ..."

"Governments and funding agencies should increase research support and focus efforts on crucial unsolved problems related to greenhouse gases and climate change ... Special emphasis should be placed on improved modelling of the ocean, cloud-radiation interactions and land surface processes ..."

"Support for the analysis of policy and economic options should be increased by governments and funding agencies. In these assessments, the widest possible range of social responses, aimed at preventing or adapting to climate change should be undertaken in a regional context to link available knowledge with economic decision making and to characterize regional vulnerability and adaptability to climatic change. Candidate regions may include the

Amazon Basin, the Indian subcontinent, Europe, the Arctic, the Zambezi Basin and the North American Great Lakes."

Ozone Depletion

Ozone (O_3), a variant of oxygen, is present in small amounts in the atmosphere. Its concentration vary with altitude. Ozone in the troposphere (0 to less than 15 kms) is a pollutant closely connected with emissions of cars, etc., known to damage plants and to affect human health, as well.

The stratospheric ozone, however, which shows a peak in the layer between 20 and 30 kms, plays a crucial role in shielding the Earth's surface against ultraviolet radiation, by absorbing wavelengths of the sun's light, harmful to human health and to vital biochemical mechanisms.

The concentrations and specific distribution of ozone at the various atmospheric strata are also critical for the meteorological processes that determine climate. Changes in the stratospheric ozone would directly affect heating rates, since ozone, by absorbing also infrared radiation, provides the main heat source for the stratosphere. Such a change affects air movements and the downward emission of infrared radiation.

In the lower stratosphere, ozone absorbs heat radiated from the Earth and whatever changes in its concentrations would directly contribute to the greenhouse effect. All systematic changes in atmospheric temperature affect water vapor concentrations in the atmosphere and could be important factors in climatic changes.

The concentrations and vertical distribution of ozone are affected by complex catalytic reactions between various forms of oxygen, nitrogen, chlorine and hydrogen oxides. Small amounts (ppb) of catalytic oxides and free radicals are able to control the actual ozone concentrations.

Human activities are changing the amounts of these catalysts and these variations, in turn, are expected to affect the amount of ozone. Particular concern has been expressed for a group of chemical compounds known as chlorofluorocarbons (CFs), used mainly as aerosol propellents, solvents, foam-blowing agents or for refrigeration.

These stable compounds have an atmospheric lifetime of approximately 100 years. If their emissions remained at current levels, they would reduce the total amount of ozone by 3% to 5% in the same period. This apparently small change in the overall ozone column is the net result of depletion up to 60% of the ozone layer above 40 kms, much smaller reduction at 30 kms and an offsetting increase at lower altitudes. Greater depletion is expected at high latitudes and different seasons, leading to major changes in lateral air movements and to greater increase in ultra-violet radiation.

Besides chlorofluorocarbons, other gases (important also for the greenhouse phenomenon) are likely to affect ozone concentrations. Models show that methane and carbon dioxide emissions increase stratospheric ozone, whereas nitrous oxides decrease ozone. The effect of nitrogen oxides (e.g. from aircrafts exhaust gas) is localized and varies with the altitude of injection. The concentration of chlorine and the synergetic effects of many pollutants further complicate matters.

The major known effect of increased ultraviolet radiation, which would be the result of a reduction in ozone, is an increase in non-melanoma skin cancers. The possibility of an increase in the frequently fatal but rarer melanoma form of skin cancer is controversial. Other potential effects include suppression of human immunological systems, damages to plants, animals (eye cancer in cattle), aquatic organisms and microbes, as well as accelerated degradation of polymer materials.

International Action for the Protection of the Ozone Layer

In March 1985 representatives of 20 nations */ concluded an international environmental agreement, known as the Vienna Convention for the Protection of the Ozone Layer. This Convention is the first world-wide legal instrument directed to the protection of the atmosphere as a resource and represents an important success for the United Nations Environment Programme, which has acted as Secretariat for governmental meetings on the issue for almost a decade. Despite the failure of two blocks of countries, namely the EEC and the so-called Toronto Group (USA, Canada, Finland, Norway and Sweden) to reach a compromise and include a protocol on control strategies, the Convention had important results.

The agreed exchange of information on chlorofluorocarbons production should be considered as particularly significant, especially since the U.S. Chemical Manufacturers Association had stopped reporting global production figures several years ago, as a reaction to the lack of reporting by the Soviet Union and Eastern Europe.

The signatories to the Convention adopted a resolution which provides for continued actions by UNEP and a working group, to conclude a protocol, and authorized UNEP to convene a Diplomatic Conference in 1987 for that purpose. Furthermore, the Convention provides for the creation of a new permanent institution to oversee its implementation. UNEP will initially act as secretariat, until the parties act. The Convention becomes effective upon ratification by 20 countries.

*/ Argentina, Belgium, the Byelorussian SSR, Canada, Chile, Denmark, Egypt, Finland, France, the Federal Republic of Germany, Greece, Italy, the Netherlands, Norway, Peru, Sweden, Switzerland, the Ukrainian SSR, the Soviet Union and the United States of America signed on April 1st, 1985. Mexico and Luxembourg also signed, on April 17, 1985.

Recently, after a series of meetings and seminars at various levels, with the involvement also of major international environmental NGOs, such as the World Resources Institute, the International Institute for Environment and Development and the European Environmental Bureau (EEB), the EEC and the Toronto Group came closer to an agreement concerning the production of chlorofluorocarbons.

Very recently, upon a request of the EEB expressed on the occasion of the European Year of the Environment, the ozone issue was included in the agenda of the European Environmental Council.

In conclusion, the ozone question offers perhaps a unique example of an emerging problem that received an anticipatory response from the international community.

Water Pollution and Supply

The basic type of water pollution, common throughout the planet, is that caused by discharges of untreated or poorly treated waste water into lakes, rivers and enclosed or semi-enclosed coastal systems.

Although in the industrialized world, waste water treatment plants have been installed at considerable costs, which in a general improvement and restoration of the quality of waters delivered to certain recipients, the trends are just the opposite in the developing world. In addition to that, industrial waste water discharges increase in volume and complexity, as loads of inorganic and organic toxic substances grow; as the number and size of industrial accidents also arguments, new pollution problems arise.

The non-point pollution of rivers, lakes and ground waters caused by the runoff and washout of fertilizers and pesticides from agricultural lands, is also a serious problem. Eutrophication is one of the most common phenomenon included in this form of pollution.

Many lakes of Europe (e.g. Lake Geneva, between France and Switzerland; Lake Balaton in Hungary; etc.), Canada and elsewhere, as well as artificial water reservoirs (see Morocco, Latin America, etc.) suffer from eutrophication.

International action and cooperation, particularly in the field of monitoring, have had some promising results, even though only for a relatively small proportion of the world's rivers. Forty-two rivers monitored in the OECD countries since 1970, have shown decreasing concentrations of ammonium, heavy metals and organic load (deduced from biological oxygen demand - BOD values) and higher amounts of dissolved oxygen.

Even in the badly polluted Rhine River, lead and cadmium concentrations have shown an impressive decrease, partly because of international concern, public pressure, as well as measures taken by all countries it traverses.

In many other cases however, increasing freshwater pollution has been reported all over the world. In Europe and North America there has been a marked increase in phosphate, nitrate, ammonium

and heavy metal concentrations in inland and ground waters. In the Soviet Union, river pollution parallels industrial expansion. Industrial waste waters partly untreated comprise a relatively significant percentage of the flow of the Volga River at Volgograd.

As regards other regions, in China, 54 of the 78 monitored rivers in the People's Republic are reported to be seriously polluted with untreated sewage and industrial wastes. The Huangpujian River, which supplies Shanghai with drinking water, whereas 41 out of 44 of the country's large cities were reported as suffering from polluted ground water.

India suffers even more: 70% of its total surface waters are polluted. Lack of proper sewage systems and treatment facilities result in severely contaminated waters. A stretch of 48 kms of the Yamuna River, which flows through Delhi, contains 7.500 coliforms per 100 ml of water already before entering the capital. However, after receiving daily an estimated two million tons of untreated sewage, it leaves New Delhi carrying the incredible amount of 24 million coliforms per 100 ml. Industry discharges every day in the same stretch, 200.000 tons of waste effluents, including half a million liters of "DDT wastes".

Forty major Malaysian rivers are reported to be so polluted with oil, palm and rubber processing residues, with other industrial effluents and sewage, that they are nearly devoid of fish and aquatic mammals.

Water pollution problems are often viewed as local or national in nature, which is no correct.

Already in the mid-1970s, approximately 40% of the world population was living in international river basins dependent on imported water. The quantity and quality of most of this water is controlled through activities carried out in the upstream countries. In Africa, for example, most of the river systems spill across national boundaries, making the continent particularly sensitive to problems of shared water resources. European rivers, on the other hand, and particularly the rivers Rhine and Rhone, offer classic examples of conflicting water quality management of various countries. In India, the Ganges River gives another example of an upstream country diverting significant quantities of river water for its own use (flushing out Calcutta harbor) and subsequently reducing the river flow for the downstream country, Bangladesh. The list of examples can be very long.

International Action on the Water Supply and Pollution Issue

From the global study of this issue, it becomes apparent that what was described at the 1984 International Seminar on "River Basin Strategy" (sponsored by the International Water Resources Association - IWRA) as "water illiteracy" prevalent among many planners, needs to be overcome, if new strategies are to be implemented in order to deal with freshwater pollution, as well as the urgent need for adequate supplies of potable water and water for industrial and agricultural use.

The issue of international river basins was given considerable attention by Unesco, through the International Hydrological Programme (IHP), and during the United Nations Water Conference in Mar del Plata, Argentina, in 1977.

Many downstream countries collectively demanded an "international code of conduct" that would attempt to set regulation guidelines for upstream countries, and a "modus vivendi" on how upstream and downstream nations could use their shared resource. Indeed, an "International Code of Conduct" would encourage countries to cooperate on specific water use and water quality management, whereas there is a need to strengthen the force of International Law as an instrument to induce states into cooperative actions to protect and wisely manage common water resources.

After the U.N. Water Conference and encouragement by MAB and other international bodies, several countries formulated and/or implemented long-range policies on water economy or established networks of river basin Authorities, to regulate water resources. Similarly, water law was given attention, both in developed and developing countries, as a result of which, within the last 15 years, major new water pollution control statutes were enacted in at least ten countries (Fed. Rep. of Germany, Greece, Ireland, Italy, the Netherlands, New Zealand, Spain, the Soviet Union, the United Kingdom, the United Kingdom and the United States of America).

In the field of research and education, the international community enlarged its capabilities. Three major Centres were established: the Institute of Water Economics, Legislation and Administration, in Latin America; the Water Research Centre, in the United Kingdom, and the International Training Centre for Water Resources Management, in France.

A major international undertaking was the launching in 1980 by the United Nations, of the International Drinking Water and Sanitation Decade (1981-1990), aiming to create a global awareness on the importance of good potable water in the fight against disease. The far too ambitious goal of the project, to bring freshwater and proper sanitation to all by the year 1990, would necessitate the provision of water supplies for 500.000 people every day during the entire decade 1980-1990, which has proven unrealistic.

Moreover, despite an adequate, in certain cases, calories supply, malnutrition is often caused by infections due to unclear waters. The solution of this problem is still an urgent need, for the improvement of public health conditions.

Environmental education including information on sanitation, nutrition and health can greatly contribute in facing these problems.

International Cooperation on Environment and Development

Many international organizations and specific programmes (among which UNEP and Unesco/MAB) have been established, and a large number (of the order of several hundreds) of international meetings dealing with environmental issues, have been organized at

various fora, levels, places and topics, during the last 20 years, and particularly during the last decade. A considerable number of research projects with international cooperation, coordination and/or support, have also been launched, with reasonable results in most cases. Close links and contacts have already been established among scientists dealing with specific environmental issues, i.e. acid rain, marine pollution of the Mediterranean (see UNEP/MAP project), etc.

Only recently, however, the majority of political leaders and the wide public have started to understand that the great combined "environmental and development" question of our time, mankind's survival question as it is, can only be dealt with through international cooperation.

In 1985, Julius Nyerere of Tanzania, speaking for many Third World countries, particularly of Africa, said: "Until the last few years, Africa regarded environmental concern as an American and European matter. Indeed there was a tendency to believe that to talk of the environment was part of a conspiracy to prevent modern development of our continent. We have now reached the stage of recognizing that environmental concern and development have to be linked together if the latter is to be real and permanent".

The developed countries also move collectively and steadily, although slowly, towards "preventive" rather than "curing" policies.

The point concerning environmental issues, cited in the Final Communiqué of the 1985 Bonn Economic Summit, attended by Canada, the Federal Republic of Germany, France, Italy, Japan, the United Kingdom and the United States of America, is characteristic and undoubtedly indicates a positive international spirit:

"New approaches to strengthening international cooperation are essential to anticipate and prevent damage to the environment, which knows no national frontiers. We shall cooperate in order to solve pressing environmental problems, such as acid deposition and air pollution from motor vehicles and all other significant sources. We shall also address other concerns, such as climatic change, the protection of the ozone layer and the management of toxic chemicals and hazardous wastes. The protection of soils, fresh water and the sea, in particular of regional seas, must be strengthened."

The fact that environmental problems bring together nations and governments perhaps more than any other international issue, is also indicated by the great number of international treaties and multilateral agreements (more than 250) concerning the protection of the environment. Most of them are relatively recent (post 1950). Appendix I shows a selection of the most important recent conventions, the dates of signature and of entry into force upon ratification, drawn up by the OECD, as it appears in the publication, World Resources 1986.

Legislation alone, however, is not the answer. Proper implementation and enforcement require action.

Recent (post 1980) Initiatives

A number of international initiatives were set out during the last years in order to speed up environmental protection and translate the international messages and conventions into national policies and legislation. Six of them stand out for the impact they have had on policy formulation:

1. The World Conservation Strategy, 1980: A large number of traditional wildlife conservation organizations made their first contact with the broader environmental agenda through the drafting of the World Conservation Strategy (WCS), which had an important impact on the strengthening of the new approach toward sustainable development, a development having conservation as an integral element.

UNEP, with the support of the World Wildlife Fund for Nature (WWF), commissioned the International Union for Conservation of Nature and Natural Resources (IUCN) to prepare the Strategy.

The WCS explains the contribution of living resource conservation to human survival and to sustainable development; it identifies priority conservation issues and the requirements for dealing with them, proposing at the same time effective ways of achieving the Strategy's goals.

2. The World Commission on Environment and Development, 1983: The World Commission, established by the United Nations in December 1983, has been organized outside the UN System, but will present its report, "Common Future", to the General Assembly in 1987.

Fourteen of the Commission's twenty two members come from developing countries. This initiative was not welcome by all governments. Some feared confusion or pressures that might be generated from new proposals and initiatives put forward outside the formal structures.

The Commission intends to re-examine the critical environmental and development issues and formulate innovative, concrete and realistic action proposals to deal with them; it will also propose new forms of international cooperation on environment and development that can break out of existing patterns and influence policies and events in the direction of needed change, and raise the level of understanding and commitment to action on the part of individuals, voluntary organizations, business, institutions and governments.

3. The Inter-Parliamentary Union Meeting, 1984: In the Inter-Parliamentary Union (IPU) Conference on the Environment, participated 98 legislators from 44 national parliaments, who encouraged the creation of greater environmental awareness within their own governments. Major problems such as desertification and transboundary air pollution united many of the delegates, and even normally divisive issues, produced some strong recommendations. The IPU distributed its 93 Recommendations to all participating parliamentary groups.

4. "The Global Possible" Conference, 1984: In May 1984, the World Resources Institutes (WRI) convened a meeting of 75 government, science, industry, environment, and development leaders from 20 countries, to identify problems of global significance and to propose strategies for their solution.

The Conference's summary statement was cautiously optimistic: "At a time when bleak predictions are all too familiar, the Global Possible Conference was convened to re-examine the relationship between Earth's resources and the human future. The Conference accepted that these predictions could be accurate. But its central and emphatic message is that they need not be -- that it is possible to build a world that is more secure, more prosperous and more sustainable both economically and environmentally."

5. The World Industry Conference on Environmental Management, 1984: In 1984, UNEP and the International Chamber of Commerce (ICC) organized the first World Industry Conference on Environmental Management, attended by more than 500 participants from 71 countries.

The meeting produced 15 recommendations grounded in principles of sustainable economic development combined with environmental management, planning cycles, cost benefit analysis, anticipatory policies, and other measures which, if taken seriously into account by industry, could dramatically improve the present situation.

6. The Global Meeting on Environment and Development for NGOs, 1985: In February 1985, the Environment Liaison Centre (ELC), with support from UNEP, convened the Global Meeting on Environment and Development for Non-Governmental Organizations (NGOs), in Nairobi.

Reflecting the growing confidence and strength of the NGO community worldwide, the meeting brought together leaders of more than 100 citizens groups, voluntary organizations, and other private groups from 48 countries, to discuss common issues on environment and development. Needed actions were identified in more than a dozen different fields, including agriculture, forestry, water and energy, development, assistance, appropriate technologies, international debt, impact of militarization, etc.

The meeting also highlighted the need for effective lobbying of governments and international agencies through the media, membership efforts, and leadership education, as well as for strengthening grass-root capabilities to understand international issues through broad environmental education and information, monitor the environmental situation and manage community projects at local level.

Conclusion

It is thus apparent that environmental policy becomes more sophisticated at national and international levels, and that it is being more widely and somewhat more wisely practiced than ever before. At least on paper, nearly all governments and international development and funding institutions recognize the relation between

protection of the environment, conservation of natural resources and development, and have taken legal and administrative measures towards this end.

Environmental NGOs and the public in general support such policies even though, in most cases, these policies are incomplete and poorly implemented, and the public is still at large very poorly informed, particularly on global environmental issues.

Throughout the world, environmental management is often weak or non-existent because of lack of several factors, such as adequate financial resources, properly trained staff, technical capabilities, reliable data and reasonable infrastructure. Though domestic environmental problems still prevail in the priorities of most governments, the environmental policy agenda is becoming increasingly crowded with issues that must be addressed collectively on a regional or even global basis.

Although world institutions do not always adequately respond to the environmental needs put before them, and the record of accomplishment of traditional international agreements is still rather weak, in certain recent issues such as that of acid depositions and ozone layer depletion, governments are taking some promising first steps to address the problems.

The experience of the past decade has shown that environmental problems can be, and in some cases are, solved, whenever sound international cooperation is obtained. This cooperation can be made to work only if it is genuine and extends between rich and poor countries.

The physico-chemical, biological and socio-economic linkages of the globe are so close and all-embracing, that the international dimension must be taken seriously into account when addressing environmental problems. Decisions on policies to solve them are being increasingly taken at the international level. This of course, does not imply that problems can be solved only in international meetings and through conventions alone.

To act with responsibility and efficiency means that environmental issues have to be treated nationally, with care and in depth. There is a need for sound supportive structures of national policy, national legislation and efficient administration, national research, training and information, together with globally oriented environmental education at all levels.

II. PEACE AND ENVIRONMENTAL PROTECTION

War, the Worst Form of Pollution

The ultimate aim of peace should unquestionably be the improvement of the quality of life for mankind and the securing of a sustainable and balanced development (economic, technical, cultural and social).

The notions of "quality of life" and "sustainable development" are the corner-stones of modern perception for the protection of the environment, which includes not only the natural environment and wildlife, but also natural resources, the cultural heritage,

monuments and even the urban settlements and the social values, as well as the whole cluster of the complex, dynamic processes through which man is connected to them.

Hence, it becomes clear that peace constitutes the prerequisite to any attempt for an effective environmental policy, whereas the opposite of peace, war, should be identified, in all its shapes, as the worst form of pollution. It destroys man himself and kills directly or indirectly more people than any other pollutant does. It destroys nature and ecosystems, disturbs vital natural processes, damages cities, settlements and monuments, works of art and the products of accumulative experience of centuries, while it dismantles social structures and ethical values, as well as the continuity and balance at all levels.

Even after war, it is common that pressing needs and problems which were generated throughout its duration, require urgent solutions, inevitably poorly planned and inadequately applied, which very often complete or sometimes even start an ecological disaster. Intensive housing and poorly designed industrial or even agricultural structures, are known examples.

We should stress the fact that the most dangerous forms of war, that is nuclear, chemical and biological, are clearly meant to be environmental disasters.

Possible Large-Scale Effects of War on the Climate - The Nuclear Winter

In the 1970s, various assessments of long-term global effects of nuclear war were studied. During the first half of this decade, nuclear war was for the first time identified as the most important potential human influence on climate.

In 1980, scientists gave shape to a theory according to which the massive extinction of species that occurred 65 million years ago, could be attributed to the blocking out of the sun's light by a dust cloud projected into the atmosphere by the force of an asteroid striking the surface of the Earth.

A sizable exchange of nuclear warheads can have a similar effect, with profound changes in weather, known as "nuclear winter". The nuclear winter hypothesis has been examined and considerably refined, since it was first advanced. Various reservations were voiced, based either on the complexity and uncertainties of atmospheric physics or because the theory was so much at variance with conventional thinking, and had profound implications for prevailing nuclear strategic policies. Within the past four years, and particularly after the publication in September 1985 of the SCOPE (Scientific Committee on Problems of the Environment), thorough assessment of the climatic and associated biological effects of nuclear war, based on a two-year study conducted by more than 300 scientists from 30 countries, the nuclear winter concept was widely accepted by the international scientific community, despite certain critics.

According to the SCOPE scenario, 6000 megatons of nuclear explosives would be detonated injecting 50-100 million metric tons of smoke into the atmosphere, 30 million of which would be light absorbing carbon. Much of the dust and soot would be driven into

the stratosphere, where it would stabilize. Trapped above altitudes where precipitation occurs, this smoke would remain for many months, resulting in a reduction of sunlight reaching the ground of even 90%.

The most interesting finding of the SCOPE report is that world population would be facing starvation in the aftermath of a nuclear war, due to disruption of agricultural productivity, food trade and aid. In Africa, 100-450 million people could run out of food within the first ten days of a war in which no nuclear weapons struck the continent itself. The study concluded that starvation and other indirect effects of a nuclear war on the environment could have a greater impact on all, combatant and non-combatant countries, than the direct effects of blast, heat and radiation.

Environmental and Peace Movements

Both peace and environmental protection cannot prevail as a result of the intellectual or even political will of only a few politicians, although none can question the important role of individual personalities in the guidance of larger groups or in the enforcement and implementation of principles and ideas.

Environmental and peace movements are not at all identical and have certain basic differences in structure, participation, connections with political parties and policies. They are however comparable and parallel. I believe that, in most cases, they can help each other, bearing in mind that they both keep their identity and independence, so as to be more effective in tackling specific issues.

For both movements, war is the source of evil. Even the armaments and the preparations for war, such as the nuclear testings, etc., are a major reason for concern, since:

- a. They absorb colossal amounts of funds (of the order of one million dollars per minute), which should be invested for environmental protection including urgent measures against famine and poverty, and in general for the improvement of the quality of life.
- b. They occupy the mind of politicians and wide numbers of people (among which many youngs), and divert their dynamism to activities resulting in destruction, rather than creation and protection of existing goods.
- c. They occupy a growing number of top scientists, needed in other fields.
- d. They directly pollute the environment, with considerable amounts of various noxious substances and they cause a tremendous waste of energy and resources. It is known that during the first few years of atmospheric nuclear testings, more than $2.3 \cdot 10^{23}$ artificial radionuclides were discharged in the environment.

The effect of underground and underwater testings to seismic phenomena have not been fully assessed yet, but there is strong evidence that they cause severe problems.

Combining Peace Messages with Environmental Education

In order to protect and safeguard something, you should first appreciate its value. This is a fundamental principle which also applies to the present case. To protect our planet from a nuclear or other holocaust, we should make people aware of the beauty of our earth and the wisdom of the natural processes.

Therefore, in order to persuade vast masses of people about the fundamental value of peace for the survival of mankind and civilization on Earth, it is necessary to introduce peace messages in the curricula of all levels of education, not alone in the higher one. The most appropriate field for the incorporation of these messages among the topics already offered in most countries are, in my view, the Environmental Sciences.

Perhaps nowhere else can nuclear threat be better explained than in a lecture about global pollution and our "spacecraft Earth" or, in a more advanced level, when discussing artificial radionuclides and their effects. The reason why Environmental Sciences as well as Human Sciences, can be used as the most suitable backgrounds for the development of the spirit of international cooperation and peace, is that they both are multi-disciplinary by nature. For the teaching of environmental protection, the scientific, legislative, economic, historical and social dimensions should be all taken into account.

Making Environmental Problems Deriving from Armaments Known to the Public

In order to gain further public support, it is necessary to educate the wide public, decision makers and future military officers, about the environmental problems deriving from armaments, testing and storage of nuclear, chemical, biological and even conventional weapons (I wish to stress this latter, which seems to be the everyday nightmare of many people).

This requires a joint effort between environmental and peace organizations, educational institutes and individual scientists.

III. RISKS FOR STABILITY AND PEACE RESULTING FROM ENVIRONMENTAL PROBLEMS AND DIFFICULTIES IN MANAGEMENT OF RESOURCES AND LARGE SCALE ACCIDENTS

The overgrowth of world population, coupled with rapidly changing traditional ways of life in developing countries, presents an extremely complex problem, that cannot be solved by the current national policies which, even if suitable, are rarely adequately implemented. In many regions natural resources - forests, soils, fisheries, terrestrial species - are already showing the signs of heavy human pressure. The growing world population, which by the year 2100 will likely more than double, poses huge challenges to sustainable management of the environment and natural resources.

Quite frequently, these resources are locally either over-exploited to the point of collapse, or polluted and badly damaged. While the relationship between population growth and use of resources is extremely complex, several of the implications for governments are straightforward.

Increase of population means greater needs for food, public infrastructure, and basic services - housing, health care, education, transport. It also means needs for new jobs and investments. Africa, the continent having a population growth rate of 3.01% per year (compared to about 1.67% for the world as a whole) is adding people ten times as fast as Europe and more than three times as fast as the Soviet Union or the United States. In other words, one million more mouths open every three weeks on a continent in which more than 80% of the soils have fertility limitations and 47% of the land is too dry for rain-fed agriculture.

Though Africa's environmental and resources problems should not prove insurmountable, the situation is not very promising. The continent's water supply and agricultural problems are closely linked to fuelwood crisis as well. Many African countries depend on fuelwood for more than 90% of their energy. In rural areas, fuelwood shortage means further destruction of forests, more erosion, desertification, less forage for livestock and growing misery, whereas in the rapidly developing cities, a "ring of desolation" expands around them, as fuelwood and charcoal made from it, are trucked in to supply urban residents.

Half of the world's population depends on energy from biomass (principally fuelwood) for their daily needs. About 60% of this population, 1.5 billion people approximately, cut wood, destroying forests faster than what they can grow back. The deficit is expected to double by the year 2000. As always, the most affected are the poor, particularly the inhabitants of rural areas. As supplies of dead wood dwindle, whole branches and entire trees are chopped down; the amount of time spent collecting fuelwood or dry grass rises to as high as 300 workdays per year.

Although economizing on the amount of wood eases the shortage, there is always a minimum limit (about 500 kg per person per year) which nearly 100 million people in Africa cannot meet today. It should be remembered that fuelwood does not only supply energy for cooking food and heating water, but serves also as source of lighting, space heating, insect repellent, defense against wild animals and perhaps above all, as focal point for family life.

Accommodating the needs of a rapidly growing population demands an equally rapid and sound national economic growth, which cannot be achieved unless it is grounded on excellent management of resources. This exercise becomes extremely difficult when it is carried out under the tremendous pressure of hard figures.

By the year 2025, the estimated working-age population of the developing countries will be larger than the total present world's population. Creating jobs for five billion people in an often unfriendly or damaged environment will be all the harder in a world where the always-expanding sophisticated modern technology requires more literacy and education and displaces labour.

Migration cannot solve the problem any more. Although up to the early 1970s, labour migration to Western Europe resulted in more than 30 million foreign workers moving in one decade, the economic recession that followed the oil crisis of 1973-74 disrupted migration patterns. One consequence of the strict policies adopted by most countries as regards the admission of migrant workers, is illegal migration. The social problems connected with it are easily understood.

In Africa, environmental and other pressures resulted in large flows of refugees who have constituted a major form of migration. Only few African governments have accepted permanent migrants on a large scale, though some Arab countries allow substantial numbers of foreign workers.

Rapid urbanisation and increasing densities of population in urban centres, particularly in the Third World, have strained the capacity of most governments to provide the necessary infrastructure and basic services required. Illegal settlements without adequate water supply and sanitation, heavy water and air pollution, unemployment or underemployment, creating large pockets of urban poverty, are some of the most pressing problems of our days, which give rise to social tensions, crime and loss of cultural identity, moral and human values.

The degradation of the environment affects society and relations within it in a negative way. Put otherwise: pollution, unorderly construction, noises, radiation and other forms of energy, influence the physical world of individuals, altering thus the body's resistance to all types of pressures and augmenting stress as a result.

Even though this influence does not differentiate social classes, it is to be particularly encountered in highly industrialized countries. The increase of anti-social behaviour, as well as the tendency towards violence and vandalism in young people growing up in cement-cities, cut off both from nature and natural processes, has already been proved.

Such social incidences including pollution and neurosis, mounting drug-addiction and suicide figures, surpass 5000 cases yearly in the USA alone.

The points stated above do not contribute in any way to the stability of international welfare and social peace.

Quite different in character, but with similar implications as far as destruction of natural resources and human suffering are concerned, are the major accidents in chemical or nuclear plants. To a somewhat lesser extent, one should also consider accidental water pollution either in rivers or the sea, caused by chemicals and crude oil spillages.

The most serious accident of this kind, which occurred in the nuclear power plant of Chernobyl in the spring of 1986, left its mark in Europe, from Ukraine to the North Sea. Though far from being the only one, it happened at a time of doubt and controversy about the relation between energy and mankind and it seems likely that it will play a catalytic role in determining the energy policies and priorities of the future.

The immediate reaction of public opinion and politicians is probably indicative of a re-orientation of options towards the question of energy, although it is difficult to see exactly the direction to be followed.

Nuclear accidents, of which more than a score seem to have occurred since 1952, have always been a grey area even for experts; expediencies of various kinds have always imposed impenetrable veils of secrecy. What does seem certain is that the rate at which they happen is constantly increasing. Although incidents, the worst of which until last year were that in Britain in 1957 and the two in the USA (Idaho Falls in 1961 and Three Mile Island in 1979), may differ from a technical point of view, an unforeseeable error has always been the common denominator. Effects have been identical, too. Radiation, whose consequences are immediate and just as certain in the long run: deaths, cancer (particularly, various types of leucemia), mutations, damages to crops, widespread pollution, disruption of most productive activities, moving and/or migration of large numbers of inhabitants under time and other pressures. All these create of course, major social problems and tensions, increasing human suffering, at the same time.

Human suffering, depletion or destruction of natural resources, socio-economic and political instability are closely linked together and do not at all contribute to harmonious international cooperation and maintenance of international order and peace.

It has become clear that "environmental problems" with the broadest meaning of the word, can be identified at the root of many confrontations and wars today.

IV. ENVIRONMENTAL EDUCATION: A TOOL FOR INTERNATIONAL UNDERSTANDING

Existing Background

Article 6, para. 2 of the Universal Declaration of Human Rights states among other principles that education shall be directed to the full development of the human personality in order to: "... promote understanding, tolerance and friendship among all nations, racial or religious groups, etc.". In accordance with the above-mentioned aims, the 1974 Paris Recommendation proposed the following major guidelines for educational policy:

- a. An international dimension and a global perspective in education at all levels and under all its forms.
- b. Understanding and respect for all peoples, their cultures, civilizations, values and ways of life, including domestic ethnic cultures and cultures of other nations.
- c. Awareness of the increasing global interdependence between peoples and nations.
- d. Ability to communicate with others.

- e. Awareness not only of the rights but also of the duties incumbent to individuals, social groups and nations, towards each other.
- f. Understanding of the necessity for international solidarity and cooperation.
- g. Readiness on the part of the individual to participate in solving the problems of his community, his country and the world at large.

Environmental education ideally fulfills all these principles. The role of environmental education together with environmental information, directly connected and derived from it, at local, national and international levels, is fundamental for the development of international understanding.

In many cases, international cooperation in the field of environmental education has been viewed either as "horizontal" cooperation between governments of countries having similar socio-economic development and confronted by similar environmental problems, or as "vertical" cooperation between countries having different levels of development, or finally between countries and institutions of the UN System and other international organizations. All these extremely useful forms of cooperation are recommended in order to strengthen, expand and improve environmental education itself.

In the present report, environmental education is viewed mainly as the source of inspiration and tool for international understanding.

Already in the "Recommendation concerning education for international understanding, cooperation and peace" (Unesco, General Conference, Paris, 1974, article 18, e and f) the use, management and conservation of natural resources, environmental pollution and preservation of the cultural heritage of mankind, were identified among others as problems to which interdisciplinary education promoting international understanding should be related.

Through environmental education, the awareness of both individuals and the community is drawn not only to the interactions among bio- and physico-chemical environmental components, but also to socio-cultural ones, enabling thus individual and collective action, so as to solve local and international, present and future environmental problems. This dimension of environmental education is further deduced from a series of important Declarations, Resolutions and other documents.

In the Declaration of the Tbilisi Intergovernmental Conference on Environmental Education (1977), it is clearly stated that: "Environmental education, properly understood, should constitute a comprehensive life-long education, one responsive to alterations in a rapidly changing world ... It helps reveal the enduring continuity which links the acts of today to the consequences of tomorrow. It demonstrates the interdependence among national communities and the need for solidarity among all mankind."

In his opening address at the Tbilisi Conference, the Director General of Unesco, Mr. A.M. M'Bow, stressed that: "If the unity of purpose of all peoples and of all governments is necessary in order to forestall and solve environmental problems, it can be said that environmental education provides, as regards cooperation between countries and groups of countries in the same region, a field of action where it is indispensable and which is ideally suited to it."

In Tbilisi Recommendation No. 2 it is recognized that "... Environmental education should promote the strengthening of peace, the further relaxation of international tensions and development of mutual understanding among states ..." and that environmental education "... should be a real instrument for international solidarity and for elimination of all forms of radical, political and economic discrimination."

In Recommendation No. 3, environment is considered as a major component of the broader conception of development and, accordingly, it is recognized that environmental questions would be better approached and dealt with in relation to overall policies applied by governments, as regards both national development and international relations, in an attempt to establish a new international order.

In Recommendation No. 23, the global impacts of the present, past and future evolution of "all nations of our planet" are considered, together with "the lessons to be drawn therefrom for preserving a sound and healthy environment for all, now, and for the generations to come", and it is further emphasized that: "... Only cooperation, understanding and mutual help, good will and systematically prepared, planned and implemented actions, are able to solve present and future environmental problems in the conditions of peace." In the same Recommendation it is stated that environmental education gives people throughout the world not only "... the necessary knowledge to use nature and natural resources to control the quality of the environment, so that it is not impaired", but also "... knowledge, attitudes, motivation, commitment and skills to work individually and collectively towards a solution of current problems and prevention of new ones, since at present humanity has the means, as well as the skills to do so."

In the publication of Unesco "Environmental Education in the Light of the Tbilisi Conference" (1980), under the objectives of international cooperation, one can read: "In the context of a new international economic order, cooperation that claims to be directed towards the strengthening of endogenous development, cultural identity and national autonomy, should work towards increasing the mobilisation of the human technical and financial resources required to develop environmental education at the national, regional and international levels."

Further Analysis of the Relationship Between Environmental Education and International Understanding

Environmental education includes ecological principles and messages, which, because of their very nature can be found at the basis of international cooperation and co-existence.

If a direct parallelism between nature and society is to be avoided, being unsafe as all over-simplifications, experience has shown that comprehension of natural laws helps to better and respond to social rules and international regulations.

Awareness of the ground fact that any individual or community depends for its life, its very existence, on the dynamic relations with its living or inert environment, is an environmental information of fundamental importance, which contributes to international understanding. This principle is reinforced by the fact that no system is absolutely self-sufficient or complete, and while it can contain smaller harmoniously functioning sub-systems (e.g. biotopes), it still constitutes part of a larger system. This system, which cannot be separated through conventional boundaries, follows laws and obeys to mechanisms that cannot either be included in pre-determined structures or totally controlled, without upsetting them. Only through the harmonious cooperation of sub-systems and individual units can the continuity and balance of the overall structure be ensured. On the other hand, external pressures and violations of the rules governing the ecosystems are not rare, but as long as damages incurred are kept between certain tolerable limits, the same can be either suppressed or satisfactorily restored. On the contrary, when this breaking point is surpassed, damages are usually irreparable.

Within the scope of ecological and environmental knowledge it is being taught that limits of ecosystems or regions, subject to the same environmental conditions, have no relation with national or administrative boundaries.

It can be immediately concluded that an ecosystem or a broader area with the same environmental conditions, that is shared by two or more countries, cannot be protected unless all parties concerned have confluent conceptions and are willing to cooperate. This cooperation for a peaceful purpose of vital importance, presenting a minimum of reasons for antagonism, can either directly or indirectly lead to the development of less-advanced parties in the fields of knowledge, research and administration, and probably in many other fields, thus multiplying the chances and the possibilities of development of international cooperation and understanding.

Environmental Education is in Itself Conducive to Development

The dilemma between development and environmental protection can be a false one. It has been repeatedly proved so by the evolution of events, both in the domain of environmental protection, as in that of development. On the one hand, environmental protection results in the rational management and use of valuable natural resources, indispensable for short- and long-term development; on the other hand, through environmental care, the possibilities of new investments are being increased, new jobs can be treated, while leading, among others, to a more correct utilization of sub- and by-products, to the improvement of productive processes and to the abatement of losses of raw materials, energy and space.

Moreover, environmental protection prevents ecological catastrophes with incalculable economic consequences on people, agricultural production, material, natural and cultural property,

the replacement or restoration of which, even when possible, can have staggering costs.

Furthermore, we know today that without development, poverty, misery and hunger will expand, and that no form of contamination is worse than that of children starving to death, a form of pollution no one can ignore today, when praising the achievements of our times.

This knowledge, on which environmental education is founded, should be complemented by awareness of the fact that misery usually goes together with unsuccessful attempts at economic development, which are one-sided and hostile to the environment (e.g. the case of destruction of tropical forests and desertification), and have not taken the particular natural and social conditions of the region seriously into account.

Elucidation of errors of a specific form of one-sided development should not be mistaken with the refusal of attempts for development, but should aim at correcting and complementing these attempts through the institution of critical and open to the public Environmental Impact Assessment.

The wide-range implementation and assessment of this possibility, already adopted by many national governments, presupposes the development of adequate knowledge and of a sense of responsibility among citizens, so that they can actively participate, expressing opinions in the decision-making process, at the local level at least.

Another dimension of environmental education is that related to development, based on the fact that environmental education teaches on the limits of many natural resources and sources of energy, directly impelling to the search for renewable sources of energy, rational utilization of unexploited sources, such as the oceans of our planet, and reduction of all sorts of losses of mass and energy, encouraging recycling, development of exploitation systems of small amounts of energy, insulation, biotechnology and security systems, as well as timely diagnosis of damages and losses, in all types of production processes.

The development of the above-mentioned processes and the evolution of technology and science, presuppose international cooperation, under conditions of peace and mutual understanding and friendship.

Environmental education, development and international understanding and peace can be also linked through information about the mechanisms and historical processes of development. The evolution of mankind, economic, moral and social, is not and has never been homogeneous in all human races and geographical latitudes, nor temporally linear.

It could be described as the attempt of a long, slow-moving worm up the sides of a spire, an exercise not always easy and successful, where portions of its body advance or retreat, mount or descend, either absolute or relative terms.

Acme and brilliant periods of flourishing and maturity are followed by decadence and oblivion, which will again be followed by a bigger or smaller renaissance, in a never-ending circle, that strongly reminds of many ecological and seasonal cycles.

Awareness of this fatal temporality of development, with "leaders" or rich peoples, groups or individuals, following and being followed by others, help dismiss fanaticism and excessive tensions that divide and poison the relations of peoples and societies.

Our approach can be much more positive if we are conscient of the fact that our by far more numerous descendants, through "languages", advanced knowledge and forms of development probably unknown to us, with new "writing", communication and information patterns, will be called to live upon this same planet, with the same non-renewable sources that had our less numerous ancestors.

The complexity of balancing interests, as well as relations between needs and values, will become even greater and more intense, in such a way that no group, society or people will be able to prosper and develop unless its neighbours prosper and develop at the same time.

Points to be Treated with Particular Attention by Educators

The exercise and practice of environmental education in the last years, together with a more extensive search of the ideological background for the protection of the environment, lead to certain evaluations and opinions that are expressed both tentatively but without fear by the author, these being points that educators should handle with great care and sensitivity, so that environmental education might actually lead to strengthening of international understanding and peace.

1. Environmental education has a great potential of influence, since its ultimate finality is to pose the following questions:

Which are the causes of environmental degradation? Who is responsible for it? What solutions to the problem, if any, are there? How much do these solutions depend on us and how much on others? Who are these others? If solutions do actually exist, why are they not being implemented?

2. Answers to these questions should be guided by awareness that environmental education, in spite of its vital importance, cannot solve by itself all international problems. Any effort to turn it into a "super-ideology" can put it in jeopardy by: a) altering its aims; b) hindering or preventing its dissemination; c) making its mission fail.
3. Answers should also avoid identifying causes or solutions with a concrete political and economic system or ideology. The fact is that no existing political and economic system prevented or eradicated pollution, even if motives or reasons for encouragement or constraint of concrete polluting activities may vary as the case may be.

4. Answers must also avoid terminant philosophical positions, as these may be completely unrealistic or lead either to rejection of economic and social development, or to deification of technology and non-polluting industry, without the simultaneous reorientation and adoption of models of rational management of natural resources and the environment.
5. Just as in all other forms of education, elements of personal experience are particularly valuable, and reference to the existing cultural background is usually absolutely necessary for the acquisition of knowledge. In this context, mention of religious principles or other, dogmas or beliefs can be used, provided that no form of fanaticism is thus indirectly fomented.
6. Absolute identification of environmental messages or environmental education with teachings of older cultures or religions should be carefully avoided, the same as completely differentiating them from others. It has otherwise been proved that even though almost all philosophical, religious or legislative texts of the past may, more or less, include environmental messages, the meaning of environmental problems, with the complexity and dimensions that we know and conceive them in the modern world, were unknown in the past, and environmental education, with its present substance and internationality, non-existent.
7. Environmental education should avoid exaggerations. It must not either diminish or augment the importance of problems, and most of all, it should not lead either to despair, to a fatalistic way of facing problems, or to anti-social behaviour.
8. Environmental education must lead to direct modelling of a positive behaviour of the individual, face to society as a whole. It should avoid creating a tendency of escapism from a society of "destruction", as well as creating separate cultural, social or economic groups, detached from the rest of society. Such groups become inevitably marginal, increasing social divisions and minimizing the more extensive meaning of environmental thought and ecological approach, at the same time.
9. Environmental education should not promise a world where environmental problems will be wiped out completely, should environmental principles prevail. Such a conception would probably discourage those people believing in the permanent solution of environmental problems, very quickly.

Environmental education undoubtedly helps either to prevent or solve many problems but its main goal is to prepare both individuals and societies to make personal and collective choices for the solution of their problems in a way most friendly to the environment.

10. Since environmental education is from its nature, multidimensional and touches on many activities and aspects of life, it could be very easily overwhelmed with messages or information unnecessary or often purely utilitarian.

This situation should be avoided, since the expansion of its scope renders environmental education less effective and dulls its means of acting as a catalyst for international understanding.

Epilogue

Environmental problems of our days, growing in number and complexity, are linked with most other international issues.

However, pessimism about the future cannot be justified, on the condition that international cooperation strengthens.

Environmental education is fundamental in any attempt to effectively protect our globe and secure both mankind's survival and a sustainable development.

Environmental education is the education of hope and tolerance, a form of education combining vision with reality and respect of all scales of time, all forms of life and all peaceful achievements of mankind.

Environmental education reads the wisdom of nature.

Allow me to quote Bacon's phrase again: "Nature to be commanded, must be obeyed." Allow me also to add: "Nature to be obeyed, peace must be obtained."

ANNEX I

International Legal Instruments Concerning the Environment^a

No.	Purpose of Regulation	Type of Regulation ^b	Place and date	Entry into force
Sea pollution				
1.	Limitation of liability of owners of sea-going ships	Conv.	Brussels, 1957	5/31/68
2.	Prevention of marine pollution by ships and aircraft	Conv.	Oslo, 1972	4/7/74
3.	Prevention of marine pollution by dumping of wastes	Conv.	London, Mexico, 1972	8/30/75
4.	Prevention of pollution from ships (MARPOL)	Conv.	London, 1973	10/2/83
5.	Protocol to No. 4 (segregated ballast)	Prot.	London, 1978	10/2/83
6.	Marine environment of the Baltic Sea	Conv.	Helsinki, 1974	5/3/80
7.	Prevention of marine pollution from land-based sources	Conv.	Paris, 1974	5/6/78
8.	Protection of Mediterranean Sea	Conv.	Barcelona, 1976	2/12/78
9.	Protocol to No. 8 (dumping from ships and aircraft)	Prot.	Barcelona, 1976	2/12/78
10.	Protocol to No. 8 (protection against land-based sources)	Prot.	Athens, 1980	5/17/80
11.	Protocol to No. 8 (pollution by oil; cooperation in emergency cases)	Prot.	Barcelona, 1978	2/12/78
12.	Limitation of liability for maritime claims	Conv.	London, 1978	Pending
13.	Prevention of pollution of the sea by oil ^d	Conv.	London, 1954 ^e	7/26/58
14.	Pollution of the North Sea by oil ^d	Agc	Bonn, 1969	8/9/69
15.	Civil liability for oil pollution damage	Conv.	Brussels, 1969	6/19/75
16.	Intervention on the High Seas	Conv.	Brussels, 1969	5/6/75
17.	Protocol to No. 16 (substances other than oil)	Prot.	London, 1973	Pending
18.	Protocol to No. 16 (CLC)	Prot.	London, 1976	4/8/81
19.	Cooperation against pollution of the sea	Agc	Copenhagen, 1971	10/16/71
20.	International fund for compensation (oil pollution damage) ^f	Conv.	Brussels, 1971	10/16/78
21.	Civil liability for oil pollution damage-exploration of seabed mineral resources	Conv.	London, 1977	Pending
22.	Law of the Sea	Conv.	Montego Bay, New York, 1982	Pending
23.	Protection and development of the Wider Caribbean region	Conv.	Cartagena, Colombia, 1983	Pending
Nuclear				
24.	Third party liability for nuclear energy	Conv.	Paris, 1960	4/1/68

Notes:

- a. Signed or ratified by at least four OECD countries.
b. Agc = Agreement, Conv. = Convention, Prot. = Protocol.
c. Renounced by several countries in 1983 and 1984.
d. Four amendments (London).
e. One amendment (Bonn, 1983).
f. FUND protocol, 1984.
g. Two supplements (Bonn, 1976).
h. One supplement.

Source: Organization for Economic Co-operation and Development (OECD), *OECD Environmental Data Compendium 1985* (OECD, Paris 1985), pp. 275-77.

No.	Purpose of Regulation	Type of Regulation ^a	Place and date	Entry into force
25.	Protocol to No. 24	Prot.	Paris, 1964	4/1/68
26.	Supplementary to No. 24	Conv.	Brussels, 1963	12/4/74
27.	Liability of operators of nuclear ships	Conv.	Brussels, 1962	
28.	Banning nuclear weapon tests in the atmosphere, outer space, and under water	Treaty	Moscow, 1963	10/10/63
29.	Prohibition of nuclear weapons on the seabed, ocean floor and sub-soil	Treaty	London, Moscow, Washington, 1971	5/18/72
30.	Civil liability on maritime carriage of nuclear material	Conv.	Brussels, 1971	7/15/75
Fauna and flora				
31.	Preservation of fauna and flora	Conv.	London, 1933	11/8/33
32.	Establishment of the European Mediterranean Plant Prot. Org.	Conv.	Paris, 1951	4/18/51
33.	Conservation of the living resources of the SE Atlantic	Conv.	Rome, 1969	10/24/71
34.	Wetlands; waterfowl habitat	Conv.	Ramsar, Iran, 1971	2/2/71
35.	Protection of world cultural and natural heritage	Conv.	Paris, 1972	11/23/72
36.	Antarctic seals	Conv.	London, 1972	11/23/72
37.	Polar bears	Agt.	Oslo, 1973	5/26/76
38.	Fishing and conservation of the Baltic Sea	Conv.	Gdansk, 1973	7/28/74
39.	International trade in endangered species	Conv.	Washington, 1973	7/1/75
40.	European wildlife	Conv.	Berna, 1979	6/1/82
41.	Migratory species	Conv.	Bonn, 1979	Pending
42.	Antarctic marine living resources	Conv.	Canberra, 1980	4/7/82
Rhine pollution				
43.	Protection of the Rhine against pollution ^b	Agt.	Bonn, 1963	5/1/65
44.	Rhine chloride pollution ^b	Conv.	Bonn, 1976	Pending
45.	Restriction of use of detergents	Agt.	Strasbourg, 1968	2/16/71
Miscellaneous				
46.	Damage caused by space objects	Conv.	London, Moscow, Washington, 1972	8/17/72
47.	Nordic environmental protection	Conv.	Stockholm, 1974	10/5/76
48.	Prohibition of military environmental modification techniques	Conv.	New York, 1977	10/5/76
49.	Long range air pollution	Conv.	Geneva, 1979	3/16/83
50.	Transfrontier co-operation	Conv.	Madrid, 1980	12/22/81