



A sustainable planet?

Barbara Ward

The books and articles on environment and development that Barbara Ward wrote before her death in 1981 still remain among the most influential and widely read. Her publications include Spaceship Earth (1966), Only One Earth: Care and Maintenance of a Small Planet (1972, with Rene Dubos) and The Home of Man (1976). She was President of the International Institute for Environment and Development (IIED) from 1974 to 1981. This paper is drawn from the final chapters of her last book Progress for a Small Planet first published by Penguin in 1979 and re-issued by Earthscan Publications in 1988.

I. INTRODUCTION - AN EMERGING WORLD COMMUNITY?

WE CAN SURELY say in theory at least that between today and the year 2000 the planetary community has the means to achieve more stable, conserving, and satisfying ways of life. In developed societies, if waste and pollution are overcome, there are few prospects of immediate stringency nor any doubt about the nations' vast accumulation of capital and skills. In the developing world, vigorous investment in the basic needs and infrastructure of the communities can provide the food, the water, the secure farmland, and the growing labour-intensive industry which are required to bring genuine productivity to the present billion "marginal" men and women, to raise them above absolute poverty and prepare decent living standards and more stable levels of population among the next 2 billion people, who will be born largely in developing lands in the coming two decades.

Technically, all this is possible. Neither the doomsters who tend to write off science as even a possible contributor to human well-being nor the techno-fixers who believe breeder reactors and hydroponics will solve all our confusions can make more than half their case. Technology looks both ways - to weal and to woe. What determines the outcome is the human strategy that gives technology both its stimulus and its limits. And here, we must in honesty confess that our world in its present post-imperial upheavals, its wholly unprecedented growth in population, its changes and demands on life, its great switch from rural to urban living, still lacks the strategies of conservation in the broadest and yet the most critical area. The sense of equity and availability, of "compassion" and "frugality", are not yet to be found at the **planetary** level.

The fundamental reason for this rift, this virtual vacuum, lies in our history. Every society, global or local, is in part what it is because of the inner history of its own development, and as the twentieth century draws to a close, the global society built up by four centuries of colonialism, two centuries of industrialism, and a few decades of advanced communication and space technology is an extraordinary mixture of the traditional and the unprecedented. It is unprecedented to abandon the idea of the legitimacy of empire. But it is totally traditional to lapse back into accepting the absolute sovereignty and inward-looking self-interest of individual states. It is unprecedented to set up a global system of institutions, from the Security Council to the latest, humblest recruit to the United Nations family. It is traditional to leave all large decisions to the greatest powers and most smaller ones to local states. It is unprecedented to spend a whole dec-

ade within the United Nations system discussing the fundamental issues of the planet's common life - environment, population, food, the role of women, employment, settlements, water, the deserts - as though joint strategies and agreed-upon policies offered the only hope of secure survival. It is traditional to leave the global system very much unchanged in the meantime and, in practice, if not in rhetoric, to give to virtually only one aspect of global unity the attention which realism commands - that aspect being the world-wide market system largely inherited from the colonial years.

The basic reason for this predominance of world-wide economic connections and interests is of course quite simple. The nations cannot escape from them. Centuries of mutual trade underpin them. The internationalization of investment grows more intense, and with it goes a steady adaptation of new types of production in one set of countries to developing patterns of demand in others. Cumulatively, in spite of political decolonization and bitter ideological disputes, all these threads of economic interdependence - in price, in supply, in services, financing, and management - have woven the continuous fabric of a single planetary economic system. No amount of political rhetoric or wish fulfilment or simple benign neglect can conjure away a bedrock economic reality. The world's economic life has a genuinely and inescapable planetary element. Of virtually no other organized human activity is this even remotely true.

By the end of the nineteenth century, the whole globe had become to a very considerable degree an interdependent market system. It had also begun to demonstrate on a world scale some of the characteristics which all markets display, whatever the area they cover. No one denies the value of a market in providing a mechanism for exchanging all the infinitely diverse needs and desires of human customers. In fact, the benefits are such that almost invariably, if markets are tightly controlled, as under total war or total planning, black markets or *marches paralleles* grow up, nourished on private deals, overpayments, and corruption. But if normal markets are to function, three conditions at least seem to be basic. The first is that the power of buyer and seller should not be too skewed. The second is that the mass of buyers should not be too poor to enter the market and thus stimulate further production. The third - which has hit markets recently with unexpected force - is the opposite need, that purchasing power should not too far outgrow the means of satisfying it. These conditions are not guaranteed by the market alone. They form the social and political context within which it operates. And if they are too distorted, the market itself cannot fulfil its proper function of evening out demand and supply in a flexible and decentralized fashion. In fact, as we have seen, the modern industrial state has enmeshed its market in a whole series of social and political prescriptions and institutions which make it something closer to a community than to a raw confrontation of opposing interests. The process is still obviously and indeed often tragically incomplete. Nor can we be sure in what direction Western societies may be led by such "taxpayers' revolts" as California's reduction of property taxes by referendum. But we do know that moderating social and political institutions curb and influence at every level the bitter confrontations of pure economic power and interest. However, such moderating institutions are either stalled or non-existent at the critical level of the **global** economy.

Seen in the light of historical experience **within** states, could the "new international economic order" begin to look a little less like a

radical dream? Could not a bargain be made, a compact of interest on all sides? The first rounds - again as in nineteenth century history - had been adversary contests, with clashing interests and incompatible demands leading to recrimination and deadlock. Could the deepening of the dialogue since the oil and grain crises, the prolonged world recession, and the narrow but vital shift of power in the area of oil supplies change the tone and open up a new phase of negotiation? Could the debate be enlarged beyond the relatively narrow range of interests of those seeking trade, investment, and economic advantage? Could deeper dimensions be brought in - of common purposes in an interconnected human community, of conserving interest in a single biosphere, of survival itself in a troubled, divided, and finally interdependent world? After more than a decade of increasingly urgent yet frustrated debate, the time for a new round of common search and understanding may have come. And it could turn precisely on those issues which allowed earlier national communities to break out of evident deadlock - the issues which provide the social, political, and moral framework for economic debate and, by transcending the narrowest self-interest, create fundamental interests which all can share.

II. THE COST OF JUSTICE

IN TRYING TO envisage possible approaches to a cooperative global system, we really have only one model available to us - the **domestic** economy, which when functioning with reasonable harmony, does seek to promote and protect the interests of all its citizens.

A first principle in the modern domestic economy is that the community as a whole and not individual citizens should exercise a measure of control over the distribution of wealth. In any society, certain groups, by inheritance, by skill, by health, by luck, will tend to secure higher rewards than others. Virtually until this century, redistribution in favour of the less fortunate was largely at the discretion of the rich. At the planetary level, this is still the case. Eighty per cent of the wealth may be concentrated among a quarter of the world's people. But any transfers they make in development assistance are voluntary - charity, not justice - and at present these transfers do not exceed 0.5 per cent of a nation's GNP. A first step toward the equivalent of the automatic transfers secured by domestic taxation might be a binding institutional convention which secures the acceptance of the developed states' often proposed target for official development assistance of a transfer of 0.7 per cent of GNP from rich to poor nations, 84 per cent or more of it in the form of grants, loans at minimum interest rates with long repayment terms, or other suitable concessions.

To this modest first exercise in direct taxation, the international community could add a variety of automatic transfers corresponding in some measure to the systems of indirect taxes within a nation. A small sales tax on materials entering widely into international commerce might be acceptable - provided the poorest states were assured of the compensating finance they would require. Tolls could be charged on international sea and air journeys. Once international authority is finally established over seabed resources lying beyond the proposed two hundred mile exclusive economic zones, corporations given concessions there for mining minerals or for extracting oil could

be taxed by the Seabed Authority for the benefit of poor and land-locked states. Alternatively, the Authority could carry on the exploitation itself and utilize the profits to satisfy the needs of the poorest states.

Another potential area for international control lies in the southern oceans, where jurisdiction is shared by a consortium of twelve treaty powers and no decisions have yet been taken on the types of control over local resources that are acceptable. Yet these resources include among other valuable products the small shrimp-like krill, a source of high quality protein and so prolific that its annual catch could equal the whole of the world's present marine harvest. The protection of this resource against the kind of greedy overfishing which is already reducing regional fish stocks, and the transfer of a proportion of the sales revenue or profits to assist the protein deprived children among the poor rather than simply to profit the rich through providing cheap feed for cattle and battery hens, could at one and the same time conserve the Antarctic commons and tax them for the good of the whole planetary economy.

A further possible extension of automaticity might be thought of for the international community's principal financial agencies. It was inevitable that at the time of their foundation - at Bretton Woods, in 1944 - neither the World Bank nor the International Monetary Fund (IMF) could be designed to take into full account the interests of what were then in the main still dependent, colonial countries. Today, the whole balance of needs and numbers underlines the advisability of a new approach. The scale and renewal of appropriations made to the World Bank for concessionary loans through its International Development Agency (IDA) might, for instance, cease to be a matter of decision (and dissension) among individual governments, but be fixed by an international convention, stipulating, say, five-year renewals at agreed rates of expansion.

This brings us to a second principle in domestic society - acceptance of the concept of the "general welfare". Can anything so indeterminate be more clearly defined in planetary terms? To what ends should a much larger flow of automatically appropriated public funds be devoted? As in domestic society, there can be little doubt about the first priority. It is to abolish absolute poverty by the end of the century. This goal is conserving in a double sense. It can be defined in ways that are directly conserving of the citizen's life, health, and human dignity. It can also be conserving in the indirect yet vital sense of preserving the patrimony of soil and water, of clean air and uncluttered oceans, upon which everyone's survival ultimately depends. In fact, the two cannot be separated. To give only one example, half the world's grain supplies are grown on lands which are environmentally fragile - from low rainfall, from intensity of cultivation, from the salting and silting up of irrigation systems. It is no use talking of balanced diets for all by the year 2000 if meanwhile a critical part of the land needed for raising food has been allowed to deteriorate beyond hope of restoration.

Satisfaction of basic human needs can cover a number of specific physical targets in developing lands - a doubling of per capita incomes in poorer nations, an adequate diet for all, access to safe water. Life expectancy should be advanced to 60 years or more (in several of the poorest African and Asian nations, it is still below 40). Universal primary education and adult education could raise literacy from the present level of 23 per cent in low-income countries and 63 per cent in middle-income countries to 75 per cent or more. As a cumulative

effect of all these measures, infant mortality could be brought down from 122 to 50 children for each thousand, and national birth rates (which often exceed 40 or even 50 per thousand) lowered to 25 or less.

Clearly, a large part of the investment required to secure these targets will be mobilized by the developing nations themselves - just as they now generate some 80 per cent of the capital for their own development. Indeed, some countries and regions which are very poor in terms of per capita income - Sri Lanka, Kerala (India), China - have already achieved remarkable progress toward some of these social objectives without either very rapid internal growth or large-scale foreign help. (The contrary case has also occurred - high growth and pitiable distribution of benefits). But the sheer scale of world need for such basic factors as food, soil conservation, reafforestation, energy, water, and sanitation - all essential to any effective attack on basic poverty - and the need to speed up the whole momentum of the programme as 2 billion more world citizens arrive to take their share, require that sustained international transfers of capital should be a central part of the strategy. Indeed, it can quite simply not succeed without them.

III. THE FINAL CONSTRAINTS

IF WE WERE to depend solely upon the record of our political history, we could well doubt whether any widening of understanding and solidarity to a planetary level was even conceivable. Wars and rumours of wars, fierce tribal, communal, and national loyalties, fear and hatred of the stranger, pillage and destruction - are these not to an overwhelming extent the tragic determinants of human destiny? Why should we hope for anything different today? Surely we should need some quite new concept of reality, some revolutionary upheaval in past habits of thought, even to suppose that we could escape from the old "melancholy wheel" of ever repeated conquest, decline, defeat, and conquest again.

But it is at least just possible that such a concept is beginning to gather strength in our imagination. Still perhaps no more self-evident than human rights at the time of Magna Carta (in the year 1215), or anticolonialism in 1775, yet it has begun to make its first impact on human thinking, with results which may over time prove to be as unpredictably radical and hopeful. This is the concept, made increasingly explicit by new methods and tools of scientific research, of the entirely inescapable physical interconnectedness of the planet which the human race must share if it is to survive.

Precisely those areas where immensity and distance have seemed to reign - climates, oceans, atmosphere - are beginning to be seen as profoundly interdependent systems in which the cumulative behaviour of the inhabitants of the planet, the various activities of each seemingly separate community, can become the common destiny of all. This is not to say that earlier philosophers and sages have not sensed this underlying unity and spoken, with virtual unanimity, of a universal moral order - of human respect, of modesty and restraint, of Lao-tzu's "frugality" and "compassion". But these were dreams and visions. The radical change of the last century is the discovery that in literal, unchangeable scientific fact, interdependence is a reality and - what is an even more vital insight - that the connections which underlie it do not depend upon vast forces and changes alone. Rather, so delicate is much of the environment, so precarious are its balances, that human actions and interactions (especially now that they are

armed with the forces of modern science) can have vast, potentially catastrophic and even irreversible effects. The whole picture is not yet clear. Systematic monitoring is only just beginning. Moreover, only a third of humanity has so far plunged into the full-scale technological organization of society which, in its first century or so has been based upon a totally blind and exploitative reaction to the planet's own life-support systems. We are thus, in the most fundamental sense, at a hinge of history. If we can learn from the growing evidence of destructive risk in our present practices to determine that the next phase of development shall respect and sustain and even enhance the environment, we can look to a human future. If on the contrary we have learned so little that every present trend toward pollution, disruption, decay, and collapse is merely to be enhanced by its spread all round the planet, then the planet's own capacity to sustain such insults will be ineluctably exceeded.

Our global atmosphere and regional climates are maintained by forces which would seem to be on a scale virtually to exclude human influence of intervention. The planet's mean temperature is maintained by the balance between incoming solar radiation that is absorbed and eventually reradiated back into space, and that which is reflected. Within the general balance, the poles absorb less solar radiation than the tropics. The uneven absorption of solar radiation by the earth's surface causes the winds to develop, and this vast continuous interchange, complicated by the effects of the earth's spinning on its axis, gives us the specific climates of particular regions, all entirely integrated into the total system and thus, one might guess, on too vast a scale to be affected save very locally by the pygmy acts of humanity.

But the balance is not, over geological time, at all stable. Evolution went forward together with a changing atmosphere and changing temperatures. For much of its existence, the planet had no ice caps at all and an atmosphere lacking free oxygen. For the last 2 million years, there has been a succession of prolonged glacial epochs, or ice ages. We are recovering from the last ice age, eight to ten thousand years ago, which at its peak brought glaciers to Missouri. The whole climatic system may be vast, but it is influenced by many physical factors - among them, the carbon dioxide and dust concentration in the atmosphere, the cloud cover, and the earth's reflectivity, or "albedo". The largest, stablest seesaw in the world can be budged by shifting weight a few inches at one of its edges. Similarly, human intervention within a complex climatic system, if it takes place, as it were, at the edge of the planetary balance, might have catastrophic effects - a cooling down to another ice age, a heating up which could partially melt the ice caps and swamp lower-lying lands as the sea level rises. Some meteorologists put the potentially catastrophic average annual temperature change at no more than three degrees centigrade either way.

The difficulty at present is that although we know that changes are being brought about by human activities - for instance, the explosive growth in our use of energy in the last two centuries - it is much more difficult to be certain of the effects. Burning fossil fuels and cutting down forests for firewood has the effect of putting more carbon dioxide into the atmosphere, since these processes release the carbon locked up within the fossil fuel and within the wood. The concentration of carbon dioxide in the atmosphere has gone up by 12 per cent since 1860 and, of that, 5 per cent was added in the last two decades. This trend will continue as more forests are cleared and fossil fuel

consumption goes on growing. And what is the effect? Here the debate begins. The increased carbon dioxide concentration helps a general warming up process, since it absorbs some of the heat given off by sun warmed lands and oceans which would otherwise be lost into space.

But this warming up is partially offset by the effect of other human activities - for instance, particulate matter, massively released in the burning of fossil fuels. However, since these substances are linked to cancer and respiratory disease, most efforts at conservation are now designed to prevent them from escaping from their source - the power plant, factory, or automobile engine - and no one is likely to advocate their release in order to offset possible warming up of the planet, especially when one remembers that some particle pollution can itself contribute to the warming up process instead of compensating for it. In short, the effect of particulate matter on the temperature of the atmosphere is variable and unpredictable, and it must be offset by placement of the maximum emphasis on conservation and on a steady shift to the renewable energy resources - sun, wind, falling water - which involve no carbon dioxide or particulate pollution. Massive re-afforestation to provide fuel for the poor and to protect fragile soils will also help to reabsorb some of the carbon lost through deforestation. Fuel conservation reduces both carbon dioxide and thermal pollution in that less fuel is used to do the same task. And tapping renewable energy sources leaves nature's own climatic system to operate without destabilizing human encroachment.

As with the atmosphere, so with the oceans - on the face of it, they are so vast, so all-embracing, so seemingly independent of minute human interventions, that it is difficult for the imagination to see them as a single, interconnected natural system, vulnerable enough in its essential function of supporting life to be tampered with and even put at risk. Organic life evolved under the protection of the oceans; plants and animals moved from sea to rock to carry the evolution of organic life to the whole globe. The 70 per cent of the earth's surface that remains the water's share, receives all the earth's detritus, breaks it down so its components are recycled, operates with the sun the giant purifying cycle of water desalination which returns the runoff of springs, lakes, and rivers in the form of rain for the whole world's harvests. And all the while it is moderating extreme temperatures - cooling the tropics, bringing warmer currents to chilly regions, and thus ensuring the habitability of a large part of the earth's surface. How could any system on such a scale be influenced by what must surely seem to be, in comparison, the all but marginal activities of human beings?

But once again, the growing insights of scientific research give us far more than visions of majesty and power. Vast oceans may be, but like the atmosphere and climates, they contain critical points of vulnerability and fragility. The areas under greatest pressure from our activities are precisely those where such pressure can do most damage. Traditional fishing grounds no longer provide fish for all who want it. Depleted fish stocks have led to international conflicts such as the British-Icelandic "cod wars" and to governmental restrictions on both domestic and foreign fishing fleets in newly defined territorial waters. This does not mean that the oceans' full capacity to produce food has been reached or even approached. Indeed, we fish only for certain choice species, with very considerable wastage in getting even these from the boat to the customer. But it does mean that traditional attitudes toward unrestricted fishing are having to be completely rethought. Take another example. At the beginning of the 1970s, less

than 20 per cent of the world's oil drilling was done out at sea. By the 1980s, the figure may have increased to over 50 per cent, with some of the drilling in polar regions, where oil spills could have lasting, unpredictable, and almost certainly risky consequences. And while oil drilling increases, the scale of carriers used round the world to transport the oil goes up comparably. As late as 1948, no oil tanker was larger than 29,000 tonnes. Now we find monsters of over half a million tonnes.

And oil tankers present only one of the major risks in sea-borne trade. Add ships with nuclear wastes, add the new effluents of a planet industrialized not by a third of its people but by all of them, add the new prospects of deep-sea mining with (a dream still no doubt, but creeping into the blueprints) nuclear power stations *in situ*, processing minerals in mid-ocean, add in short the incorporation of the ocean systems into full technological activity of every kind, and is it really irrational to fear that even the oceans' productivity might suffer? The most productive ocean areas are the continental shelves adjoining the land masses. Most of the marine catch comes from these. And because of their shallowness and their close proximity to land they receive the worst of technological society's water-borne wastes. Nor can any state, with Canute-like pretensions of sovereignty, bid other people's pollutions keep away. As the "moving waters" go to their work around the planet, here at least unity is incontestable. We have no choice but to share.

But how can we do so? Do not the sheer scale and immensity of atmosphere and ocean make it all but inconceivable that human beings should keep any sort of check upon the consequences of their own innumerable activities? It is one thing to give voice to the rhetoric of inter-dependence. But what hope is there of providing the concept with force and content sufficient for it to begin its fundamental task - that of changing the climate of our imagination, of clarifying our perception of the interconnections and interactions in our single planetary home?

But here all need not be darkness and discouragement. In the last two decades, the conquest of space and the infinite elaboration of instruments for tracing terrestrial and extraterrestrial movements - of air, of water, of heat, of changing tree cover, of areas of increasing desiccation (not to speak of the precise location of possible oil-bearing strata deep in the oceans or of surreptitious tankers emptying their bilges in contravention of agreed conventions) - all these new satellites and monitors have come just in time to give mankind a new and accurate picture of planetary events and changes which even 30 years ago were wholly beyond human assessment and comprehension. Whatever the would-be secrecy of certain societies and systems, the physical behaviour of human beings is becoming increasingly open to view. So are the physical underpinnings of all their activities. People are now less likely to create, say, irreversible pollutions or desiccations or erosions by pure inadvertence. They have a clearer picture of how human activity affects the biosphere, even if there remain particular uncertainties, as with, for instance, the effect of inadequately tested chemicals still brought onto the market every year.

And, however slowly and unwillingly, people do seem to be leaning away from some of the old arrogant sovereign habits of the past and realizing, marginally and cautiously, that the old ways no longer work. In all this effort to create what one can perhaps call a planetary awareness, the United Nations Environment Programme (UNEP), working closely with other organizations of the United Nations - the

World Meteorological Office (WMO), the Food and Agriculture Organization, the World Health Organization, the regional commissions - is taking the lead in what must be, of very necessity, the first stage in some sort of world control of conservation, anti-pollution activities, and sane resource management. Its Global Environmental Monitoring System (GEMS) covers many of the relevant fields. On land, it coordinates and links research and monitoring, usually in collaboration with local research stations, on such critical matters as soil cover, inroads on tropical forests, the spread of deserts. In the oceans, it coordinates the monitoring of the entry of effluents and poisons into the marine environment. In the air, data on chemical content, turbidity, and the amount of carbon dioxide are being collected, in collaboration with WMO, and regularly published. In addition, the movements of pollution in the air - including such rising dangers as acid rain - are being studied in GEMS on a regional basis (where the gravest impacts are most likely to occur).

Accurate information, widespread dissemination - neither would have been conceivable even two decades ago. But the biggest hurdle remains - the problem of obtaining action, a readiness by means of internationally shared sovereignty, expressed in formal conventions, to eliminate the dangers and undertake the positive activity, the "spring-cleaning" of so much that is damaged and toxic in our small and vulnerable world. One should not for a moment underestimate the importance of monitoring and knowledge. They are essential for the formulation of effective policies. Equally important are the mechanisms for ensuring that the policies are followed. It is simply because satellites and other surveillance systems can be developed to trace delinquent tankers that controls over illegal oil spills can now be envisaged. It is because aerial reconnaissance and the various forms of radar already exist that it can make sense to suggest that in narrow waters, ships, like aircraft approaching airports, should be strictly kept to lanes established for them by a local authority. Yet although the new scientific instruments make effective cooperation possible, they do not ensure it. For that, there must be a new commitment to the whole concept of joint constructive work at the planetary level.

And here, just possibly, we may find that we have reached the last and most fateful of all barriers to survival. We know - although we cannot imaginatively grasp the fact - that each year we spend US\$400 billion on the means of destroying one another. Our planet - and we ourselves - can be blasted back to little more than the bare and crumbling rock from which, over evolutionary aeons, we emerged. Indeed, so ludicrous is the scale of our "overkill" that we have at our disposal the equivalent of several tonnes of TNT for every person on the planet. But we have hardly the barest counterimage of working together to build up our capacities for coexistence, to create that community of feeling which can spring from common goals and common efforts, that dedication that can grow from working together with care and patience, that experience at every level of shared effort - building the village, the town, the shrine, the temple, the city, creating the common symbols and places and vistas of order and dignity - in which all can take pride and all can love.

If one looks about, almost with despair, at the poised missiles and bomber fleets, one wonders where in all the ludicrous apparatus of fear and hatred one unifying counter-aim of wisdom and loyalty can be found. Yet perhaps that wisdom, beginning in fear, can precisely be the realization that in a shared biosphere, no one will escape nuclear destruction, and that loyalty can be built, from however small

a beginning, from a shared effort to keep that biosphere in a life-creating, life-enhancing, and life-preserving state. A fragile hope? The first microorganism must have seemed minute enough in the vast wash of the primitive oceans. Yet it had within it the seed of life. Let us at least be bold enough to hope and, where we can, begin to act.

And there is one further reason for moving our angle of vision from the sheer immensity of our environmental interdependence on to specific instances of particular acts and functions in particular places. Again and again in human history, it is the concrete example, the flash of individual insight, the last stroke of the brush on the masterpiece, that has brought life, new light, and new understanding into existence. Are there anywhere in our present experience of our geophysical interdependence those single instances of risk and opportunity which may suddenly have the power to precipitate human imagination into a new level of awareness, bringing with it entirely new reserves of courage and readiness to act? The oceans are, we know, all finally enclosed seas, all without exits for human wastes and pollutions. They are therefore a complete paradigm of an interdependence we cannot evade or deny. But the whole system is on too large a scale for the flash of vision and insight we need to experience. Can we work to a smaller but still relevant scale?

Accepted responsibility, common consultation, and joint work are the only sure routes away from ultimate conflict. Each constructive joint scheme that is made to function is a step away from catastrophe. Cleansing the Mediterranean and the other regional seas, accepting a regime for the oceans with common environmental laws in the new exclusive economic zones and a joint authority for the remaining seabed, a worldwatch for the forests and a reversal of the world's trend to deforestation, a world tax system for providing capital for investment in basic human needs, the siting and building of communities on a human scale - how vast the prospects of peaceful construction could become, from farm to federation, from village to metropolis, if human faith and loyalty could grow to match the irreversible geophysical unity of our shared and single planet. We cannot change its nature. It envelops us, provides for us, sustains us. Our only choice is to preserve it in cooperative ventures or to end it and ourselves in a common ruin.

These are not the clichés of any kind of political rhetoric. There is really only one central factor of doubt in our present debate. We are not irretrievably threatened by what are usually thought of as the most implacable constraints. Any lack of resources can be countered by conservation and care, while a sane use of science's immeasurable virtuosity can vastly increase useful materials and maintain the renewable resources that already exist. Energy is not a problem, given the breathing space for invention provided by the careful use of the still remaining reserves of fossil fuels and the promise of steady availability of energy derived directly or indirectly from the sun. Even the most widely canvassed risk - excessive population - has already been shown to be manageable, provided health, literacy, jobs, and hope are open to all the world's peoples.

No, the only fundamentally unsolved problem in this unsteady interregnum between imperial ages which may be dying and a planetary society which struggles to be born is whether the rich and fortunate are imaginative enough, and the resentful and underprivileged poor patient enough, to begin to establish a true foundation of better sharing, fuller cooperation, and joint planetary work. In short, no problem is insoluble in the creation of a balanced and conserving

planet save humanity itself. Can it reach in time the vision of joint survival? Can its inescapable physical interdependence - the chief new insight of our century - induce that vision? We do not know. We have the duty to hope.

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Contents of issues 36 and 37

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C. Acchini: Popular health and participation in Bolivia

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R. Benencia and H. Mercier: Seasonal migration, poor working environment and Chagas disease (Argentina)

D. Veiga: Discrimination and urban crisis - a reflection on recent changes in Latin America's urbanization

Issue No. 37 (December 1991)

M. di Pace, S. Federovisky and J. E. Hardoy: Environmental problems in Argentina's cities

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