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CLIMATE CHANGE AND ENVIRONMENTAL GOVERNANCE

by
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A. Environmental Governance

The challenge of environmental governance can be looked at from four distinct but related perspectives-the ecological, the economic, the ethical and the decision making challenges that need to be addressed by the governance mechanism.

From an ecological point of view the challenge is that of reflecting systemic interactions in mindsets dominated by disciplinary or geographical boundaries. Ecological interdependence has always existed in the form of energy and material flows and species exchange between eco-systems. That interdependence is the very basis for the existence of life on earth. The geographical scale of this interaction can range from neighboring eco-systems to the earth as a whole and the time scale between cause and effect can stretch into decades or centuries. There are also thresholds and discontinuities, which, if crossed, 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 proportion of river waters impounded and the share of human emissions in the nitrogen cycle are examples where the scale of intervention is well beyond the marginal. As for depth, we are now manipulating life forms at the genetic level and even creating exotic substances unknown in the natural world. A further development is that increasingly, the geography of interdependence is global. The challenge for environmental governance is that of devising methodologies of analysis and decision making procedures that require these interactions to be taken into account.

From an economic point of view we can see these interactions as externalities where one persons welfare depends on consumption decisions made by another, one entity's production possibilities are affected by the decisions made by another and one generations options are constrained (or enhanced) by decisions made by another. A thermal power plant emitting hot water into a river affects fisher folk downstream, a chemical plant disposing off wastes increases disease risks for residents, a generation that cuts down forests reduces options for future generations. The market mechanism in most instances does not provide an opportunity for those who are affected by such externalities

to signal their preferences to others. The challenge is that of designing policies that correct these market failures with appropriate regulatory controls and economic instruments that convey the costs of these externalities to today's decision makers.

From an ethical point of view the issue can be seen as one of equity: An environmental problem generally involves some injustice between groups, regions or generations. The central issue is that of fixing responsibility. But in doing so one must recognise both meanings of the word "responsibility" – as "culpability" in the sense that a polluter is responsible for a problem because he caused it and as "duty" in the sense that all who are concerned and affected have a duty to contribute to resolving the problem. Redressing the injustice requires the allocation of responsibility as culpability with a rigorous application of the "polluter pays principle". But it also requires the recognition of responsibility as duty. The challenge is to do this in a global and national political context in which power is distributed unequally and to give practical expression to the principle of "common but differentiated responsibility".

From a decision making point of view the difficulty is that of coping with risk and uncertainty. Environmental governance requires balancing known costs and unknown benefits or unknown costs and known benefits. This has led to the formulation of the precautionary approach which requires taking measured actions to anticipate and mitigate risks without waiting for full certainty. Yet there is a need for proportionality in response to potential threats so that those that are more likely receive more urgent and more substantial attention compared to those where there is much uncertainty. The challenge for governance is that of better monitoring and assessment so that scientific resources are deployed rationally taking account of the imminence and gravity of the threat. But risk and uncertainty also pose a challenge for creating regulatory measures and incentives to shift the behavior agents to reduce risk and that hold agents liable for the risks that their behaviour poses for others.

> "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" Nitin Desai[i]

B. The Challenge of Climate Change

The basic facts about the threat of climate change are well known. There is now a near consensus amongst scientists that global warming is already under way and that it is due to human activities in the form of emissions of greenhouse gases, mainly, but not solely, from the massive increase in the burning of fossil fuels since the start of the industrial revolution in the eighteenth century. For example, the concentration of carbon dioxide has gone up from 275 to 285 ppm in the pre-industrial era (circa 1750) to 379 ppm in

2005. Additionally synthetic greenhouse gases like CFCs and HCFCs are also getting accumulated in the recent times in the atmosphere.

The issue is not the greenhouse gas effect-without it the earth would be a cold rock some 32°C colder than its present average temperature of 14°C. Nor is it the variability of climate. That also has happened due to natural causes in the past and life on earth has adapted to these ice ages and inter-glacials. Our current concerns arise because the greenhouse blanket has become thicker, raising the equilibrium temperature level to a point at which catastrophic changes are threatened, that this change is likely to take place at an unprecedentedly rapid rate, posing major challenges for adaptation and because it is manmade we can act to reverse the trend.

For the purposes of identifying the challenge that this poses for environmental governance, it is useful to distinguish between two scenarios- one involving a moderate increase (2°C) and the second exposing us to a catastrophic increase (5°C+). A moderate increase will affect hydrology, coastal zones, mountain ecosystems and biodiversity with significant impacts on agriculture, health, settlements. A catastrophic increase will amplify all of these impacts and could activate certain tipping points that fall in three broad groups. The first involves the impact of large temperature increases on the water that is trapped in the gigantic ice sheets in the Arctic, Greenland and the Antarctic. If global warming starts approaching the 5°C+ level we run the serious risks of these melting and leading, among other things, to a sea level rise that is much higher than in the moderate scenario. The second set of tipping points involve the impact of temperature increase on some processes that could lead to run away climate change, the main candidate for concern being the melting of the permafrost and the consequent release of vast quantities of methane. The third set involves the impact on certain delicately balanced climate systems like the Indian Ocean monsoon and the Gulf Stream.

A moderate increase is probably unavoidable given the accumulation of GHGs that has already taken place and the momentum of continuing increases that cannot be slowed down very quickly. But the risks of a catastrophic increase can be greatly reduced. Hence the challenge for governance is two-fold - slow down the pace of change in GHGs and even reverse it to avoid catastrophic climate change and start providing for the adaptation to the consequences of the moderate scenario which is unavoidable.

The challenge for decision making that these risks of climate change pose comes from several factors. First the time frame is very long relative to the usual time frame of governments, corporations and households. Most major impacts will be felt 50 even 100 years from now and the potential catastrophic impacts even later than that and over long periods. But action is required now if these catastrophic impacts are to be avoided. Waiting till the consequences are closer in time would not only add to the costs of action but may also be too late to prevent the effects.

The second issue is that of equity. Those with the highest culpability, the industrial countries of the Northern Hemisphere may well be the least affected. In fact some like Russia or Canada may even benefit from moderate increase. On the other hand those

who are most affected, the developing countries in the tropics, are the least culpable and also less developed and poorer. In this situation the challenge for governance is that of securing agreement on goals for mitigation. Here the focus on measures targeted at preventing catastrophic change may help as this would be in the interests of all countries, including the Northern developed world. There is also the challenge is getting an agreement on the fair sharing of costs of mitigation and adaptation.

What does economics have to say about how this challenge should be approached? Economists will look at this problem in terms of their understanding of how externalities should be handled. Climate change is the mother of all externalities: it is global, long-term, and highly variable in its impact in different geographies and involves risks of major irreversible changes in the eco-systems. The normal economist's approach of looking for policies that in effect "internalise the externality" requires global agreements that touch energy production and use which lies at the very core of any economy. The variable impact of the externality and the very large differences in the degree of culpability for the problem pose issues of intra-generational equity.

It also involves issues of inter-generational equity. The choices that we make now will involve big differences in potential utility between generations separated by a century or more. These choices will be affected by judgments about the value that today's generation places on the welfare of future generations relative to their own. The issue here is not that future generations will be wealthier and therefore a rupee accruing to them as a benefit is less valuable than a rupee of cost incurred today. The issue is about the pure rate of time preference, the discount on future utilities simply because they arise in the future even if the future were not any richer than the present. Analytically to argue that such a discount is justified is like saying that one jurisdiction is justified in placing a lower value on benefits accruing to another jurisdiction simply because it is different. An alternative view looks at it in terms of opportunity costs and uses the current marginal productivity of capital as the rate at which current and future costs and benefits are made commensurate.

A further complication arises because all of these economic assessments have to be performed for a problem where there is a substantial uncertainty about the scale of the impact, its timing and its geographical spread. The actions required now are mainly precautionary measures to prevent future disasters rather than compensatory measures to take care of realised externalities only to a limited extent; more about potential risks.

Many economists have written about the economics of actions to mitigate climate change risks. Unlike the underlying climate science, there is as yet no consensus view from economists. There are some well known skeptics, like Bjorn Lomborg, who have argued that the costs and benefits of action on climate do not compare favourably with other priorities like health care.[ii] An intermediate position is taken by economists like William Nordhaus, who argues for a policy ramp with a slow start to mitigation in which policies involve modest rates of emissions reductions in the near term, followed by sharp reductions in the medium and long term.[iii] A more radical approach is advocated in

the influential Stern Review.[iv] Nicholas Stern has argued forcefully for a goal of 50% reduction in GHG emissions

> "Our estimate of the optimal emissions-reduction rate for CO2 relative to the baseline is 15 percent in the first policy period, increasing to 25 percent by 2050 and 45 percent by 2100. This path reduces CO2 concentrations, and the increase in global mean temperature relative to 1900 is reduced to 2.4 °C for 2100 and 3.4°C for 2200… these calculations measure the emissions-reduction rates relative to the calculated baseline or no-control emissions scenario." William Nordhaus[v]

> "Avoiding the risks of dangerous climate change requires that global greenhouse gas emissions peak within the next fifteen years are halved relative to 1990 by 2050, and then decline to less than 10 Gigatonnes (GT) of emissions (1 tonne per capita)." Nicholas Stern.[vi]

Economists look at issues like this in terms of costs and benefits and that is the case both for Nordhaus and for Stern. The difference in their proposals reflects the difference not so much of methodology as about assumptions, particularly regarding discount rates. But there are certain things which are quite clear. The costs of mitigation will depend on when we start-the later we start the higher the cost. They also depend on the goal for permissible temperature increase (and ambient GHGs) that is considered acceptable.

The costs of adaptation will depend on the extent of temperature increase. There is a big difference between the moderate and catastrophic scenarios defined above, with adaptation costs being prohibitively high in the high temperature increase scenario. The geography of incidence is also expected to be very uneven between coastal/inland areas, high latitudes/low latitudes, etc. Many of these costs of adaptation will have to be borne well into the future and it is tempting to argue that a poor country has to focus on addressing current poverty and building the economic capacity to address these problems when they are more imminent. But this argument must take account of the very real possibility that the costs of action will rise more rapidly than economic capacity the later we start the mitigation and adaptation effort.

Before proceeding further one must note the weakness of cost estimates. We lack knowledge about high temperature impacts, particularly with regard to the probabilities attached to possible catastrophic changes. There is a lack of adequate assessments from developing countries where the most adverse impacts are expected. There is also a certain ambiguity about extent of adaptation assumed. Will we just learn to live with a warmer more uncertain climate or will we need to spend to protect ourselves from this more adverse climate?

C. <u>From Analysis to Action</u>

The messages from current scientific assessments of climate change for environmental governance are very clear. The time to act is now as the costs of inaction are far greater than action and costs will go up if action is delayed. Every country must aim at a

transition to low carbon economy. There is another more difficult message and that is that mitigation actions are not enough. A certain measure of global warming and resultant climate change is unavoidable. Early action on programmes and polices which focus on adaptation of land and water use and human settlements are as necessary.

The case for action from an economic perspective rests on an assessment of costs and benefits. According to the Stern Review, inaction would mean loss of consumption equivalent to a reduction of 5%-10% now and forever. As against this the costs of mitigation actions to stay within the moderate increase scenario would cost the equivalent of 1% of consumption now and forever. Clearly this is a very attractive cost benefit ratio and would justify the strong response favoured by the Stern Review. A further argument for strong action is that it is needed as an insurance to prevent a catastrophic increase that could activate tipping points that would involve costs as high a the equivalent of 20% of consumption now and forever.

The uncertainties actually reinforce the case for action. The available evidence suggests a certain asymmetry and the downside risk is greater than the upside gain. If the outcome turns out to be worse than expected there are huge costs. But if it turns out to be less bad than there is not much gain and the loss of premature expenditure on mitigation is modest. This is particularly true for the early action which will focus on energy efficiency and forestry. The McKinsey Study[vii] gives a cost curve identifies specific options for saving 27 giga tonnes of CO_2e costing €40/tCO_2e or less. Of this 5 giga tonnes of saving can be secured at zero or negative cost. The curve also identifies a large potential in forestry (deforestation accounts for 20% of CO_2 emissions). It also suggests that much of the potential in developing countries.

Action to manage climate change risks must be guided by three strategic imperatives: innovate, integrate, and anticipate. The importance of innovation can be illustrated by the required increases in carbon productivity. Between now and 2050 carbon emissions have to halve according to most projections. But global GDP will rise by a factor of five or so. That means that carbon productivity must increase tenfold by 2050 ($740GDP/t$CO_2e$ to $7300GDP/t$CO_2e$ according the McKinsey estimate[viii]). An increase of this order is comparable to the increase in labour productivity during the industrial revolution and will not come without a profound change in the way in which energy is produced, distributed and consumed. This will require innovations in technology and business models that are as yet unknown.

The case for integration can be seen in forestry, Deforestation accounts for 20% of CO_2 emissions and actions to address this are one of the quick win routes to mitigation. But forests cannot be managed simply as carbon sinks. They fulfil many other ecosystem functions like biodiversity conservation, water and sol management, which have to be protected. This requires the integration of climate change mitigation and adaptation with other objectives. One must also recognise that in some cases there is a synergy between actions to address climate change and other objectives. For instance renewable energy and energy efficiency promotion may also help to address objectives about widening

energy access and enhancing energy security. Forest conservation may deliver other benefits while sequestering carbon.

The importance of anticipation can be illustrated in the case of adaptation. This requires that climate risks which are not yet evident are taken into account in water, land use, agriculture, settlement planning. The investments being made in housing, urban infrastructure, water resource development, transport, energy and other infrastructure will last for many decades and will have to cope with some of the anticipated consequences of climate change on ambient temperatures, rainfall, sea levels, river water flows, adverse weather events well within their lifetime. Prudence requires that the risks of climate change are taken into account in their design at the very start rather than postponing adaptation to some expensive retro designing at a later stage.

The modalities of intervention to secure the mitigation efforts can take many forms. There is a general preference in economics for price type measures say through carbon taxation because they can ensure Pareto optimality. But the quantitative impact of such price signals is uncertain as the response of corporations and households will be clouded even more by uncertainty. More than that the real difficulty is the near impossibility of securing an international agreement that would ensure that all producers and consumers all over the world received similar price signals. The large differences that prevail in energy prices at present testify to this. The alternative is quota type measures in the form of carbon caps on major emitters or in the form of carbon emission standards for equipment. With such quotas quantitative impact is ensured if compliance is good. But they may lead to departures from Pareto optimality unless they are combined with trade as in cap and trade systems with carbon permit trading In fact both approaches may be needed. At the micro level quotas are implementable for big point sources which account for large proportion of emissions. In certain other cases like road transport and electrical appliances legally enforced efficiency standards may work. But price/tax type measures are required to reach diffuse sources like household use and road transport. Nor can one rely only on quotas and price signals. Public funding is necessary to finance compensatory payments to ensure equity and as support for long gestation activities necessary because of centennial time frame.

D. Securing Global Co-operation

The greenhouse gas mantle surrounds the earth as a whole and the ecological cycles that affect the concentration of greenhouse gases in the atmosphere are global. Emissions by one country affect every other. Hence actions to mitigate climate change have to be based on a global agreement which engages all the major emitters. The elements of an international agreement that is needed to address the issue are basically as follows:

- The acceptable limit for the likely temperature increase.
- The implied time profile of global carbon dioxide and other GHG emissions.
- The distribution of allowable global emissions between countries.
- The mechanisms that would allow flexibility in fulfilling commitments.
- The mechanisms that would support adaptation actions.

- The financial and technology transfer arrangements for compensating countries which take on more than their fair share of obligations.

The world is still far from such a comprehensive agreement. But the process started in the form of the Inter-governmental Panel on Climate Change (IPCC) which brings together thousands of scientists from all parts of the world and the UN Framework Convention on Climate Change (UNFCCC) which was opened for signature at the Rio Earth Summit in 1992. The UNFCCC is only a framework and in the mid nineties a Kyoto Protocol was negotiated and this established quantitative caps on GHG emissions by the industrial countries, which are basically the OECD plus Russia and Eastern Europe. But the biggest emitter, the USA never ratified the Protocol and has consistently refused to accept legally binding obligations on its emissions.

The first Phase of the Kyoto Protocol ends in 2012 and the countries of the world are, as of end 2010, still in the midst of a negotiating process that addresses several thing – the next phase of the Kyoto Protocol, a Long Term Cooperation Agreement (LCA) that seeks to engage all countries and dilutes to some extent the differentiation between developed and developing countries that characterised the first phase of climate diplomacy, an agreement on Reducing Emissions from Deforestation and Degradation (REDD), an agreement on the funding of adaptation and agreements on finance and technology.

The world faces a carbon constraint on all future production and consumption if it is to avert the risk of uncontrolled climate change. The central issue for securing a global agreement is that of equity in the sharing of this scarce environmental space. The UNFCCC recognises the principle of "common but differentiated responsibility", the historical culpability of industrial countries who account for the bulk of the increase in ambient GHGs since the industrial revolution and the primacy of development for developing countries. All of these are an attempt to translate the principle of fairness into the language of rights and obligations.

The degree of fairness in the sharing of environmental space can be assessed in terms of the share of carbon emission in relation to population. One concept under discussion in seminars if not in the negotiations is convergence to equal per capita emissions by a target date, say 2050, at a level consistent with containing emissions to ensure a 50% chance of keeping the average global temperature increase to 2°C. India has already offered that it would ensure that its per capita emissions never exceed the average for the developed countries, so that any action by them to reduce their emissions very substantially would act as a brake on India's emission growth. Another concept that has received some attention lately is that of carbon budgeting where the available room for carbon emissions, given agreed goals on temperature increase risks, would be shared as a stock on the basis of population. A more contentious proposal would do this but also take account of cumulative use from past emissions.

The real issue is not just the analytics of fairness. It is the adequacy of the process that we have to secure the cooperation that we need. The politics of cooperative action have

been studied by social scientists and one such survey suggests the following conditions for success in securing cooperation[ix]:

- There is a reasonable presumption that cooperative management can improve the resource and that all users will benefit: with open access resources like atmosphere the history of unequal use challenges this
- The extent to which participants agree on the data and the dynamics underlying projections of the future state of the resource: the IPCC process helps in the development of a consensus on the science but there is no process for securing a consensus on the economics or the ethics of climate change.
- The ability of participants to take a long-term view and be willing to accept short term costs for resource recovery: governments are moved by short term political costs and benefits and by influential lobbies and these do not as yet give sufficient regard to the rights of future generations
- A perception by each participant that the others care for his interest, will reciprocate concessions and can be trusted to observe commitment: this unfortunately has suffered because of failures of compliance and attempts to reopen agreed principles of fairness.

"Environmental agreements are sovereignty bargains in which states surrender some autonomy of action in order to acquire some influence on the policies of other states which impinge on them." Nitin Desai[x]

In the final analysis what we need is a changed mind set. Every country has to recognise that global cooperation and agreement are necessary. No country should be satisfied with the absence of an agreement or a weak agreement simply because it leaves it off the hook. Such a policy is truly short-sighted. A strong and effective global agreement is in everyone's interest. The normal framework of reciprocal concessions that dominates international negotiations and a mind set that starts from the ethical premise that national interest trumps all other considerations cannot deliver an adequate global agreement on climate change. In the final analysis the worst risks of climate change can only be avoided by the acceptance that we are in one life boat and that steering it to safety requires that those who are most able put in a greater effort and those who are less able do what they can to avoid destabilizing the boat.

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