

ENVIRONMENT AND GLOBALIZATION

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While globalization is usually thought of in economic and social terms, it has a very important environmental dimension. The rapid growth of both the economy and population over the last century has pushed human society up against planetary limits. The environmental consequences that have been predicted and are now becoming apparent risk dominating and even destabilizing our economic and social systems. It is therefore worthwhile to analyse the global environmental context and human interference with it from a scientific perspective. A consideration of the political response to global environmental challenges will illustrate some of the strengths and weaknesses of the present approaches to globalization. This demonstration of the disjunct between the scientific realities and the human responses will be used to suggest some future directions necessary to resolve the conflicts between human globalization and the environment, and ensure a more sustainable future civilization.

SCIENTIFIC DIMENSION

One of the major advances in scientific thinking over the last few decades has been the increasing acceptance of James Lovelock's *Gaia Hypothesis* (1979) that Earth's biosphere is a giant self-regulating system with many of the characteristics of a living organism. The more we learn about planetary systems, the more we come to appreciate how delicately balanced our own Earth systems are and how perfect for the maintenance of life. These conditions are not a matter of chance. They have been carefully cultivated by living organisms as they evolved to maximize their own benefit.

The planetary environment therefore establishes the setting within which globalization is taking place, and sets the limits on how far humans can take their new global system. Ignore those limits, and the whole of human society is threatened. Despite the hubris of some economist and technologists who

believe that a substitute can be found for every resource and a technical solution for every problem, we are in fact profoundly dependent on the natural environment. Our economic and social systems are intermeshed with and inseparable from the biophysical systems of the planet (Dahl 1996).

A brief summary of certain key features of planetary systems can help to set the stage for the following discussion. Solar energy powers most of the dynamics of the biosphere, that part of the planet that supports life. The atmospheric circulation distributes energy, water and other materials around the world through the phenomena we describe as weather and climate. Biological activity over eons has produced the present composition of the air by removing carbon and adding oxygen. Carbon is thus cycled between carbon dioxide in the atmosphere and the oceans, and the carbon in organic matter, or deposited in long-term storage in carbonate rocks or as fossil organic carbon in coal and oil. The 70 per cent of the planet covered by oceans interacts with the atmosphere in the storage and distribution of solar energy, with the ocean circulation redistributing energy between the equator and the poles. These are all important processes in the water cycle, with evaporation supporting precipitation that supplies all our freshwater resources. The nitrogen cycle is also significant for life, with organisms fixing nitrogen from the atmosphere in forms useful for biological activity like making proteins, or releasing it again as organic matter is degraded. The millions of species that have evolved on this planet have formed ecosystems for their mutual benefit, and on which most are totally dependent. These are themselves integrated into a single global biological system linked by various forms of exchange and by migratory species. All these features demonstrate the integrated global nature of the environment and the need for global approaches to its understanding and management.

The combination of human population pressure and our increasing technological capacity to use natural resources and interfere with natural systems is producing two kinds of human impacts: direct interference with planetary systems and processes such as the composition of the atmosphere, and the cumulative destruction of the environmental capital of the planet through many local changes.

GLOBAL IMPACTS ON THE ENVIRONMENT

The ways in which human activities inflict environmental damage are as diverse and complex as the environmental systems themselves. For example, the chemical industry invents large numbers of new chemicals every year, and

manufactures some on a massive scale. While most countries have legislation requiring the testing of new chemicals for toxicity, carcinogenicity and teratogenicity, these tests do not identify all possible risks, and many older chemicals have never been tested. As these chemicals escape into the environment during or after use, they cause chemical pollution and environmental harm, sometimes in surprising ways. Many have no natural counterparts and are not readily degraded by environmental processes, in which case they accumulate. The persistent organic pollutants (POPs) are one category that have become so threatening that an international convention was adopted to control and eliminate them. Some of these are known as endocrine disrupters because they interfere with hormonal systems in man and animals. Indian vultures are disappearing because a widely used veterinary painkiller, when ingested even in tiny quantities from an animal carcass, destroys their liver. The damage to the stratospheric ozone layer was caused by chlorofluorocarbons and similar chemicals appreciated for their harmlessness, but which, because they were so inert, drifted up to the stratosphere where they were finally decomposed by ultraviolet radiation, releasing chlorine which then destroyed the protective ozone. It is almost impossible to anticipate all the potential ways that a new chemical might be harmful.

HUMAN INTERFERENCE

Human interference in the carbon cycle is now beginning to cause enormous harm around the world by changing the climate. Since much of human society, from agriculture to housing, is adapted to a particular local climate, any significant change will result in huge costs of adaptation. If some regions become less habitable and others more, then it will be necessary to organize the global relocation of significant populations. The flooding of low-lying deltas, islands and coastal areas as sea levels rise will create millions of environmental refugees, straining global solidarity.

The artificial production of massive quantities of fixed nitrogen as fertilizer, combined with high emissions of nitrogen oxides from the combustion of fossil fuels, has completely altered the nitrogen cycle. It is estimated that human activity is now responsible for as much as 70 per cent of all the reactive nitrogen in the atmosphere, oceans and soils. Some nitrogen compounds are carcinogenic, and excessive nitrogenous pollutants cause eutrophication or the over-fertilization of fresh waters and coastal areas producing excessive algal growth followed by oxygen depletion. The global scale of human interference in the nitrogen cycle is therefore of great concern.

Moving mountains used to be a metaphor for the impossible; now it is a normal engineering activity. Human impacts on the land surface have transformed the world, and not always for the better. Materials flows, or the amount of materials that we move around, mostly in construction, trade and waste disposal, have become a new measure of economic activity, and the reduction of materials flows per unit of GDP a measure of efficiency and sustainability (Adriaanse et al. 1997). The built environment removes land from most biologically productive activity. Land clearing for agriculture or other uses destroys natural areas. The rich biodiversity of those natural areas is under great pressure as habitats shrink and are fragmented. Species extinctions have risen to a thousand times the natural rate, and the decades ahead may see a massive die-off of the Earth's biodiversity comparable to those caused by asteroid impacts and other past global disasters. At the same time increased trade and transport have moved species around the world to new environments, and free of their natural predators and diseases, some of these have become invasive, multiplying at the expense of the local fauna and flora, and often of humans as well when they require expensive control measures. In this sense *globalization is becoming a biological catastrophe*.

FREQUENT SPATIAL MOBILITY

Our propensity for travel has also created a single global human population vulnerable to emerging diseases. HIV AIDS has already spread around the world and is destabilizing the population of many countries. Other diseases like SARS and Ebola seem to have been contained for the moment. The experts are predicting another global influenza pandemic which could kill hundreds of millions of people, possibly even up to a quarter of the world population if the virus is particularly virulent and control measures cannot be put into place in time. Preventing such epidemics requires a scale of global cooperation and finance that we have not yet achieved.

NATURAL RESOURCES AND ENVIRONMENTAL HAZARDS

Globalization has also created challenges for the resource base of our economy and society. Half the world's freshwater is already captured for human needs. The water resources of many countries are insufficient to meet basic requirements, not to mention allowing for development. Forty per cent of the world's population lives in water-short countries, and up to 2.4 billion people could be water-short by 2050. While water resources are usually managed regionally rather than globally, the limitations water can place on development and even

survival make it a global problem. Soil degradation is another insidious problem with global repercussions. As intensive agriculture and poor land management accelerate erosion and soil degradation, the productive capacity of the planet is reduced, particularly for food. The effects will become shockingly obvious when the world population exceeds the remaining food producing capacity, when one person's steak could mean another person's life.

Another resource challenge results from our dependence on fossil fuels for a major part of our energy requirements and as feedstock for the chemical industry. Demand is rising rapidly, but global oil production is expected to peak in the next few years and will then decline as it becomes ever more difficult and expensive to extract the remaining oil. This will signal the end of cheap energy, with repercussions all through the economic system, forcing changes in the technological basis and infrastructure of Western society.

All the above factors threaten the way the environment meets our physical needs. There is also an important social dimension to the environment that also must be considered in a global perspective. Contact with and experience of the natural environment resonates in the human spirit at a very fundamental level. Many cultures make no separation between humans and nature, and find spiritual roots in the natural world. Ties with the natural environment have cultural importance. Animals teach us much about ourselves and how to relate to others. The beauty of nature is an inspiration for many. Some see the countryside as the world of the soul and the city as the world of bodies (Baha'u'llah, quoted in Esslemont 1980, Ch. 3), and find spiritual renewal in nature. With half the world population now living in cities, opportunities to benefit from the direct experience of the natural environment are increasingly rare. We do not know the long-term effects of such distancing from nature at a psychological or spiritual level. Tourism and recreation become correspondingly important, and both operate at the global scale.

As human society pushes against global environmental limits in all these ways, interactions between the different parts of the system will become increasingly apparent. The global environment is one interrelated whole, and impacts on one part ricochet throughout all the others. Climate change is accelerating habitat loss and species extinctions, accentuating drought in Africa and flooding in Europe and North America. Chemical pollution can impair the immune system, making us more vulnerable to epidemics. A destabilized global environment may be pushed to a tipping point where positive feedbacks accelerate change to produce very different conditions. Recent scientific observations of *melting permafrost* and of the Greenland and Antarctic *icecaps sliding* into the sea suggest such a situation may be closer than we think.

THE POLITICAL DIMENSION

Even as the environment has emerged as a significant political issue, it has become at the same time a powerful force for unity of action among nations. Scientific facts speak to people of almost all political persuasions, and the need to manage shared resources in the common interest represents a logic that few can refute. It took time to get this message across. At the time of the Stockholm Conference on the Human Environment in 1972, the developing countries were sceptical of what they saw as an effort by the rich to prevent them from profiting from their natural resources as the rich countries had themselves done before. Talk of limiting growth seemed unthinkable when technology had the capacity to resolve every problem. The accumulating evidence of environmental damage has gradually swung the tide of political opinion. It is only since the closing years of the 20th century that the implications of climate change for the Western economic system have become so threatening that some politicians and vested economic interests have attempted to discredit or rewrite the science in defence of their short-term self-interest.

FEEDBACK OF POLICY DISCUSSIONS

The creation of the United Nations Environment Programme in 1972 as an outcome of the Stockholm Conference illustrates these unifying forces. At the regional level, Regional Seas Programmes were established to enable all the countries sharing a common sea area to collaborate in pollution prevention and control. Even countries with extreme antagonisms such as Greece and Turkey, Israel and Libya, or at war in the case of Iraq and Iran, were ready to sit around the same table and discuss their common sea area. At the global level, conventions were adopted to control trade in endangered species, to stop the pollution of the seas from ocean dumping, and to create a framework of collaboration to protect the stratospheric ozone layer, among others. The number of multilateral environmental agreements multiplied throughout the following decades, culminating with the Convention on Biological Diversity and the UN Framework Convention on Climate Change signed at the Rio Earth Summit in 1992 and the Convention on Desertification signed soon after. With the opposition of some powerful countries to an extension of multilateral action, global progress has slowed, but development of the legal environmental framework at the regional level has continued, and supranational environmental bodies like the European Environment Agency have emerged.

To complement the political globalization of the environment, other sectors of society have moved in the same direction. In the scientific community, the

International Council for Science (ICSU) had already established a Scientific Committee on Problems of the Environment in the 1960s and launched international research programmes leading to the International Geosphere Biosphere Programme (IGBP), matched in the social sciences by the International Human Dimensions of Global Environmental Change Programme (IHDP) and complemented by Diversitas (International Programme of Biodiversity Science) on biological diversity. The UN agencies, governments and the scientific community together began designing Global Observing Systems for the oceans, land and climate on top of existing weather observations, and building towards a Global Earth Observation System of Systems (GEOSS). The International Union for the Conservation of Nature and Natural Resources (IUCN) - The World Conservation Union, provided global leadership for governments, scientists and non-governmental organizations on nature protection and endangered species, while research centres such as the World Resources Institute, the Stockholm Environment Institute, the WorldWatch Institute and many others provided science-based reports and assessments for public education and action.

Often the most effective action on the ground has come from the non-governmental environmental organizations, many local or national in scope, but others such as the World Wide Fund for Nature (WWF), Greenpeace, Friends of the Earth, Conservation International, The Nature Conservancy and others too numerous to mention are developing international stature and influence. This has been encouraged by the opening of the intergovernmental processes for dialogues with accredited non-governmental organizations, first on a small scale at the Stockholm Conference, then with approximately equal weight in numbers at the Rio Earth Summit in 1992 and the World Summit on Sustainable Development in Johannesburg in 2002, as well as at the UN Commission for Sustainable Development.

One important sector of society that has been slow to take up the environmental challenge is the business community. This is especially significant because the multinational corporations have led the movement for globalization, acquiring increasing economic and even political power at the expense of governments. Initially, business only saw the environment as something that raised costs and reduced profitability, and thus to be avoided in every way possible, including by delocalizing polluting activities to countries with few environmental regulations. By 1992, a few enlightened business leaders formed the World Business Council for Sustainable Development. The development of the environment as a business sector in its own right, and the recognition that attention to the environment could reduce risks, has helped to shift business opinion. Even the World Economic Forum now recognizes that there

can be a competitive edge in environmental responsibility. A survey of world business leaders in 2004 showed that the most globally competitive leaders wanted strong government environmental regulation fairly enforced, so that they could compete effectively for environmental efficiency (Dahl 2004).

Despite all that has been done at the international level and some progress with particular problems at the national level, the global environment has continued to degrade rapidly (UNEP 2002). The propensity of political leaders to sign grandiose conventions, declarations and action plans is quickly forgotten when returning to national political priorities. The political will to take unpopular decisions in the long-term interest is all too rare, and the financial means to implement international action must compete with what always seem to be more pressing national requirements. Lobbies for vested interests carry great weight in national politics, and since most international decision making is by consensus, it does not take many recalcitrant governments to block effective international action. Government efforts at the international level to date can best be described as too little, too late.

GLOBAL ENVIRONMENTAL SOLUTIONS

With the inevitable move towards the globalization of many aspects of modern life, society faces a challenge that is particularly evident in the environmental field: how to match institutional arrangements to the appropriate scale of the problem. Given that we are pushing the planetary environment into multiple processes of rapid and unpredictable change, our only option is to prepare for multi-level adaptive environmental management. This will involve improving our scientific understanding of biospheric systems, observing them systematically to monitor the rates and directions of change, and, as change occurs, responding with appropriate management or adaptation strategies. Given the inertia in planetary systems, we shall need to respond very quickly, and to anticipate problems whenever possible by applying the precautionary principle.

ENVIRONMENT MANAGEMENT

The biggest institutional gap is at the global level. Environmental problems like climate change, stratospheric ozone depletion and biodiversity loss can only be managed at a planetary scale with all countries working together. International conventions already exist for all these issues, but only ozone depletion has yet seen any really effective action. Sometimes the problem is that environment ministries represent their countries in international environmental ne-

gotiations, but they tend to have little power or influence at the national level relative to ministries of finance, economy or trade. Also, the environmental conventions have no real power of enforcement. Perhaps their major accomplishment to date is to build an international machinery for dialogue, negotiation, and reporting which in the future could take on more extensive functions when the political will is there. The Kyoto Protocol of the Climate Change Convention was an agreement based on what was possible rather than what was necessary, and even the possible proved less than satisfying for certain countries. Much more stringent and enforceable action is needed in these areas to meet international objectives. Such action could create the level playing field that international business needs to compete effectively within a government-designed and government-enforced framework of universal standards and targets. Without these common global approaches, the innovation and efficiency of the private sector cannot be harnessed to meet planetary environmental objectives.

Equally important, if less evident politically, is the need to manage most natural resources at the global level. Governments hold firmly to the notion of national sovereignty over their resources, but the unequal distribution of those resources has created winners and losers in the international economy. This has accentuated unsustainable extremes between countries. In addition, where national governance is weak, as in much of Africa, valuable resources like oil, diamonds and strategic metals have fuelled (and funded) rampant corruption and civil wars with enormous civilian suffering. Globalization means that the major natural resources are traded in single world markets. These markets do not consider the environmental effects of natural resource exploitation, nor do they account for the non-market values of these resources like environmental services or biodiversity importance. Only a global approach to resource management and exploitation would make it possible to consider these factors.

For example, the global market in forest products represents a pressure on all the world's forests. Logs to make plywood or wood chips to make paper or building boards can come from anywhere. Yet for some forests, their highest value may be in biodiversity conservation or watershed protection. Should the countries with such forests be deprived of development, or should they be compensated for preserving their forests in the global interest? A global management scheme for forests could classify forests by their highest uses, and pay to preserve forests for globally-recognized values, funded perhaps by a global tax on the trade in forest products. This would allow optimization of the world forest resource for all uses, while providing for an equitable distribution of the benefits.

A similar principle will become increasingly necessary as fossil fuel reserves decline relative to global demand. The most powerful nations will go to extreme measures to protect the security of their energy supplies in their fundamental national interest, to the detriment of the poor. The only way to avoid this will be to create a global management mechanism empowered to ensure the equitable distribution of the remaining energy resources.

To make such global mechanisms work and win the confidence of all nations and peoples, there will have to be international legislative, executive and judicial processes in which everyone participates. With the present poor performance of government at the national level, there is an understandable reluctance to consider a world government. One essential safeguard would be to restrict global governance to only those matters that must be handled at the global scale, leaving all other responsibilities to subsidiary levels.

Another scale for environmental management is at the level of river basins, shared seas, and eco-regions sharing a common set of ecosystems or vegetation types. These are ecological functional units with specific management requirements, but their boundaries seldom correspond to existing political units. New management authorities may need to be established for this scale of environmental processes. Migratory species are another group that cross political boundaries, and for which the Convention on Migratory Species already exists to set up management regimes specific to the needs of each species.

The other neglected area of environmental management is the local level. Too often national governments concentrate all the environmental responsibility at the national, or in some cases state or provincial, level. Yet most decisions affecting the environment are taken by individual property owners or resource users, farmers, fishermen (or women), small and medium enterprises, and local authorities. These people are living in the environment, using and observing it on a daily basis. They should have more responsibility for its sustainable management within the global perspective of resource limits. To do this effectively, they need a sound environmental education, and monitoring techniques that allow them to collect systematic observations on the state of and changes in their environmental resources. As they observe changes, they can modify their use and management of the resources adaptively. This is by far the most efficient approach to dealing with the great diversity of local environmental situations around the world. Effective implementation at this level will greatly reduce the need for heavy approaches at the national and global levels.

SUSTAINABILITY

The modern framework for considering environmental issues, not in isolation but combined with the economic and social dimensions as part of an integrated perspective on the present and future of society, has been formulated by the international community as sustainable development. Many prefer the term sustainability to avoid the implication that development means growth, when what may be necessary is less development or consumption, at least among the wealthy.

The issues of globally coherent responses to the environmental challenges raised in the preceding sections need to be integrated into the larger sustainability framework that also considers economic and social issues (Dahl 1996). This also implies a wider institutional framework than one just dedicated to the environment. As global environmental problems become more acute, they will raise the pressure on governments and the other institutions of society to evolve the solutions necessary to live together sustainably in a globalized world. Whether this is done constructively through acts of consultative will, or only in reaction to the disasters and possibly even global catastrophes that continued environmental neglect will bring upon us, is a choice we collectively have to make.

REFERENCES

- Adriaanse, Albert, Stefan Bringezu, Allen Hammond, Yuichi Moriguchi, Eric Rodenburg, Donald Rogich and Helmut Schütz, *Resource Flows: The Material Basis of Industrial Economies* (Washington, DC: World Resources Institute, 1997).
- Dahl, Arthur Lyon, *The ECO Principle: Ecology and Economics in Symbiosis* (London/Oxford: Zed Books Ltd. 1996).
- , 'The Competitive Edge in Environmental Responsibility', in Michael E. Porter, Klaus Schwab, Xavier Sala-i-Martin and Augusto Lopez-Claros (eds), *The Global Competitiveness Report 2004–2005* (Houndsmill and New York: World Economic Forum, Palgrave Macmillan, 2004), pp. 103–10.
- Esslemont, J.E., *Bahá'u'lláh and the New Era* (Wilmette: Baha'i Publishing Trust, 1980).
- Lovelock, James, *Gaia: A New Look at Life on Earth* (Oxford: Oxford University Press, 1979).
- UNEP, *Global Environment Outlook 3: Past, Present and Future Perspectives* (London: Earthscan Publications Ltd, 2002).