ENDANGERED EARTH

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I start by thanking the organisers of the Cambridge Lectures on Environment and Development for the honour of my initiating what promises to be a prestigious and influential series.

It is timely too. Back in 1983, when Mrs. Brundtland invited me to join the World Commission on Environment and Development, the world's environment was well down the list of priority political issues almost everywhere; academic interest in ecology was often treated by practitioners of more traditional disciplines with suspicion and disdain; as for 'environment and development', that was a specialism within a dubious specialism or, as Churchill might have said, a mystery wrapped in an enigma; even environmentalists themselves sometimes seemed less concerned about people than pandas. I hesitated before accepting the Prime Minister's invitation. If the world wasn't ready for 'Brandt' on development, would it be ready for 'Brundtland' on environment and development?[1]

Now—barely five years later—such hesitation would seem strange. The interrelated issues of environment and development now vie with nuclear disarmament as the dominant issue of our time. Politicians—from Mr. Gorbachev to Mrs. Thatcher—and financiers—from the President of the World Bank to environmentally 'clean' unit trust managers—advertise their 'green' credentials. Britain—one of the few countries not to contribute to the costs of the Commission's work—decided to host the presentation of its Report at the end; and is now convening (in March) an important international conference on the ozone layer. The *National Geographic* carried on its December 1988 cover a holograph of the planet which fractures as it tilts.[2] *Time Magazine*, at the start of 1989, dropped for only the second time in 60 years its 'Man of the Year' theme to emphasise that this is to be the year of 'endangered earth'.[3]

How has this transformation in perception come about? I like to think that the World Commission, and its Report *Our Common Future*,[4] had something to do with it. But perhaps more important was the way in which a succession of disasters all over the world

triggered intellectual awareness about the possibility of some underlying pattern of causality, and aroused those emotions of fear and anger that are often the mainspring of political action. While the Commission met, some of those happenings graphically illustrated the dangers faced by humanity: Bhopal, Chernobyl, the Rhine chemical spillage, the mud slide in Colombia, the Mexican liquid gas explosion, drought and famine in Africa. When Commonwealth leaders debated the work of the World Commission at their last meeting in Vancouver in 1987, the whole discussion was given immediacy by the recent experience of disastrous flooding in Bangladesh (worse was to come) and the inundation of the low-lying islands of the Maldives by unprecedented waves. Reinforced by empirical evidence that such disasters have steadily increased in frequency in recent decades, political leaders were beginning to accept that all these—and more—are not purely random events.

But, while this spate of disasters has raised public and political consciousness about environmental stress, it is the quieter, less immediately dramatic, trends which are, in many respects, more disturbing. The most recent estimates suggest that 11 million hectares of tropical forest—an area the size of East Germany—are being lost every year, mainly to land clearing for crops and cattle ranching.[5] In India, where there tends to be a more honest and open discussion of environmental issues than elsewhere, it is now publicly acknowledged that forest loss is far more serious than previously recognised and, on present trends, little if any of the remaining 30 million hectares of forest will be left by the end of the century.[6] In Brazil, one of the few remaining tropical forest areas of any size, destruction proceeds apace. You may well have seen reports over Christmas that Chico Mendes, the rubber tappers' leader who fought, using non-violent Gandhian methods, to preserve Amazonia—and whose Association, incidentally, gave eloquent testimony to the Brundtland Commission when it visited Brazil—was murdered because he stood in the way of powerful interests wanting to destroy the forest.[7] The costs of this forest destruction are only just beginning to be understood: long-term soil erosion; substantial contribution to the accumulation of greenhouse gases in the atmosphere; and irrevocable loss of plant and animal species which are becoming extinct at a rate of, perhaps, hundreds or even thousands of species a year.[8]

Deforestation is only one symptom of the declining health of the earth:[9] six million hectares of new desert—an area almost the size of the Irish Republic or Holland and Belgium combined—form annually; thousands of lakes and rivers are biologically dead or dying; there is growing toxic contamination of water and soils. In India, 130 million hectares—almost 40 per cent of that country's land area—have been classified as degraded beyond the point of productive use. In Poland, one-quarter of the soil is regarded as contaminated beyond the point of safe use and only one per cent of fresh water is now considered safe for drinking. In Mexico City, residents have been advised to jog indoors because of the dangers of breathing the air.[10] Even in England's green and pleasant land, the claims of bottled water and organic farming no longer contend in vain—and not only because of 'princely' support.

For much of humanity, however, an even more pressing issue than where to jog or how to farm is how not to starve—how to rise above absolute poverty. Perhaps the most distinctive contribution of the Brundtland Commission was to provide a clear explanatory link between Third World poverty and global environmental deterioration—between economy and ecology. Traditionally, pollution has been seen largely as a by-product of wasteful life styles and harmful production processes in the rich world. And in many respects that remains the case. Eighty per cent of all commercial energy is generated in the industrialised world, including Eastern Europe; almost all the world's chlorofluorocarbons—the CFCs, those gases that are helping to destroy the ozone layer—originate in rich countries. But, in other respects, poverty is as environmentally degrading as it is in human terms. The imperatives of daily survival force poor families to think (and live) short term—to overgraze grasslands, to overexploit soils to maximise immediate yields, to cut down dwindling forest stocks for farmland or firewood. What is, individually, rational behaviour becomes a collective disaster.

Nowhere is there a wider disparity between understandable human choice and inevitable human disaster than in relation to population. For an individual family on the brink of survival it makes eminent sense to have large numbers of children in the hope that some survive and help around the family farm or find work to support parents, brothers and sisters. But when many families do the same the combined result is to produce far more

people than the stock of available fertile land and the infrastructure of schools, health and other services can sustain. In Kenya, a country that suffers acutely from land hunger, urban unemployment and environmental stress, a woman now produces eight children on average and the population is expected to rise from 25 to over 80 million in the next 35 years—even if the birth rate halves over that period. In Bangladesh, where almost every last acre of cultivable land is already used—and millions live precariously on mudbanks facing imminent disaster—the population is expected to double from 110 million to 220 million over the same period of 35 years[11] and, again, assuming a halving of the birth rate. These are the pressures which contribute to many of the world's most acute environmental problems. And the process is circular, since it is poor people and poor countries which depend more than others on land and natural resources for survival and which are consequently more vulnerable to environmental deterioration.

It is important to realise that these problems do not arise from ignorance, let alone stupidity. There is, in most poor countries, a sophisticated awareness of the kind of agricultural practices that are sustainable. Particularly in India, China, Indonesia and also in many parts of Africa, there are, in peasant farming communities, traditions of terracing, crop rotation, natural fertilizers and animal husbandry that long pre-date the arrival of European technology. But poor countries often find themselves trapped in a downward spiral in which the pressures of poverty and rising population lead to sound practices being abandoned. There is also a generally wide awareness of the undesirability of excessive population growth: in a recent survey, while only 10 per cent of women in rural Ghana were practising contraception, 90 per cent expressed a clear preference for having no more children.[12] But partly because of the high levels of child mortality—and the generally low status of women—these wishes do not prevail over the seeming compulsions of economic need; they go unfulfilled, with disastrous consequences for development, and eventually for global living.

What makes all this so acutely critical is that all the signs point to the incidence of poverty growing in the Third World. For example, the number of people on inadequate diets, excluding China, rose from an estimated 650 million to 730 million in the 1970s and, since 1980, matters have turned from bad to worse.

Among children under five alone, 160 million are reported to suffer protein energy malnutrition—and this includes two-thirds of all children in South Asia. In 21 out of 35 low-income developing countries, the overall daily calorie supply per capita was lower in 1985 than in 1965. Almost half of 115 developing countries have experienced falling per capita staple food consumption this decade. In most parts of the developing world, there have been sharply reduced growth rates, falls in real per capita income, rising unemployment and cut-backs in educational and health provision as a result of austerity measures consequent upon economic crisis. Such poverty is the worst form of pollution.

Let no one dismiss this as rhetoric. The simple, and terrible, truth is that poverty and environment are inextricably linked in a chain of cause and effect. Problems of environment cannot be tackled in isolation from those national and international economic factors that perpetuate large-scale poverty. This is why those concerned with environment in Latin America and Africa see links with international economic problems such as oppressive debt servicing and depressed commodity export prices—which, together, force developing countries to overexploit their natural resource base in order to maintain export earnings. Imagine, then, how utterly galling it is for them to find Western aid agencies and multilateral institutions (like the World Bank) preaching about the need for greater environmental concern in developing countries against a backdrop of grossly inadequate financial flows, the consequence of which is to perpetuate the very underdevelopment which contributes to environmental neglect. Man has stood on the moon and looked on the earth's oneness; yet centuries of preoccupation with ourselves—in family, then tribe, then nation state—still stand in the way of those holistic global perceptions and solutions that are essential to human survival.

Amidst this catalogue of negative trends it is easy to be defeatist. The message of the World Commission was, however, by no means a negative one; and while, for example, the massive burning of fossil fuels continues to degrade the physical environment everywhere (as the burning of books degrades the intellectual!), some decidedly positive developments are now beginning to emerge. In Scandinavia, Canada and West Germany, environment is close to the top of the political agenda; in Britain, Mrs.

Thatcher has made a strong and welcome intervention in this area; now, President Bush has appointed a strong conservationist to head his Department of the Environment. It is, of course, somewhat easier to espouse and pursue environmentalism in rich countries where there are no great pressures of rising population and where resources can be diverted to environmental protection. But it is no less welcome for that. There has been, too, significant progress in, for example, recognising the need to curb the sulphur emissions that cause acid rain, and introducing more environmentally-sensitive agricultural policies.

So far, most 'green' politics has been in, and for the benefit of, developed countries; but some developing-country politicians have also taken up the challenge. Rajiv Gandhi has launched a programme to turn back five million hectares of land every year into fuelwood and fodder plantations.[13] Robert Mugabe has tackled the sensitive issue of population and family planning; within two years of his launching the programme, contraceptive practice in Zimbabwe rose from 14 per cent to 38 per cent.[14]

Of comparable significance is the way President Gorbachev is trying to lead international opinion. When the World Commission visited Moscow two years ago, the administration was reeling in the aftermath of Chernobyl, and was very much on the defensive. Soviet authorities now freely admit that, no less than in the West, great damage has been done to the Russian environment by insensitive industrial planning. The planning system has quite disastrously neglected environmental factors and has promoted—through irrational pricing—a wasteful use of energy and raw materials. The emergence of the Soviet Union as a major and constructive participant in global environmental discussions adds a whole new dimension to what is possible.

These stirrings of awareness at a national level are now beginning to create the basis for tackling those environmental problems that are truly international. The most striking success has been the international agreement, under UNEP auspices, to cut the production and use of CFCs.[15] It has been estimated that the Montreal Accord, if fully implemented, could avoid two million future skin cancer deaths.[16] Even before the agreement came into effect, however, scientific research suggested that far more dramatic curbs will be necessary to prevent continuing

increases due to ozone depletion. Still, the agreement was remarkable from several standpoints. It was the first time Governments had acted together, not in response to a demonstrated calamity, but to predictions and warnings of scientists. It imposed effective restraints on some of the world's most powerful multinational companies. And, at a time when the whole idea of multilateralism has been called into question, it showed that global co-operation to face global threats is, after all, possible.

The agreement is propitious, too, for dealing with the much bigger and more complex problems of global warming produced by greenhouse gases, notably carbon dioxide. Within the last few months, a major step forward has been taken with the formulation of a clear consensus among scientists of the scale of global warming that is likely. The Expert Group the Commonwealth has established in the light of the Vancouver Summit discussions to look at the issue of climate change estimates that, even with policies adopted now to reduce greenhouse gas emissions, there is a 90 per cent probability of mean global warming of at least one to two degrees by the year 2030 and continued warming after that.[17] Some estimates are of much higher figures. I deliberately present the estimates in a cautious way since there is a danger of environmentalists overstating their case and inviting the kind of ridicule which one leading columnist captured a few weeks ago when he claimed to have read that 'if we continue to use underarm deodorants, drive motor cars and burn fossil fuels unchecked the consequent greenhouse effect may create temperatures at which lead melts and other metals become red hot.'[18] Even so, scientific consensus does suggest that the speed of warming—which is already being monitored—is historically unprecedented.

While the precise effects of this process on particular countries or even regions cannot yet be predicted with any certainty, among the more probable is growing aridity in already semi-arid tropical areas—those parts of Africa, for example, that have recently experienced severe drought and famine. Another is a greater incidence of extreme events, such as major hurricanes in tropical areas. The US Space Agency (NASA) has suggested that hurricane 'Gilbert' was a harbinger of a more powerful and disastrous generation of hurricanes engendered by global warm-

ing.[19] Even small climatic changes can have dramatic effects; it is believed, for example, that the lethal strain of mosquito which has killed tens of thousands of people in Madagascar in the last year, could have flourished due to slight warming.[20] There may be some beneficiaries—if, for example winter warming in Canada and the USSR permits agriculture in the more northerly, currently frozen, latitudes. But, there is no basis for complacency that global warming could be a 'zero sum game'; adjustment will be necessary everywhere, with attendant costs.

Among these costs will be those of adjusting to higher sea levels. The Commonwealth Expert Group conservatively predicts—again with a very high level of probability—that the sea will rise at least 20 to 30 cm. (approximately 12 inches) by 2030 and possibly as much as three times that level (approximately three feet) with continuing increases for decades—perhaps for centuries—to come.[21] For areas at, or below, sea level—the big, highly populated deltas of Egypt, India and China; large areas of the United States, Britain and Holland; coastal atolls in the Indian and Pacific oceans; and the capital of my own country Guyana, which is built behind dykes—there is the prospect of widespread, perhaps catastrophic, flooding in years to come.[22]

Surveys of some of these areas conducted for the Commonwealth Group suggest brutal options. One is large-scale abandonment of land; conceivably, abandonment of whole countries. In the case of the Maldives, for example, the overwhelming majority of the 1200 islands in the chain are already barely above sea level. Who will house the displaced population of low-lying areas? Current attitudes to refugees and immigrants, in most countries, do not suggest that large population movements are feasible. Acceptance of an enhanced risk of large-scale drowning is clearly not an option. The 1970 cyclone in Bangladesh, when 300,000 were killed in one storm surge, and last year's lesser but serious disaster, when hundreds more perished,[23] are warnings of what could happen on an even larger scale. Common humanity alone prevents us regarding this as an acceptable risk. A possible option is to build defences. But this is simply beyond the means of most poor countries. A single four kilometer barrier in Holland cost over $3 bn; many countries would require much more. Is it not a global challenge to make our planet habitable for all its people? And is the challenge not at hand?

The costs of doing nothing to prevent climate change are simply unacceptable. Concern is now such that for the first time, following a little-noted meeting in Geneva in November, governments have at least started to consider—under UN auspices—the issue of climatic change and global warming collectively. The problems in progressing from collective study to collective action are, however, immense. There is no obvious way of stopping some greenhouse gas accumulations. There should be some help as an indirect by-product of the Montreal Accord on CFCs, and also if deforestation can be slowed. The core issue, however, is the carbon dioxide emitted by burning carbon based fuel, especially coal. The main clean, renewable, source of energy—nuclear power—is, to say the least, problematic as well as costly and is likely to remain so, especially for countries with a limited technological base. Non-conventional sources of energy have been shown to be useful at the margin; but cannot substitute for traditional sources on a short time scale.

The approach of many environmentalists to this dilemma is to advocate a world of slower economic growth. While this may be superficially appealing to those already materially comfortable, it is both selfish and unwise. Given the extent and growth of mass poverty and the link between poverty and environmental stress, rapid economic growth in developing countries is essential; also developing countries can grow more rapidly in a buoyant world economy that bolsters trade opportunities, particularly commodity markets. The World Commission spoke of 5 per cent as representing a rough normative minimum economic growth for developing countries taken as a whole. At present, only a small number of countries, mainly in Asia, are reaching that level. Some parts of the Third World have experienced much lower economic growth in the last decade or so—notably Africa and Latin America—and have experienced declining per capita incomes, deepening poverty and the most extreme forms of environmental stress. Unless growth is revived there is no prospect of reversing these trends. And growth is necessary not only for developing countries; 'perestroika' in the Soviet Union is quintessentially concerned with transforming stagnation into growth. And few seriously imagine that the major problems of the West—with large pockets of poverty and unemployment, and fraying public services and infrastructure—can be solved except in dynamic economies. The last decade has seen, in almost every

part of the world, a combination of slower economic growth and accelerated environmental decline. The experience does not commend itself for the future.

So, as long as large-scale poverty and rapid population growth remain, 'no growth' is no solution. The Brundtland Commission made a major break with earlier environmental analysis—such as the Report of the Club of Rome in the early 1970s—by recognising this explicitly. It positively looked forward to 'a new era of growth'.[24] But it stressed that growth must be qualitatively different from that experienced in the past; it must be growth that contributes to sustainable development: as we defined it, 'progress (in all countries) that meets the needs of the present without compromising the ability of future generations to meet their own needs'.[25] This means, for example, not being too mesmerised by GNP figures; in some countries these show impressive progress which is entirely illusory when we take into account the depletion of forests and other environmental assets, and the quality of life.

In most respects, growth and environmental sustainability reinforce each other naturally. This is the case in agriculture. There is now abundant evidence that the kind of protective Common Agricultural Policy system operated by the EEC, and comparable arrangements in Japan and elsewhere, have both retarded economic efficiency and added greatly to the pressures for excessive, and chemical-intensive, production; while in developing countries, the artificial suppression of farm prices in the interest of urban consumers has retarded economic development and made environmentally prudent farming uneconomic.

Equally, there are some real conflicts of interest. Growth, even if carefully managed, is bound to result in a rapid growth of demand for some natural resources, particularly energy. Electrical generation multiplied eight times worldwide between 1950 and 1980. The electrification of villages; the replacement of wood burning by commercial power; industrialisation: these are integral parts of development. But technology provides at least the hope that it will be possible to counter this problem. Over the last decade, Western countries have achieved an annual growth of energy efficiency of 2 per cent and the potential undoubtedly exists for further major savings and on a worldwide basis.[26] It is possible to reconcile rapid growth with frugal energy and material use. But it will not be easy; it requires a willingness by

consumers to pay high prices that fully reflect their environmental as well as narrowly economic costs; and governments to tax depletable resources and to finance major long-term research—difficult enough in secure democracies, let alone in countries where government is fragile and the rise in petrol and kerosene prices can precipitate riots and even *coups d'etats*. And fresh water supplies—of which there are reported scarcities in 80 countries[27]—now provide an even more acute constraint on expansion—particularly of agriculture.

These problems will present painful dilemmas to which technology will not always provide solutions, It is, however, possible to say with reasonable confidence that those countries which are able to surmount the external and internal impediments to growth will find it easier to deal with the dilemmas. Korea, for example, is one of the very few developing countries expanding its forest acreage; Singapore has become the very antithesis of urban squalor; among the less publicised developmental success stories, Cyprus has been a leader in energy conservation and solar power, and Mauritius is pioneering a comprehensive approach to economic and environmental planning.

While there are pieces of evidence and experience which suggest that brisk economic growth and respect for environmental values can be reconciled, we would be fooling ourselves if we imagine that 'sustainable development' is as yet well established as a working principle. To achieve it globally will require a transformation of attitudes in some fundamental respects. It requires, first of all, a long-term perspective; a recognition that we all have an obligation to future generations as well as to ourselves. This is difficult to realise where key policy-makers in the rich world are geared to the daily stock exchange index and monthly balance of payment figures, and in the poor world to watching the levels of foodstocks in granaries and foreign exchange reserves at the Central Bank. Even when priorities shift from the immediate to issues of long-term investment, investment criteria in both public and private sectors invariably discount future costs and benefits so that the very long term is always effectively ignored. In almost every country policies are being formulated whose long-term implications—for climate change, sea level rise, species extinction and nuclear waste disposal—are not part of the calculus of decision-making. This has to change.

A second imperative which deserves to be stressed, particularly in a university context, is the need to see environmental problems in interdisciplinary terms, not in terms of narrow specialisations. The world is replete with projects that made excellent engineering sense but were economically disastrous; or were economically sound but environmentally catastrophic. The current work on greenhouse gases and global warming and their effects requires the combined skills of physicists, meteorologists, oceanographers, biologists, geographers, economists, lawyers, engineers and students of international relations among others. To deal with such problems satisfactorily is a challenge to both statesmen and thinkers. There are pressures—of institutions, of culture, of fashion—to work in national and disciplinary compartments. These must be resisted. The wide range of patrons to this Lecture Series suggests that at Cambridge such a step forward is already being made. I hope that you will build on it in future work at the University, and also help policy-makers to translate the concept of 'sustainable development' into operationally useful advice.

Finally—and this is a factor I particularly stress as the head of an international organisation—a large and growing number of environmental issues are cross-border problems which simply cannot be solved nationally. Norwegian lakes and trees have been polluted by power stations in England and East Germany; the Chernobyl fallout affected farmers as far afield as Wales and Scotland; tree cutting in Nepal has led to flooding in Bangladesh, and in Ethiopia it has caused water supply problems in Sudan and Egypt; CFC emissions in the northern hemisphere could cause skin cancer in Australia, Chile and Argentina.[28] Unless there is a regional or global framework for handling such issues we will see some of them escalating dangerously—in some cases to conflict, as may already have occurred as a consequence of large-scale environmental refugee movements in the Horn of Africa. It is not at all implausible to hypothesise that if environment and development problems become even more serious—with, for example, the large-scale involuntary migrations many believe will follow climatic change—some of the most serious consequences could be in the field of security.

Some international problems—those concerned with the global commons, the oceans and the ocean bed, the atmosphere, Antarctica, which no one owns—present particular problems.

Unless access is regulated in some way, rising demand will result in over-use. For the global commons this means internationally agreed controls. In some respects—such as deep-sea fishing, dumping of waste, fisheries agreements and Antarctica—there have been embryonic forms of multilateral control. But they tread a very delicate dividing line between the competing claims of conservation, private business and governments—all with different interests. To handle these common problems requires strong multilateral institutions and respect for international law. That means a change in habits by some of the major powers.

An effective Law of the Sea to manage the ocean bed has been frustrated for the last decade by the refusal of the US to conform.[29] Russia and Japan have often shown a cavalier disregard for the need to observe fishing agreements. More seriously, there is insufficient attention to the position of poorer countries which are trying to develop in a world in which much of the world's environmental capital has already been drawn down and effective control of much of the remainder lies elsewhere. For example, the Treaty governing Antarctica,[30] in some respects an admirably enlightened and conservationist arrangement, which has kept the world's last true wilderness free of both weapons and developers, is currently faced with the issue of whether or not to allow mineral and oil exploration. The decision will be made only by the 18 Treaty countries; the decision-making process will, for example, have no African representation except for South Africa. Regulation of all the world's global commons—which are truly part of the common heritage of mankind—face similar problems of inequity and unrepresentative control.

An enduring message of the Brundtland Report was that questions of the global environment cannot be separated from the political, economic and moral issues posed by a world in which there is great wealth and also great poverty; with states trying to co-exist that range from the super-powers to vulnerable microstates; and with still only tenuous legal and institutional arrangements preserving international order. Underlining its message of a common future was the unspoken premise that we must think of our planet not only as a world of many states but also as the state of our one world; that we must be ready to nurture tomorrow's concepts of global governance, not have them stifled at birth by yesterday's notions of national sovereignty; that our common future may not be secured save by the reach of

enforceable law across environmentally invisible frontiers. I trust that during this series you will, in dealing with the technical issues, not lose sight of this wider, and necessary, dimension of saving our endangered earth.

Notes and References

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2. *National Geographic*, Vol. 174 No. 6 (December 1988).

3. *Time Magazine*, 2 January 1989, p. 10 and pp. 12-47.

4. op. cit.

5. Lester R Brown and Christopher Flavin, "The Earth's Vital Signs", in *State of the World* 1988: Estimates of Worldwatch Institute (W.W. Norton, New York and London, 1988), p. 6, based on *Tropical Forest Resources* (FAO, Rome, 1982), p. 5.

6. *The State of India's Environment: 1984-85* (Centre for Science and Environment, New Delhi, 1985), p. 80.

7. See e.g. *The Guardian* London, 25 January 1989, where Tanya Schwarz, co-ordinator of Save the Forest People's Support Group, states that 88 other people doing similar work to Chico Mendes have also been killed.

8. *Our Common Future*, op. cit., Chapter 6: 'Species and Ecosystems: Resources for Development', pp. 147-167, at p. 150. Also E. Wolf, *On the brink of Extinction: Conserving the Diversity of Life*, Worldwatch Paper 8 (Worldwatch Institute, Washington DC, 1988), pp. 101-107.

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10. Press reports, January 1989.

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23. Over and above the flooding disaster a few weeks earlier in which a total of 45 million people were displaced and otherwise affected by flooding of the Ganges and Mahananda Rivers.

24. *Our Common Future*, op. cit., p. 8.

25. Ibid., p. 43.

26. Ibid, Chapter 7: 'Energy: Choices for Environment and Development', p. 196. Also J Goldenberg, T Johansson, A Reddy and R Williams *Towards an Energy Strategy for a Sustainable World* (World Resources Institution, Washington, 1987), pp. 29-38.

27. *Our Common Future* , op. cit., p. 293.

28. See n. 15, *supra.*

29. The United Nations Convention on the Law of the Sea closed for signature on 9 December 1984, having received a total of 159 signatures. It will enter into force 12 months after the date of deposit of the sixtieth instrument of ratification or accession. As at 6 October 1988, 35 instruments of ratification had been deposited with the UN Secretary-General. The Convention has continued to receive broad support not only on the national level but on the international plane as well, as an instrument regulating the uses of the oceans and their resources in a manner consistent with the interest of all nations and as an essential pillar in the process of strengthening co-operation and peace. The UN General Assembly, on 1 November 1988, called on more countries to ratify the Convention so that the new international legal regime for the uses of the ocean and deep sea-bed, and their resources, can come into force as soon as possible. A Commission has been preparing for two institutions—the International Sea-bed Authority and the International Tribunal for the Law of the Sea—which will come into being when the Convention takes effect.

30. The 1989 Antarctic Treaty, which generally administers the Antarctic continent and waters south of 60 degrees south latitude, has 18 Consultative Parties. These have adopted a Convention on a minerals regime in the Antarctic. In November 1988, the UN General Assembly's First Committee (Political and Security) approved two draft resolutions, one regretting that the Antarctic Treaty Consultative Parties had adopted a Convention on a Minerals Regime in the Antarctic despite a resolution calling for a moratorium on such negotiations, and the other appealing to the Treaty Parties to exclude the racist apartheid regime of South Africa from participation in their meetings at the earliest possible date. *UN Press Release No. GA/PS.27422* (United Nations, New York, 22 November 1988).