GLOBAL ENVIRONMENTAL SECURITY
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The phrase environmental security includes two words from very different areas of discourse. The geography of environmental discourse is defined by eco-systems rather than political boundaries, while security analysis focuses on the nation state. Environmentalists often worry about threats posed by national sovereignty. Security analysts are most often concerned about threats to sovereignty. Environmentalists tend to look at the very long-term consequences of our actions. Security analysts are much preoccupied by immediate threats. Therefore at the outset let me clarify the sense in which I use the term 'environmental security' in this paper.

The 'Securitisation' of the Environment

The environment and access to natural resources clearly plays a major role in any state's conception of what it needs to do in order to protect the well-being of its citizens. In so far as this requires it to take into account the actions of other states or interstate processes the environment will become a factor in its foreign policy and security policy. An explicit discussion of environmental matters is now quite common in official statements of security policy.[1] This has been fed by doomsday journalism of how environmental stresses and resource competition could become a source of inter-state disputes, conflicts, refugee flows, state failure and all manner of other disruptions.[2] Water wars are a perennial in these forecast. Almost all of these projections see this as happening in the developing world. Some also see these pressures threatening Western values and lifestyles.

There is little evidence of this happening. This is not surprising. Environmental conflicts are often diffuse and subnational and can lead to violence within states. They can cause tensions between neighbouring states, which share vital resources. But this is as likely to lead to cooperation as to conflict. Environmental and resource disputes are long-term and there is rarely a clear triggering event to provoke violence. As for competition arising from resource scarcities, one would have thought that in an open trading system market prices allocate scarce resources rather than the force of arms. Systematic analytical work leads to the conclusion that the environment has seldom been the primary or even the major source for conflict, though it may have contributed to economic and societal stresses that led to conflict.[3] In fact, looking particularly at recent events in Africa, one could argue that the causation is the other way around. Famines do not cause wars; wars cause famines.

The state centric view of environmental security is part of the search for security threats in the post Cold War world perhaps in order to justify the continued role of security establishments. It reflects a pervasive fear of the majority that any privileged minority will tend to harbour. The truth however is that it is the lifestyle of the rich which threatens the poor who have to cope with the consequences of global warming and hazardous waste disposal, to take but two externalities.

Environmentalists have sometimes joined in this conflation of environmental security and national security because the apocalyptic style of discourse suits their proclivities. They have also been seduced by a desire to raise the profile of environmental issues in national policy, to move in from the outer rims of government to the inner sanctums that deal with weighty matters of war and death. Their hope is that by connecting their concerns with grand strategies of national survival they will enhance political support for the solutions they propose. But this also carries the risk that resource and environmental questions get enmeshed in group or national rivalries. It is difficult enough to secure agreements on transnational and global environmental issues when the environmental concerns and interests of countries differ. Linking these with other sources of difference and tension makes the task even more complex.

Global environmental security matters not because of any threat of violent conflict but because of environmental trends that are recognisable threats to human survival and well being. Its importance does not have to rest on any hysterical fear of war. It is sufficient to recognise that it is vital for the life of each individual human being. The security that we need to address is that of individuals and of eco-systems not that of states. In fact some analysts would even prefer the term 'ecological security'.[4] However this may suggest a type of deep ecology that refuses to privilege humans. Hence it is best to stay with the term as it is and connect it with the broader notion of human security.

Environmental security cannot be secured except as part of an effort that simultaneously addresses both environmental concerns and the livelihood and well-being of people. It is of course good if people are provided with protection from floods. But that is incomplete if they are not provided with protection from starvation and disease. Nor can the support for livelihood and consumption be limited to emergencies. It surely is a paradox if nutrition improves in droughts and floods because of emergency relief and worsens in normal times.

As is well known, at the Stockholm Conference on the Human Environment, Indira Gandhi, the only head of government from outside Sweden who considered the issue important enough to attend, said:
"Are not poverty and need the greatest polluters?...How can we speak to those who live in villages and slums about keeping the oceans, the rivers and the air clean when their own lives are contaminated at the source? The environment cannot be improved in conditions of poverty."[5]
The point she sought to make is that unless people's livelihood and well-being are sufficiently secure it is difficult to give priority to longer-term threats from environmental stress. At the same time, this livelihood security is itself threatened by certain types of environmental risks. That is how the concept of sustainable development entered the policy debate through the Brundtland Commission, the Rio Earth Summit and the Johannesburg Summit. In some ways this was a compromise allowing developing countries to focus on developmental concerns and the industrial countries to focus on long-term environmental risks. Yet something new came out of this compromise – a recognition in developing countries that the pursuit of development itself required greater attention to sustainable resource management and environmental health and in the developed countries that end-of the-pipe solutions and resource preservation were not enough and that driving forces in the economy had to be addressed if environmental risks are to be managed. [*]

The primary focus of this paper is on global environmental issues. But actions at the ground level are driven more by local needs and priorities and, even if our purpose is to address global problems, it is useful to start with local needs and then see what needs to be tweaked to reflect global concerns better.

Environmental Security at the Local Level

At the local level the primary developmental concern in poor countries is clearly poverty eradication in the broad sense of income generation, improved health and education opportunities, participation and

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[*] The author of this paper was Senior Adviser to the Brundtland Commission and was brought in essentially to bridge the differences regarding priorities that had emerged in the deliberations of the Commission. He recollects with satisfaction the relief with which the Commission received his first paper on the concept of sustainable development submitted to them in 1986. He was also the Deputy Secretary General of the Rio Summit, which was labeled a Conference on Environment and Development. The more integrated notion of sustainable development entered the policy discourse as it evolved during the negotiations. This is when the real political compromise between developing and developed countries was struck. By the time of the Johannesburg Summit, where the author was Secretary General, the term had become an accepted part of the diplomatic vocabulary and is present in the official title of the summit itself. However, as with all compromises, and even more so with a fuzzy concept like sustainable development, each party stresses what it considers more important. To avoid all confusion developing countries often insist on qualifying the phrase by saying 'sustainable development and sustained economic growth' much to the annoyance of the committed steady state environmentalists. After some two decades of proselytisation, the author is satisfied that the concept has helped to find common ground between North and South and between environmental and developmental activists and has led to some change in mindsets and priorities on all sides.

empowerment and greater equality. Much of this is reflected in the Millennium Development Goals which were endorsed by world leaders at the UN's Millennium Summit. Most developing countries have similar national goals. From the perspective of sustainable development and environmental security, the main challenge is to connect these goals with better resource and environmental management.

Take first the case of rural areas of the developing world where most of the world's poor live. The most important task is to recognize that sustained improvements in rural living standards and employment requires that the natural resources, land, water, forests, fishing grounds, on which this depends, are managed for equity and long-term development. Hence household oriented anti-poverty programmes must include provisions for resource management and, in turn, area oriented programmes must include differential support for poor households. Poverty stricken households may be the target group, but the planning should be built around the concept of *sustainable livelihoods*, starting first with the existing activity base of these households. It has to address other enabling conditions, particularly local infrastructure. One dimension of this that is of particular importance both for development and for environmental management is rural energy supply, a matter which rarely receives attention in typical anti-poverty programmes.

Poverty is more than income deficiency. Addressing it requires improvements in health and education. The health dimension is closely connected to environmental issues like water availability and quality, indoor air quality (closely connected with the issue of rural energy supply mentioned above) and control of communicable diseases, many of which are vector borne and linked to local environmental conditions. Often it is the poorest households who are most vulnerable because of where they are forced to live or because they lack adequate access to safe water and sanitation. Hence local environmental management has to be seen as part of the drive to improve the quality of life for poor people. Better health, besides being a necessary goal in its own right, also has beneficial effects on the ability to work and on productivity. Improvements in water supply, sanitation, energy availability have been shown to have a beneficial effect on school attendance, particularly by girls.

Empowerment is a crucial component of the accepted goals of development. Too often this means a token consultation with local notables and NGOs by bureaucrats and aid agencies. Building credible public authority at the local level is essential if the anti-poverty programmes are to work. Hence local democratic institutions and community organizations need to be brought into the process of planning, implementation and accountability.

Many of the elements mentioned above are missing in household oriented anti-poverty programmes. A major focus of international support is the PRSP (Poverty Reduction Strategy Papers) process launched initially for countries being provided with debt relief and now extended to others. These strategies must move beyond safety nets and provide for the creation of sustainable livelihoods, for resource management, for local roads and energy, for water supply, sanitation and local environmental management and for the engagement of local democratic institutions.

The situation in urban areas of the developing world requires an even closer integration of anti-poverty and environmental goals. The 600 million slum dwelling poor in the Third World cities experience some of the worst conditions for water supply and sanitation, for air quality for exposure to hazards for living space. This is an integral part of their poverty. Hence the integration of anti-poverty and environmental management is absolutely central for programmes aimed at helping the urban poor in developing countries.

Planning for development, monitoring development performance, coordinating multiple entities around critical development goals have been the staple of development administration for a long time. Public responsibilities for environmental management are relatively new and much of the capacity available is at higher levels. But action is required at the ground level and that is where public capacity needs to be strengthened. The management of an environmental resource or issue cannot be neatly partitioned into separate activities for local, national global ends. Forest management, for instance, will involve very similar activities whether it is undertaken as part of local ecosystem management, or as part of a national forest strategy or as a fulfillment of a global obligation. The ends may be global but the action has to be local.

Using an analogy from the health sector, the strengthening of public capacity to manage the environment at the local level can be done through the promotion of local capacity for *primary environmental care*. This local capacity has to be designed as the first point of a system for

- monitoring the environment (air, water and land quality, local flora and fauna, eco-system integrity, etc.),
- ensuring observance by local enterprises of norms set by legislation (emission and waste management standards, chemical safety standards, etc.),
- providing referral services for environmentally sound technology to local enterprises,
- providing early warning of impending environmental problems, coordinating the relevant local activities of line departments (land and agriculture, forests, fisheries, transport, energy, industry, etc.),
- providing a space for public participation in environmental management and for addressing local environmental disputes.

The local capacities that are required for primary environmental care could be brought together under one roof as is often the case for health services in a primary health centre. In this case too, the physical presence of the centre could become a potent force for mobilisation and education. Such a centre has to be seen as a knot that brings together several threads that run hierarchically from the local level upwards. The threads may represent line departments or programmes built around objectives like disease control or wasteland rehabilitation. The role of the primary environmental centre is not to take over these line or programme functions, but to use these capacities for local environmental care.

Some of the line departments and programmes may also need reorienation. An important instance of this is the injection of an *eco-system management orientation* in planning for land use, water resource development, forest management and support systems for agriculture and related activities. Line departments and programmes dealing with these are often organised around schemes for specific crops or products, or inputs, or functional specialisations. An eco-system orientation means that the organising principle should be to group functions, personnel and resources according to local eco-systems and frame all interventions as integrated plans for these.

Environmental concerns play a far greater role in local politics than they do at higher levels. Hence local capacities for environmental management should be anchored in local democratic institutions and be well connected with community organisations and locally active NGOs. This is a better way of handling public participation than the alternative of consultations conducted by public officials accountable not to local people but to higher levels in the political system or bureacracy.

The emphasis placed on local capacity in these proposals reflects the obvious fact that in the absence of action in individual fields, factories, fishing grounds and forest stands neither local nor national or global goals can be attained. There is of course a different sort of capacity building which has to take place at higher levels – for referral services and technical support, for planning, monitoring and reporting, for research and analysis and so on. The strengthening of national capacities for environmental management will involve improved legislation, monitoring systems, planning capacities, personnel and resources for implementing plans and similar measures. Building national capacity for addressing global environmental threats has to be done as part of the capacity building required for environmental management in general.

The situation in developed countries is substantially different. In most parts of the developed world local environmental quality has improved greatly over the past decades. The bulk of the population lives in urban areas where air and water quality, housing conditions and public amenities have improved to a point at which there is no immediate sense of local environmental threat. Certainly some problems of a local character remain, traffic congestion, the presence of hazardous waste dumps, industrial squalor in some places. But the most urgent issues are really about the contribution of developed country consumption to global problems and, in turn, the potential long term impact if the global threats do come to pass. These are the matters that are addressed in the next section.

Global Ecological Interdependence

There is a widely shared perception that environmental stresses are becoming worse and more threatening. However at the outset a word of caution is necessary. There is a tendency in the environmental literature and a great deal of the related journalism and policy dialogue to an apocalyptic style of discourse that seems to suggest that every dimension of human existence is becoming worse or precarious. Warnings of doom are used to attract attention at some cost to accuracy. Confident predictions that were made some thirty years ago about dire famines in South Asia, water wars, exhaustion of minerals have not come to pass. Projections of the future framed in alarmist terms that do not stand up to scrutiny may well discredit the underlying cause for concern when they are shown to be false. That is why a balanced assessment of risks is very necessary.[6]

This concern for balance must also recognise that some global trends are positive. Humans live longer and are better fed and educated than they have ever been and that is the case in the poor countries also. The point however is that there are still too many who are undernourished, illiterate and subject to avoidable diseases. There are also many whose exposure to health, environmental and economic risk requires measures to reduce these risks or insure against them. One can go further and say that a simple extrapolation of present trends in energy and material use will, with present technologies and projected population growth, worsen many of these risks. Hence, with full respect for all the progress achieved so far, 'business-as-usual' is not a viable option.

Environmental risks have to be looked at in the context of interdependence. Ecological interdependence has always existed in the form of energy and material flows and species exchange between eco-systems. The geographical scale can range from neighboring eco-systems to the earth as a whole. The time scale between cause and effect can stretch into decades or centuries. There are thresholds and discontinuities, which can lead to a sudden change. The reason for concern now is because the scale and depth of the human impact on eco-systems has increased enormously. The geography of interdependence is now global. The emission of greenhouse gases threatens global climatic changes at rate higher than at any time in the past 440,000 years for which we have ice core data. The globalisation of industries like fishing extends the impact of resource depletion to countries far away. The accumulation of radioactive wastes generates a man-made risk that will last for generations. Human interventions in nature now include the introduction of exotic chemicals and genetically manipulated organisms into eco-systems.

The World Wide Fund for Nature has attempted a calculation of human demands on the biosphere, a measure of our ecological footprint. The components of demand used cover crops, grazing, timber, fuelwood, energy use and space for settlements. The calculation asks how much land would be required for one person's consumption and compares it with availability. According to this calculation, at the global level our demands on the biosphere require 2.28 ha of land per capita against the availability of 1.90 ha per capita, which is an excess of about 20 per cent. There is also a wide variation by income. The demands of the rich countries would require 7 ha per capita, while those of the middle income countries would be around 2 ha per capita and of the low-income countries a little under 1 ha per capita. A summary calculation like this should of course be interpreted cautiously and perhaps the most important message is the vast difference by income in the human impact on the biosphere.[7]

The globalisation of ecological interdependence has another implication of crucial importance. Our systems for ecosystem management are basically national. But eco-systems do not respect national boundaries. In this sense ecological interdependence is qualitatively different from economic interdependence that we know so well because of the processes of globalisation. A nation can manage its economic interactions with the rest of the world through border controls on trade, investment and technology. But border controls are not a possible option for managing trans-boundary pollution or the impact of carbon emissions. The fortress option is not available.

Ecological interdependence may be different from economic interdependence, but it is connected. The human impact on eco-systems cannot be understood without addressing the driving forces in the economy in the form of consumption growth, the size, structure and location of population, technological options and choices and so on. Nor can it be understood independently of power relations within and between countries.

To summarise: Ecological interdependence involves uncertainty, long-range cause and effect relationships, thresholds and discontinuities, a scale of impact that is reaching limits in some areas, a close connection with the processes of economic globalisation, a geography of impact that cuts across national jurisdictions and an incidence of impact that reflects power relations. For all of these reasons it requires a qualitatively different form of global response.

The appropriate response to risk is to understand it better, shift the liability for bearing it to where it should belong and take measures to reduce the risk and insure against it with mitigating measures. In the case of environmental risks this translates into
- better monitoring and assessment,
- holding agents liable for the damage they cause and
- creating regulatory measures and incentives shift the behavior agents to reduce risk.

The global environmental risks that confront us involve in many cases the possibility of future damage. They also involve some uncertainty since they are based on projected effects rather than observed impacts. But environmental processes are long-term in nature and, if we were to wait for damage to be observed before requiring action to be taken, it may be too late. In the global response this has been addressed by securing agreement on the precautionary principle which asserts that action need not wait for full scientific certainty, a principle of insurance that we apply quite regularly in every day life. As a corollary, special arrangements for building a scientific consensus have been put in place in specific cases to support a policy dialogue.

One cannot over emphasise this task of a coordinated global effort to improve data and analysis of critical environmental processes. Cooperation on common problems is easier if there is s shared understanding of the facts and the underlying dynamics of the process. But if this is to be truly global, then it has to go hand in hand with a commitment to strengthen these capacities in developing countries. Developing countries themselves need to invest more in this area so that their scientists can join in making the analysis instead of their decision makers having simply to take the analysis that is placed on the table by others.

Global arrangements for liability are rudimentary. In a broad sense the principle of transboundary liability and the "polluter pays" principle are reflected in the Rio Principles which were endorsed at the Earth Summit. There is also a principle of "good neighbourliness" in international law. But formal international arrangements for enforcing liability do not exist. Redress, when available is largely within the framework of national laws. UNEP has established several working groups to develop liability protocols for transboundary pollution damage, for off shore mining and drilling, for illegal trade in hazardous products but with little success so far. Other international bodies like the International Law Commission, the IAEA and the OECD have also sought to address the issue. Some progress has been achieved in Europe within the framework of the EC.[8] Liability is a powerful tool. The judgement in the case of the Exxon Valdez oil spill in Alaska in the national courts of USA did more to raise tanker safety standards than decades of international negotiation on marine safety. The reason it has not made much progress is that many observable instances of transboundary damage involve what has been called "…the spatial outsourcing of environmental externalities" by the powerful.

The preferred mode to address environmental risks has been the regulatory one of negotiating conventions and protocols within the framework of treaty law. There are now over 100 environmental treaties including regional arrangements for shared resources or regional seas, a wide array of conventions for conservation of species and threatened ecosystems and global treaties for environmental risks like climate change, ozone depletion and hazardous wastes. There are also treaties, which cover rights and responsibilities of states in areas beyond national jurisdiction like the high seas and outer space. Besides the treaties a substantial body of soft law has been built up in the form of action programmes, codes of conduct and the like. In what follows I look at four areas in order to understand better the adequacy of this approach.

Global Environmental Agreements

The climate of the earth has always had a natural variability over geological time. It is this variability which has led to the alternation of ice ages and inter-glacial periods, one of which we are living in now.

The essential difference now is that we humans are adding to this variability with the emission of greenhouse gases that trap a larger proportion of the sun's heat in the atmosphere. There are several green house gases, but the most important, in terms of quantum and time of residence in the atmosphere is carbon dioxide emitted mainly as a by-product of fossil fuel consumption. Around 60 per cent of the carbon dioxide emissions come from the most industrialised countries that account for 20 per cent of the world's population. In effect they are exporting an externality to the rest of the world.

The most widely accepted scientific assessment projects a temperature increase of 1.4-5.8 degrees C, compared to an increase of 0.2-0.6 degrees C in the 20th century. The projected rate of warming is faster than at any time since the last ice age. This warming will alter patterns of precipitation, increase the incidence of extreme weather events and raise the sea level by 0.09-0.88 m by 2100. Even at the lower end of the projections many eco-systems and human societies will have difficulty in adapting to the rapidity of change. At the higher end, the consequences would verge on the catastrophic particularly for island countries and for coastal settlements. For instance, it has been estimated that a 1 m rise in the sea level would displace some 70 million people from coastal areas in Bangladesh and submerge 80 per cent of the Marshall Islands. Even for a mid level forecast of a sea level rise of 40 cm the number of people affected by coastal storm surges increases several fold relative to the base case of no sea level rise.[9]

The regional spread of the warming is uneven with many of the positive effects of warming arising mainly in mid-latitude and colder regions. The scientists conclude, with what they describe as medium confidence, that:
"The projected distribution of economic impacts is such that it would increase the disparity in well-being between developed countries and developing countries, with disparity growing for higher projected temperature increases…The more damaging impacts estimated for developing countries reflects, in part, their lesser adaptive capacity relative to developed countries." [10]
These estimates are based on models that do not take full account of climate variability and extremes and the effects of different rates of change. If we were to allow for this, the differential between developed and developing countries would, in all likelihood, be even greater.

Evidence of human impact on climate first emerged in international discussions at the First World Climate Conference in 1979. The international response to this particular environmental risk began with cooperative scientific work, which picked up pace with the establishment of the Intergovernmental Panel on Climate Change in 1988. At this stage there was still no clear scientific consensus on the magnitude of change which could be expected, the links with human impact and the overall impact on eco-systems. But enough was known to justify a major global scientific effort. Along with this scientific work a policy dialogue was started with the Second World Climate Conference held in Geneva in November 1990, when the Rio Summit was in the early stages of preparation.[11] The political pressure for action came from some developing countries. The then President of Bangladesh and the President of Maldives raised the issue in the Commonwealth Summit of 1988 and later in the United Nations. The combination of scientific work, the high political profile of the Rio Earth Summit, the pressure from vocal environmental groups and from some developing countries, who found allies in some globally minded industrial countries, led to a commitment to negotiate a framework convention to be ready for signature before the Rio Summit in June 1992.

The Convention that was opened for signature at Rio was merely a framework that did not impose any binding obligations on emission reductions on the parties. But by this time public awareness and pressure had built up and soon after the Convention entered into force in March 1994, a process of developing a binding protocol began, This culminated in the Kyoto Protocol in which the industrial countries accepted binding obligations on emission reductions by 2008-2012 that varied amongst them, but would amount to a 5 per cent reduction relative to 1990 and a 20 percent reduction relative to what emissions would have been in the absence of this commitment. The protocol also included some innovative flexibility mechanisms allowing countries to fulfil their obligations by undertaking emission reducing activities in developing countries or buying emission credits from other industrial countries which were in a position to do better than their obligation. [12] However the situation changed with the election of a new administration in USA which backtracked on its commitment. The situation in mid 2004 is that the Kyoto Protocol is yet to be

ratified by the requisite number of countries and is not yet in force. It also appears that only a few of the countries that have ratified are on track to meet their emission reduction targets.

The depletion of stratospheric ozone caused by CFCs was first presented in a scientific paper in 1975. The main consequence of such depletion would be an increase in the influx of UV radiation to earth with risks for human health, plankton productivity, which is crucial for marine life, and possibly for agricultural production. The projections of risks to human health attracted substantial media attention and when in 1985 actual observations of the ozone hole above the Antarctic made the threat very real, the political pressure for agreement greatly increased. This led to a negotiating process which started in 1984 and led first to the Vienna Convention(1985) and later to the Montreal Protocol(1987). As more data on the ozone hole emerged the provisions of the convention were gradually strengthened with the ultimate aim of eliminating the use of CFCs altogether. The stance of the developed country negotiators in the early stages was influenced by short-term economic considerations like export markets, access to alternate technologies and so on. Representatives of the chemical industry played a major role in influencing government positions. But with the growing evidence and the public fears about the health effects progress was made. By 1990, the differences between the developed countries about the commitments on reduction were largely resolved and the focus shifted to the inclusion of developing countries. The stance of the developing countries, notably India and China, was that they were not responsible for the problem, but were prepared to join if they were given access to finance and technology for the switchover. This clashed with the commercial interests of western chemical firms. But the mounting evidence of ozone depletion, by now observed even in the Northern hemisphere, persuaded the developed countries to make some concessions which secured the adhesion of India China and key developing countries to the Convention. In addition to the concessions there was also a certain threat of trade restrictions which played a role in bringing them around. Since then the convention has been implemented with reasonable success and current projections suggest a recovery in the ozone layer in about 50 years. [13]

The case of the trade in hazardous wastes is very different from the two earlier examples. It does not involve the use of an open access shared resource. It is more a case of transboundary pollution, an environmental externality that involves the passing on of hazards from one country to another. Well publicised events like the industrial accidents in Seveso, Italy and Bhopal, India , the Love Canal episode involving chemical wastes and Chernobyl had sensitised the public to industrial hazards generally. Waste disposal in landfills was increasingly seen as inadequate in developed countries because of the leakage of toxic substances into groundwater and other health risks and the growth of environmental consciousness had increased public objections to it. Alternatives like recycling were expensive. The particular issue in the hazardous waste discussions which led to the Basel Convention (1989) was whether producers in developed countries, which were the major exporters of waste should take advantage of the lack of knowledge about the hazards and weaker control mechanisms in developing countries. Throughout the negotiations the developed country stance was to focus on monitoring, regulation of illegal trade and prior information and consent. The African countries wanted a global ban on such trade on the grounds that environmental externalities should not be exported. There was also pressure from NGOs, particularly Greenpeace. Yet, agreement was difficult because there was no direct benefit to the developed country participants who would have to do most to implement such a ban. The Convention as initially negotiated simply recognised the right of individual countries to ban movement and put in place a monitoring mechanism to track movements. But the developing countries, particularly from Africa, maintained their pressure and finally in 1994 the Conference of Parties did pass a resolution to institute such a ban on hazardous waste movement from OECD to non-OECD countries.[14]

Biodiversity refers to all aspects of variability evident within the living world. It covers genetic diversity within species, species diversity and eco-system diversity. Focussing on species, around 1.7 million species have been described out of a possible total of many millions, the best estimate at present being around 14 million. Out of these around 24 percent of mammal species, 12 per cent of bird species, around 3-4 per cent reptiles, amphibians, fishes and flowering plants and much smaller proportions of other categories of species are threatened with extinction. These estimates are incomplete because the proportion of species assessed is quite low except for mammals and birds. The number of species domesticated by humans, which is a good measure of the numbers that are essential to human survival is quite small – around 200 out of 270,000 known species of plants, around 20 out of the 5,000 known species of plants and

around 10 out of the 10,000 known species of birds. In the case of domesticated species the major concern is the loss of genetic diversity in the varieties actually used in farming. The value of biodiversity is therefore essentially an option value of genetic resources, which may be needed in future. Species diversity also has a value in maintaining the viability of eco-systems, which depends on a complex interaction of species, many of which do not enter human consumption directly. Much of the world's bio-diversity is contained in areas within the jurisdiction of developing countries, particularly in tropical forests.[15]

The major concern of ecologists has been the rate of species extinction and eco-system degradation. Species extinction is not unusual – it has happened through time and the number of species existing now is a tiny proportion of the total numbers that have ever existed. However the current extinction rates are judged to be 100-200 times higher than the rate of "normal" extinction indicated by the fossil record. Much of this is attributed to human impact through loss of habitat, introduction of exotic species and, in the case of some species like fish, because of over exploitation.

A new element has been introduced by the ability to create exotic living organisms by genetic engineering. The main motivation for this is to introduce desirable characteristics from one species to another. This has led to fears about eco-system and health effects of these exotic organisms, which cannot be contained within the original area of use. It is, in this sense, a fear of an externality. This concern has led to bio-safety becoming a part of the global discussions on bio-diversity.

The protection of biodiversity has been a focus of global environmental diplomacy for some time. Most biodiversity conventions are designed for setting standards and providing support for the protection of specific ecosystems like wetlands or of specific categories of species like the one on migratory species. The Convention on Trade in Endangered Species (CITES) intrudes further into national autonomy and requires signatory countries to undertake trade control measures on products of species that are deemed to be endangered within the framework of the convention. The Convention on Bio-diversity grew out of an attempt to provide an umbrella for the separate conventions but developed a momentum of its own in the context of the preparations for the Rio Earth Summit. [16]

The bio-diversity convention had strong support from well-organised scientific groups and NGOs. UNEP had also worked towards it with a series of expert working groups. But the scientific consensus was not sufficient since the value attributed to the conservation of bio-diversity was essentially a matter of economic judgement based on limited evidence and political judgements about the moral value of species conservation. The concentration of bio-diversity in developing countries and the bio-technological capacity to use it in industrial countries also led to different perceptions on issues about access and property rights. Later, after the original convention was negotiated, further differences surfaced in the negotiations on a bio-safety protocol reflecting not so much a North-South divide as a Transatlantic divide.

The Convention was finally agreed with three main areas of activity as the aim – conservation, sustainable use and fair sharing of benefits. The convention places less emphasis on regulation and more on overall goals which the parties are left to pursue according o their capabilities and on capacity building. However the Cartagena Protocol on Bio-safety does provide a legally binding framework for the transboundary movement of living modified organisms.

The Convention on Biological Diversity illustrates the difficulty in negotiating agreement on a global issue, even when there is a broad scientific consensus if the resource concerned is predominantly under national jurisdiction and when there are wide differences in the interests and judgements of different countries.

There are many other global agreements that deal with resources and environment. But the lessons are broadly similar. In a sense they are all an attempt to deal with shared resources or environmental externalities. In the next section a more general analysis of the reasons which can contribute to or hold back agreement are discussed.

An Evaluation

The difficulties we experience in negotiating environmental agreements and in ensuring compliance are due to certain structural features of international relations, distortions in the motivations of states and weaknesses in the national capacity for implementation.

Sovereignty rests with states and the effectiveness of treaty based relations rests on the willingness of states to act as responsible global actors. Each state has only partial control over shared open access resources like the atmosphere or the high seas. It may have an interest in a resource controlled by other states like biodiversity. In some ways this is similar to the situation in a village where everyone has an interest in common land and each farmer is affected by how his neighbours use their land. We could learn a lot by looking at common-property management systems at the local level and the factors that determine how well they work.[17]

The first requirement is that there must be a reasonable presumption that cooperative management can improve the resource and that all users will benefit. One must distinguish here between different types of global environmental issues. Open access resources are those to which everyone has access, the global atmosphere being the most important example. The problem of finding agreement in this case often boils down to the difficulty in agreeing on fair shares for all users if existing usage is very unequal. If there is a limit to total use long-term convergence to equal shares may be accepted as a starting point. But then the difficulty becomes one of deciding on a criteria of fairness. Should it be on a per capita basis? Would that leave the resource underutilised as some may get more than they need? Should need be taken into account? How much time should be available to existing users to adjust their use to their fair share? In the case of the climate treaty all of these questions were asked but none of them were answered. The approach taken in the Kyoto Protocol was an incremental one of identifying where adjustment of use would be required on any plausible scenario and negotiating a burden sharing deal. In the ozone treaty the situation was simpler, once it was agreed that the goal must be the total elimination of CFCs. [†] Issues about the timing of implementation by developing countries and assistance to them were contentious but could be resolved as the costs were much less than the presumed benefits to the developed countries.

Biodiversity is a very different case. Most of the resource is under national jurisdiction and there is no open access. It is also a resource where there are many traditional rights, particularly amongst forest dwelling autochthonous groups. There is a perceived global interest, particularly in the developed countries, in the conservation of biodiversity, much of which is in the developing countries. They too care for conservation but more from the perspective of national interest and, in some enlightened countries, the traditional interests of autochthonous groups. In this situation, defining commitments that reflect a mutuality of interests is more difficult. Hence the focus is largely on improving the planning and funding of conservation measures and cooperative science. The growing importance of intellectual property regimes for the products of bio technology opened yet another gap in the interests of the holders of biodiversity and the users.

The case of the trade in hazardous wastes illustrates a third situation of an unrequited use of one country's resource by another. It is a classical case of an environmental externality. In the case of legal trade it could be argued that the waste disposers were simply exploiting the difference in national controls. But in the case of illegal trade this was not the case. The main reason for asking for a global ban was to add the greater capacity of the developed countries to monitor and intercept illegal shipments instead of leaving it to the border officials of the importing country, many of which lacked the means and the capacity in a very technical area. The difficulty here was that the exporting countries had little to gain and much to lose since the difference in disposal costs (or more accurately disposal charges) was huge. That is why the convention remains a weak one and still lacks a liability protocol.

[†] In terms of the classical narrative of the tragedy of the commons what happened in the climate negotiations was that there was a general agreement that there are too many cows in the field. Then, instead of working out how many there should be, the agreement was that those of us who have the largest herds will withdraw some cows. Of course the biggest cattle owner has simply refused to go along saying that he will teach his cows to behave better. In the case of the ozone everyone agreed to remove their cows from the field.

Another factor that determines the success of cooperative arrangements for common property is the extent to which participants agree on the data and the dynamics underlying projections of the future state of the resource. The massive effort put into the Intergovernmental Panel on Climate Change was aimed at this end. But given the complexity of the issue and the partisan lobbying by some industry groups (aided by some scientists) a clear consensus was not possible at the level of governments. The USA, under the present administration, continues to argue that the case for legally binding limits has not been established and has therefore backtracked on its commitment and refused to ratify the Kyoto Protocol. In the bio-diversity process we are even further away from a consensus, particularly on matters dealing with bio-safety. On the other hand, in the case of the ozone treaty, a high level of scientific agreement was attained and this is surely one of the factors, which has led to greater success in this area.

The crucial importance of science is borne out well in the case of whaling. The international agreement on this is one of the oldest and has been in place since 1946. The actual implementation has gone through three distinct phases – a first phase when the negotiations on the permissible annual catch were primarily driven by the national interest of the whale-hunting states, a second phase when the outcome was strongly influenced by objective scientific advise on safe levels of catch and a third phase when, under the influence of NGOs, a total ban was sought essentially on value based arguments about protecting whales. A careful study suggests that the second phase was the most successful and in the other phases the whale hunting states did more or less what they pleased, in contravention of the whaling bodies decisions in the last and current phase.[18]

Sovereignty-free science can help to bring sovereign states together. Nations can refrain from agreement on the grounds of incompatible national interest which, given the degree of inequality amongst them, is very likely. They can differ on the moral values regarding say animal rights or human responsibilities to nature or intergenerational equity or the principles of fairness and equity. But in the policy ethos of today it is much more difficult to reject scientific assessments and advice, particularly if it comes from a consensus building process disassociated from national positions. Scientists, particularly natural scientists, are an epistemic community with a shared language of discourse, which makes arbitrary dissent quite difficult.

The success of a common property regime depends on the ability of participants to take a long-term view and be willing to accept short term costs for resource recovery. In the case of global environmental agreements this is particularly important, as the risks we seek to avoid are far further than the time horizon of politics. In the case of the climate convention the reluctance of the USA to join the Kyoto Protocol and the very modest commitments made by the others reflects this discounting of distant benefits. In addition the current adjustments required touch core areas of the economy and could involve serious political costs. In essence this is a market imperfection as today's energy producers and consumers do not have to bear the future costs of their actions. In fact, since a disproportionate part of the future costs will fall on other countries like the small island and low-lying countries, there is a counterpart to this market imperfection in the unequal power of states in global negotiations. In the case of the ozone treaty a long view could be taken as the sector concerned was more isolated and the economy wide ramifications of initial costs were limited. Perhaps the fact that much of the future costs would have been borne by the citizens of the industrial countries helped. In the case of bio-diversity the time frame is even longer and the benefits are difficult to quantify. Unless better ways are found to reflect the rights of future generations in today's decision making this myopia will continue.

A crucial factor is the motivation of the participants. In the case of global environmental negotiations governments enter the process essentially to defend their national interest as they see it. But this interest is not defined autonomously. The role of the scientific community in shaping a global consensus has been referred to earlier. But the same scientists are often influential nationally and can shape media perceptions, public opinion and more directly carry influence through the government's scientific advisers.

Another group with great influence is the community of environmental NGOs. There are now many influential global networks that have a substantial influence on negotiating processes – the role of Greenpeace in the hazardous waste negotiations and of IUCN and WWF in the biodiversity negotiations are examples. In fact one could argue that environmental risks are on the global policy agenda because of

NGOs. They also are influential in shaping national positions– the role played by the Centre for Science and Environment in India is an important instance.

A third group that influences governmental views is the corporate sector. Corporations were central to the ozone process. National delegations were in constant touch with them. In fact it could be argued that the timing of accession by several countries was determined by corporate assessments of when they would be ready with the technology for alternates to CFCs. While the views articulated by scientists and NGOs are generally sovereignty free, long-term and focussed on public interest, corporate perceptions are shaped more by the impact on profitability in the foreseeable future. This reinforces the tendency of governments to take a short term nationalistic view. This type of influence has played an important role in the climate process.

An important consideration in the management of common property is a perception by each participant that the others care for his interest, will reciprocate concessions and can be trusted to observe commitments. It is particularly important that the more powerful participants demonstrate this. Unfortunately this sense of reciprocity and trust is often missing in global environmental negotiations. In the climate process the USA wants more substantial commitments from developing countries. But they in turn see a powerful state that has backtracked on its commitment and despite being the largest contributor to the problem is unwilling to do even as much as other rich countries are ready to do. Unless the rich are ready to play the game fairly the poor cannot be expected to join and be beaten.

Environmental change is unavoidable as human societies grow and develop. The real issue is to understand when impending changes need to be addressed by national and global policy with a thorough analysis of the costs and benefits of alternatives including the costs and consequences of inaction. A global analysis could identify a global optimum, as has been done in some exercises for global warming.[19] Such an analysis would indicate the course of action for each country. There will be winners and losers and a true optimum requires that the losers be compensated. The optimum also has to take into account the possibility of a catastrophe as distinct from a slow change. Even if all this could be done satisfactorily, whether a bargain can be struck at such a global optimum depends on how great is each states need for action by others. Each state works out its policies in terms of a national not a global optimum and may well conclude that the costs of cooperation, which would require it to factor in the costs and benefits to others, is too high. In the case of global warming, a national view may suggest a lower level of effort at carbon emission for some countries than what the global optimum requires because they do not take into account the unrequited costs that would be borne by others. That, to some extent is what has happened and lies behind the unwillingness of the USA to join the Kyoto Protocol and the large concessions which had to be made to some other countries to persuade them to join.

Environmental agreements are sovereignty bargains[20] in which states surrender some autonomy of action in order to acquire some influence on the policies of other states which impinge on them. This idea of surrender of autonomy creates an initial hurdle that is often difficult to cross. But besides autonomy, sovereignty also involves authority and control. Paradoxically global agreements can enhance this dimension of sovereignty. A commitment by a government on emission control or waste management or more sustainable resource use can become a good basis for enhancing its authority and control over domestic producers. It can also lead to better monitoring and information to exercise this control and fulfil its reporting obligations under the international agreements. This has been seen in the domestic impact of global agreements dealing with the atmosphere, hazardous wastes, chemicals, bio diversity, desertification to name some. Many agreements also include provisions to help developing countries to strengthen domestic capacity to implement international obligations.

It is the job of governments to articulate the national interest. But if they do that in a narrowly conceived short-term form, finding common ground for an agreement is particularly difficult. Interest based arguments must be accompanied by a willingness to accept a science based discourse as the basis for negotiation. In addition there must some framework of values to limit the play of national interest. In essence, environmental management is about justice between polluters and victims of pollution, between early users of common property resources and new comers, between current and future generations. Justice cannot be secured with economics alone. There has to be a global ethic that cooperation is better than

confrontation, that unrequited harm to another country is not justified, that sovereignty involves not just rights but responsibilities. The very process of global dialogue, discussion and negotiation helps in the development of such an ethic. A certain conception of global citizenship is emerging. Governments, which value their standing in the eyes of others, modulate their nationalism to gain and retain the respect of others and, sometimes, to subordinate their national interest to provide global leadership. But the actual record so far suggests that we are still very far from treating the management of our planet as a shared responsibilty.

In international relations, as in our understanding of society, we need to understand what induces cooperation amongst its members. Theories of collective action tell us that individuals cooperate when they recognise that their survival depends on it, when the pursuit of self-interest recognises the advantages of reciprocal concern for the interests of others, when norms of fair behaviour develop and transgressions of norms are punished. Such cooperation neither assumes nor leads to equality. Yet it does take place and there is implicit in every society a balance between power and consent which we may describe as a social contract.

Can we assume that something like this will evolve at the international level? That the nation-states of the world will see mutual advantage in cooperation, that they will accept a framework of shared values, applied faithfully by the powerful and the weak? The answer is not clear. Much depends on the powerful states. They are the ones with the military might, the technological capacity and the economic means which may persuade them that they can go it alone. The one area where they could be persuaded otherwise is in the pursuit of global environmental security. There is no 'fortress' which can protect the powerful from the consequences of global warming or ozone layer depletion. The global environment is one area where the 'territorial imperative' is modulated by a growing sense of a shared destiny on one earth. It may provide the best basis for a restructuring of the global political space and the acceptance of a more nuanced view of sovereignty.[21]
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NOTES

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[2] A well known example of this is Robert Kaplan, "The Coming Anarchy" in *Atlantic Monthly* 273, no.2 (1994). Further examples can be found in Norman Myers, "The Environmental Dimension to Security Issues" in *The Environmentalist*, 6, no. 4 (1986), Norman Myers, "Population, Environment and Conflict" *Environmental Conservation*, 14, no.1 (1987) and Norman Myers*, Ultimate Security: The Environmental Basis of Political Stability*, (New York: Norton, 1993). For a useful corrective see Simon Dalby, *Environmental Security*, (Minneapolis: University of Minnesota Press, 2002)

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[8] Mostafa K. Tolba and Ivona Rummel-Bulska, *Global Environmental Diplomacy: Negotiating Environmental Agreements for the World, 1973-1992*, (Cambridge, Mass.: The MIT Press, 1998) pp 120-123

[9] UNFCCC, *Caring for Climate*: *A Guide to the Climate Change Convention and the Kyoto Protocol*, **(Bonn: UNFCCC, 2003)**

[10] IPCC, *Climate Change 2001: Impacts, Adaptation and Vulnerability,* Report of Working Group II of the IPCC, Summary for Policy Makers, (Geneva: IPCC, 2001)

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[12] UNFCCC, *Caring for Climate*: *A Guide to the Climate Change Convention and the Kyoto Protocol*, **(Bonn: UNFCCC, 2003)**

[13] Mostafa K. Tolba and Ivona Rummel-Bulska, *Global Environmental Diplomacy: Negotiating Environmental Agreements for the World, 1973-1992*, (Cambridge, Mass.: The MIT Press, 1998) pp 55-88

[14] Mostafa K. Tolba and Ivona Rummel-Bulska, *Global Environmental Diplomacy: Negotiating Environmental Agreements for the World, 1973-1992*, (Cambridge, Mass.: The MIT Press, 1998) pp 97-124

[15] Convention on Bio-diversity: *Global Bio-diversity Outlook*, (Montreal: CBD, 2001)

[16] Mostafa K. Tolba and Ivona Rummel-Bulska, *Global Environmental Diplomacy: Negotiating Environmental Agreements for the World, 1973-1992*, (Cambridge, Mass.: The MIT Press, 1998) pp 125-163

[17] Sarah Gillinson, *Why Cooperate? A Multi-Disciplinary Study of Collective Action,* Overseas Development Institute, Working Paper 234, (London: ODI, 2004) pp 13-14.

[18] Ronald B. Mitchell, "Forms of Discourse/Norms of Sovereignty: Interests, Science and Morality in the Regulation of Whaling" in Karen T. Litfin (ed.) *The Greening of Sovereignty in World Politics*, (Cambridge, Mass.: The MIT Press, 1998) pp 141-171

[19] Bjorn Lomborg *The Skeptical Environmentalist*, (Cambridge: Cambridge University Press, 2001) pp 305-317

[20] Karen Litfin "Sovereignty in World Ecopolitics", *Mersham International Studies Review,* 41, (1997) pp 167-204. Also Karen Litfin, "The Greening of Sovereignty: An Introduction" in Karen T. Litfin (ed.) *The Greening of Sovereignty in World Politics*, (Cambridge, Mass.: The MIT Press, 1998) pp 1-27

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