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ENVIRONMENTAL ISSUES IN SOUTH ASIA: THEORY, POLICY AND INSTITUTIONS FOR
GOVERNANCE

KANCHAN CHOPRA

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INSTITUTE OF ECONOMIC GROWTH

DELHI: 110007, INDIA
E-MAIL: kc@ieg.ernet.in

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I INTRODUCTION

The last two hundred years after the Industrial revolution witnessed a rise in the scale of economic activity. The rapid advancement of technology and better modes of social organisation extended its frontiers at hitherto unprecedented rates. However, the last quarter of this millennium has seen an increasing recognition of the many ways in which the limits to the earth's tolerance of expanded human activity are being stretched. At the global level, this shall count as one of the major extensions of the frontiers of human knowledge and understanding during this period. A coming together of different disciplines in an analysis of the nature of the changes has resulted in a consensus that "life support systems of the earth cannot be replaced completely by technology" and that "uncompensated anthropogenic environmental risk to future generations is unacceptable"(Huetting and Reijnders 1998).

Such a realization at the global level has however taken place in a world marked by economic, social and political cleavages. The extent to which economic activity impacts natural environments differs between nations. At certain junctures and places, an irreversible negative impact on the environment takes place as a consequence of increased economic activity. However, the manner in which civil society reacts to this realization varies. The policy is sometimes centered round an attempt to export degradation beyond the frontiers of individual nation states. In other situations, alternative technologies are sought to be adopted in the process of production. Simultaneously attempts are made to put more accountable social systems in place. The problem becomes more acute in developing countries such as those of South Asia with low levels of income struggling for "development" focussing on increasing levels of economic activity. Here, the imperative of harnessing a larger part of all resources, human, natural and economic for use in the present is very dominant. The call for conservation seems somewhat misplaced. However, if one moves into the broader social and cultural context which prevails in most of South Asia, it is interesting to observe that an understanding of the human interaction with nature has always been built into it. This social and cultural backdrop has made it easier for micro-level initiatives in natural resource management to emerge in these societies¹.

The situation in the countries of South Asia appears then to be characterized best by a dilemma. The macro picture relegates resource and environment linked issues to the background, often to be brought into the forefront only at the behest of international agencies or in the course of political negotiations centered around the management of the global commons such as the climate change and WTO negotiations. At the local levels, natural resources constitute a significant issue, both from the consumption and livelihood viewpoints² and the emergence of non-governmental organizations has drawn the attention of civil society to it. Further, the state of knowledge with respect to interrelationships between the nature and scale of economic activity is often imperfect. A number of questions can be posed in this context. The ones which this paper shall attempt to explore, are:

- What is the state of economic theory in this area? What are the directions in which it needs to develop in order to integrate with development in other disciplines and provide a cogent answer to the problems that increasing demands for natural resources could place? Or is it that some answers already exist in the current body of literature?
- What is the empirical evidence with regard to environment development relationships and what can countries of South Asia learn from it?

¹ Note the emergence of village level initiatives in Nepal, India and Srilanka. For a documentation, see

² See among others Jodha (1986), Chopra, Kadekodi and Murty (1990), Chopra and Gulati (1998).

- What directions for policy emerge from the current understanding and what are the challenges for economic policy?

II THE ENVIRONMENT IN ECONOMIC THEORY: RELEVANCE FOR DEVELOPING COUNTRIES

Environmental issues have come to be focussed on, in particular in developing countries as the consequence of real life problems of degradation and an associated activism. It is therefore sometimes forgotten that economic theory, in particular its extensions and applications in the sixties and seventies have addressed some of these issues. This section shall examine these extensions with a focus on the two major functions that the environment performs with regard to economic activity: a sink for waste assimilation and a provider of resources inputs into production.

In a listing of resources in traditional economic theory, land, not environmental resources, find a mention. The latter are subsumed under the rubric "land" when they are not actually mentioned as being available in unlimited quantities. However, of late the study of economy- ecology interactions has gone far. The significance of the fact that economic activity uses natural resources and also returns waste to nature is now understood. Further, the scale of that activity is determined independently of the waste assimilation capacity of the environment or the rate of replacement of resources. For a time, the discrepancy goes unnoticed because the inputs required to be extracted are small. Traditional microeconomics treats environmental effects as externalities of production or consumption (Pigou 1932 and Ayres and Kneese 1969). As long as the uncompensated technological externalities of the production and consumption processes are small, the environment, principally watercourses and the air absorb the residuals of these activities. The services that these processes perform for humans are a part of the economic system but the residuals are in general ignored. As stated by Ayres and Kneese (1969) "These economic goods or 'bads' are transferred at zero price, not because they are not scarce relative to demand or because they confer no disservicebut because there exist no social institutions that permit them to be 'owned' and exchanged in the market."

The pervasive nature of these externalities and limits on the waste assimilative capacity of environmental sinks results in the need for such residues to be treated as a part of the materials balancing problem in the economy. The problem of externality management thus moves from the realm of microeconomics to that of macroeconomic management of the flow of materials in an input-output framework. The presence of waste generating externalities imposes a constraint on production levels in such a framework³. In principle, a new level of activity and corresponding prices can be defined for an economy, a level of activity that takes account of constraints of the new kind. For a number of reasons, explained at length in the literature, however, it may be an exercise of considerable complication and somewhat little practical return to do this. For, the institutional structure to convert the prices of "environmental capabilities" needs to be envisioned and moved towards simultaneously. Such a complete exercise in material balancing may at best be better attempted at the regional level.

The constraints imposed on growth of consumption by the nature and rates of regeneration of environmental resources have been analyzed using optimal control methods. In the earlier contributions starting from the early seventies and even earlier, issues of decision making with respect to resource use for development or conservation have been studied using optimal control theory (Krutilla and Fisher 1975, Fisher, Krutilla and Cicchetti, 1972). A number of these early writings, with roots in conventional cost-benefit analysis, conclude that in the presence of irreversibility and mutual dependence between projects (even by the criterion of net present value), the net present value of utility accruing from them is maximized by conservation or refraining from development in the present.⁴

³ This happens primarily when one realises that "nature does not permit the destruction of matter except by annihilation with anti-matter" (Ayres and Kneese 1969).

⁴ See Fisher and Peterson (1976) for a review of the earlier literature.

More recent developments within the framework of control theory have extended the analysis to take account of the multiple functions that environmental resources perform in relation to human survival and economic activity. Seibert (1981 and 1987) for instance develops models where the constraints on welfare maximization in an inter-temporal context include rates of regeneration and levels of extraction of resources as also levels of pollution accumulation. The conditions for sustainable economic development (defined as maintaining a certain level of consumption or welfare per capita for future generations) are derived in this framework. While results vary typically, it is important to note that two important parameters that determine the attainability or otherwise of sustainable development are the rate of time preference and the rate of regeneration of the resource. If the first is higher than the second, the stock of resources is driven to zero in a finite time and the situation is unsustainable⁵.

Further, if the resource stock has an amenity value and provides utility⁶, the rate of extraction is more gradual and imposes limits on economic growth. Barbier (1989) and Barbier and Markandaya (1989) suggest that an essential criterion for sustainable development is: maximizing the net benefits of economic development subject to maintaining the services and the quality of natural resources over time. A minimum viable level of the stock of environmental assets is built in as a constraint in addition to restrictions on rates of degradation, use of assets and levels of regeneration. Some of the results obtained in this specification are of interest. A low initial level of environmental quality results in environmentally unsustainable development. The discount rate makes the strategy of increased present consumption optimal. This implies that an economy with a high discount rate requires a higher initial level of environmental quality to avoid a growth path that is environmentally unsustainable.

The above is indeed a significant result, in particular from the viewpoint of low income developing countries. It is important also to remember that it is obtained using standard tools of economics. One does not, in such a formulation even take account of the so-called "outstanding issues at the threshold of economics and ecology. To mention a few: the presence or otherwise of substitutability between different kinds of natural capital (Perrings 1996); the role of resilience in measuring eco-system health and the consequent relevance of stochastic rather than deterministic models in their context (Ives 1995); and the absence of in depth knowledge of the dynamics of ecological processes. Starting from the ecology end of the continuum, it is sometimes claimed that "extraction based on human requirements results in highly disturbed sub-systems which are not sustainable" and that "ecologically bounded possibilities of using natural resources should be the normative starting point of economic theory"(Pandit 1997) There evidently exist unresolved issues at the frontiers of ecology and economics which offer interesting vistas for theoreticians to delve into.

From the viewpoint of developing economies, it may be more fruitful to keep this picture in the background. Of more practical relevance is the attempt to evolve an institutional structure at the national and the micro level that complements prices and markets and provides a coherent manner of accounting for externalities that matter and resources that impose constraints. A large number of areas exist where institutional structures for sustainable development need to be identified. Further, questions relating to the relationship of environmental conservation and development present policy options which need to be resolved.

III ECONOMIC DEVELOPMENT AND ENVIRONMENTAL DEGRADATION: THE MACRO VIEW

From the viewpoint of developing countries striving for higher standards of living, the most pressing policy issue in the last few decades has been: Do environmental constraints impose limits on development processes? The popular perception is that caring for environmental conservation limits the pace of economic growth.⁷ At the same time, development is associated with energy intensive consumption patterns seen to be a driving force for environmental stress (Parikh et al. 1991). Also, poverty and over

⁵ For an analysis of the different models and their implications, refer to Klaassen and Opschoor (1991).

⁶ Such a condition formalises the requirement that environmental preservation adds to utility i.e. note for instance the utility derived from scenic beauty.

⁷ As seen in the previous section, such a view is substantiated under a certain set of assumptions by theoretical explorations as well.

population are seen to be great polluters of another kind, leading as they do to greater demands on environmental resources for present consumption at the cost of conservation. Both these viewpoints have been subjected to examination. While this section examines the macro linkages between environmental degradation and development, the next section shall view the poverty- environmental degradation link using insights from micro level studies. Finally, the implications of this literature for the forms of environmental governance and indirectly for the dominant development paradigms in South Asia, more particularly in India shall be drawn.

III.1 SHALL DEVELOPMENT INDUCE ENVIRONMENTAL CONSERVATION

Can a 'delinking' (World Bank 1992) or decoupling of economic activity from harmful environmental impacts take place in the process of development? How can countries of the south learn from the experience of developed countries in this regard? Recent econometric explorations into the relationship between increasing incomes and environmental degradation provide an approach to the study of environment-development relationships which throw light on some such questions.

A growing body of recent literature maintains that increases in production in an economy are not always associated positively with environmental degradation indices. Better technology (in the sense of cleaner technology) presumably intervenes to mediate the relationship of growth with use of the environment. The relationship could be of the inverted U kind, implying a delinking between economic growth and environmental degradation. Thus, there may be a parabolic (inverse U) relationship between per capita income levels and environmental pressure in and across countries, not unlike the relationship Kuznets suggested decades ago as an assumption on a link between average income and income inequality (Kuznets 1965). The assumed relationship between income and environmental pressure has hence been called the 'Environmental Kuznets Curve'. Such a relationship entails that up to a point (defined in terms of average income) economic growth will be associated with environmental pressure that rises in absolute terms. Beyond that point, environmental pressure will go down in absolute terms as income levels continue to rise.

Such delinking is related to a decrease in the claims of economic activity on the environment. Empirically, these claims are often approximated by physical indicators such as rates of use of forest resources (or rates of deforestation), use of commercial energy per unit of GDP or carbon dioxide emissions into the atmosphere. Empirical evidence with respect to each of these yields varying results in the context of developed countries. Strong delinking is in evidence with respect to materials and energy use in developed countries. Further, some kinds of pollutants exhibit greater degrees of delinking. Shafik and Bandhopadhyay (1992) found that concentrations of suspended particulate matter and sulfur dioxide in urban air showed an inverted U curve. In general CO₂ emissions and water pollution does not exhibit a delinking till a very high level of GDP per capita is reached⁸.

Continued delinking can go on only as long as the rates of reduction in environmental throughput or intensity per unit of income exceed production growth rates and this is likely to come to an end and possibly even reverse (Opschoor 1990). Pezzey [1989] and Opschoor [1990], have argued that such inverted-U relationships may not hold in the long run; they foresee an *N*-shaped curve which exhibits the same pattern as the inverted-U curve until a certain income level, beyond which environmental pressure will rise again with income.

⁸ For an early study see Malenbaum (1978). More recent tests of the hypothesis are to be found in Shafik and Bandhopadhyay (1992) Seldon and Song (199) and RIVM (1996).

Given the need to delink if economic growth is to be or become sustainable, one may wonder to what extent delinking may occur spontaneously in the economic process - or, to put this in economists' jargon: that delinking is 'endogenous' or inherent in economic growth. In the developing country context in particular, the delinking (EKC) hypothesis is often quoted to support the view that if policy pursues development, the environment shall implicitly be taken care of. It is therefore important to understand the validity or otherwise of this hypothesis and the applicability of the economic arguments leading to it for developing countries.

Environmental concerns can become manifest from within the growth process if one or more of the following developments take place:

- As income levels rise, environmental quality as a good gains priority. This shows up both in consumer preference in the market and in larger budgets for environmental policies or more effective implementation of these policies by the government
- Preferences and political priorities get affected by better knowledge of ecological functions and their long term significance
- Environmental considerations trigger technological change when resource scarcities and deteriorating quality become matters of immediate concern
- Prices reflect environmental costs and generate signals for markets to initiate some of the processes discussed above

The preoccupation of macroeconomic policy with goals of structural reform consistent with development and poverty reduction preempts the possibility of a number of the measures enumerated above. However, the tailoring of macro-economic policies to satisfy environmental considerations is beginning to be talked of (Munasinghe 1999). Special policy interventions may need to be included to ensure that environmental aspects are internalized in the development process.

It is therefore important to know the empirical evidence with regard to the kinds of degradation for which turning points in the EKC exists and the levels of income at which they become operational. Panayotou (1995) on the basis of cross section data for selected developing and industrialized countries concludes that the EKC exists. However, Opschoor (1990) maintains that assuming economic growth tendencies to remain in force, from some point onward, economic activity and environmental pressure may relink, at least until further breakthroughs in research and development occur, or more environmental awareness alters preference structures or a more intensive application of environmental policy checks is implemented. This prediction we call the 'relinking hypothesis'.

III.2 EKC CURVE AND DEVELOPING COUNTRIES OF ASIA AND AFRICA

A test of the delinking hypothesis from the perspective of a set of developing countries in Asia and Africa was carried out in a recent study (Opschoor and Chopra 1997). The following indicators of environmental

throughput for the period 1980-1990 were examined for about 41 countries in Asia and Africa⁹: CO2 emissions per capita, average annual rates of deforestation and commercial energy use per unit of GDP. The point of departure of this study from other studies consists in that it includes in the set of explanatory variables magnitudes of demand as determined by levels and structures of GDP population rates of growth and densities, the impact of the degree of openness of the economy¹⁰ and of the nature of governmental awareness with respect to environmental issues¹¹.

This study of a cross section of developing economies in the continents of Asia and Africa indicates that increases in PPP(purchasing power parity)per capita shall result in increases in CO2 emissions with no evidence of a turning point to signify delinking of growth from atmospheric degradation. This relationship is weakened to the extent that a country's income comes from other than the manufacturing sector, (the services sector for instance). Further, it is weakened by a dependence on imported manufactured goods, implying that import of manufactured goods exports negative environmental externalities.

Furthermore, in the case of countries of Asia, PPP(in \$ per capita) exhibits a negative relation with rates of deforestation. The delinking of development from environmental degradation is therefore indicated for this index of degradation. The level of government awareness is significant in leading to lower rates of deforestation¹². However, rural population density turns out to be positively related to rates of forest degradation implying thereby that use of biomass based non commercial energy seems to be a significant factor affecting rates of deforestation.

Evidence on factors affecting differences in the use of commercial energy per capita indicates that the level and structure of GDP is positively and significantly related to energy use: there is no evidence of delinking as far as energy use is concerned. Further, import of manufactured goods as a proportion of total production of manufactured goods is negatively and significantly related to energy use. This corroborates the finding that the degree of openness of an economy determines to what extent it can achieve higher levels of consumption and simultaneously export the damaging effects to the larger global economy. Again, governmental awareness (as reflected in participation in international agreements on environment) does not exhibit a significant relationship with energy use. This is presumably due to the absence of any large scale shift towards cleaner technologies.

To sum up, the macro-level evidence on the environment- development relationship indicates that growth in Asian and African countries is likely to be accompanied with higher levels of CO2 emissions and more intensive use of energy. This can be mitigated only through a shift to service industries or through an export of the damaging effects to the larger global economy. No delinking of growth and environmental degradation is likely to occur if the trend continues.

The evidence with respect to rates of deforestation is different. It does indicate that a delinking in countries of Asia is in sight. Has a kind of leapfrogging taken place as a consequence of governmental and non-governmental intervention in the manner and level of use of forest resources? While it may need more substantiation, it seems that a "tunnelling" through the EKC as postulated by Munasinghe (1999) may already be on its way.

An in depth study of the nature of interventions at the macro and micro levels can provide an answer. In the next section we shall review the evidence on the resource use- development relationship emerging from micro studies of change in South Asia. The emergence of new forms of institutional management of natural resources shall also be viewed in this context.

IV NATURAL RESOURCES- LIVELIHOOD LINKAGES: THE VIEW FROM MICRO STUDIES

⁹ The exact number of countries included in the sample may vary due to data constraints.

¹⁰ This is approximated by the proportion of imported goods in the value of manufactures.

¹¹ This is indicated by the number of international treaties relating to the environment that the particular government is signatory to.

¹² This variable turns out to be insignificant when African and Asian economies are looked at together as one set. Alternatively, when only Asian countries are considered, this variable becomes relatively significant.

Analysis of the environment development relationship at the macro level needs to be complemented by and often substantiated by the insights provided by studies conducted at the more desegregated local levels. A substantial part of the understanding of the links between economic activity, livelihood generation and incentives for and against conservation oriented management of natural resources comes from these studies with origins in economics, anthropology and sociology¹³. A large number of these studies in South Asia were aimed at exploring the relationship between poverty and environmental degradation. While poverty and over population were posited as the largest polluters, it was also observed that the poor had more close livelihood and consumption linkages with environmental resources. Could these links be expropriated positively to yield sustainable patterns of development?

Jodha's pioneering inquiry (1986) into the relationship between the rural poor and common property resources established that a large part of the consumption of the rural poor came from environmental resources. Their dependence on these resources for livelihood generation was also highlighted in this and other studies. Why then would the rural poor contribute to environmental degradation by overextraction as had been maintained implicitly in policy circles? A number of explanations were offered for the apparent contradiction:

- the poor have a high rate of discount for the future due to low levels of income
- population pressure constitutes the major reason for degradation of natural resources
- a large part of the degradation of the environment is the consequence of the failure of the market and the state to provide appropriate modes of management of natural resources.

The first and second explanations do contribute to the pressure on these resources: however incremental demand may originate either in increased numbers or in changed consumption patterns. At times urban demand for fuelwood and building material constituted a large part of the pressure on forest resources. At others, biotic pressure originated in increased livestock and human populations¹⁴. High rates of discount for the future can be countered by assurances of minimal levels of living to all. This can however be done only through the creation of decentralized modes of management of natural resources. Such a conclusion is indicated from an understanding of the theoretical interlinkages. The rent seeking nature of the state and the absence of complete markets for environmental resources was in any case expected to result in poor management of natural resources by these two institutions.

The literature based on empirical observation of grassroots interventions corroborates the theoretical argument regarding the inefficacy of the state and the market in the context of environmental management. A number of alternative forms of management, in particular of water and forest resources were tried in the countries of South Asia during the eighties¹⁵. The evolution of these owed a lot to individual commitment, largely in the non-governmental sector, but sometimes with critical inputs from individuals within government. Documentation of the manner of evolution of these alternative experiments exists¹⁶. In initial studies on these grassroots movements, one sees a tendency to treat "local level institutions" as a kind of romantic closed system which could correct all ills existing in alternative institutional structures. Moreover, early efforts at the creation of alternative local level institutions of natural resource management were few and far between, focused and effort- intensive. Note for instance the heavy capital and labor investment in the much discussed Sukhomajri experiment. Total investment on a per hectare basis came to about Rs. 22, 000 compared to an average expenditure of Rs. 10,000 per hectare on similar programmes for the country as a whole. Even so, a cost-benefit

¹³ See for instance Ostrom (1990), Wade(1987), Chopra, Kadekodi and Murty(1990). For a succinct interpretation of these studies and their implication see Bardhan (1993).

¹⁴ For a conceptual framework linking poverty and sustainable use of resources see Chopra and Rao (1997).

¹⁵ This paper focuses more on India, basically due to the author's familiarity with the country.

¹⁶ See for instance, Panagare and Panagare (1992) for a documentation of the experiment of watershed management in Ralegan Sidhi, Maheshwari et al. (1990) for Tejpura in Jhansi, Bahuguna (1992) for Harda in Madhya Pradesh, Saint (1993) for Udaipur in Rajasthan, Chopra et al.(1990) for villages in Haryana . Also see the series of studies by the Society for Wasteland Development, Development Alternatives and the Center for Science and Environment.

analysis revealed that rates of return were in the range of 14 to 19% for this project¹⁷. Similar analysis of other early interventions came up with optimistic pictures of their impact on management of natural resources and its impact on local livelihoods and resource regeneration. It seemed that a kind of complementarity existed between income generation and resource conservation when the institutional structure was properly specified. It can be maintained that this literature then presented a somewhat rosy picture of grassroots initiatives on both of the above counts.

Over time, the number of grassroots initiatives increased and their nature became more diversified. A large part of this expansion took place with the support of international funding agencies and constituted a kind of reaction to the excessive centralization of decision making that had marked the earlier planning dominated phase of development. Expansion, however also threw up indifferent kinds of intervention by urban based and at times paternalistic organizations. It also brought conflict with existing structures of power, both political and economic. At times, internal dissension within local level communities also came to the fore. The question then came to be asked: what are the set of conditions that lead to cooperative behavior in the management of natural resources at the local level?

The answer to such a question has been sought through an application of theory and econometric techniques to the interpretation of links between factors affecting the emergence of alternative paradigms of management of natural resources in local situation. Such studies, though few and far between gave content to the black box of "institutional change at local levels", expanding simultaneously on the association of this change with other macro level changes in and around these communities. Agarwal and Yadama (1997) studied for example, the impact of population and market pressures on forest resources in the presence of alternative institutional forms of management of these resources in the Kumaon region of Uttar Pradesh¹⁸. Indices used for assessing institutional strength include the age of the panchayat, the frequency of elections and the level of monitoring and enforcement of rules of behavior. The last factor was found to impact resource conditions more closely than others, leading to the conclusion that co-management of forests by communities and forest department was perhaps viable. In another study Chopra and Gulati (1998) find that the number of years that a local level intervention has been operating is crucial in determining its impact on economic and demographic variables. This study posits that stress migration from rural areas in Udaipur district of Rajasthan decreased and was possibly reversed due to the introduction of better management of common property resources in these areas.

Limits to local level participatory management of natural resources are also indicated by some recent studies. When such management takes the form of pooling and management of private land, the process could take a considerable period of time before reaching a stable solution. Even when rules with respect to sharing of output and returns to owners of resources are well defined, the process is slow and uncertain. Kadekodi (1998) shows that it may take up to sixty or so years for a stable new institution to be established. Using data from an experiment in Palamau district of Bihar, he also illustrates that certain values of the parameters governing change may imply the absence of convergence to a stable solution. Sethi and Somanathan (1996) using a model of evolutionary game dynamics integrated with resource stock dynamics, show that certain threshold values of relevant parameters need to be adhered to for social norms to be followed and to result in resource conservation through the functioning of local level institutions. When these values are crossed, it may lead to a lowering of the stock of resources, possibly its eventual extinction. One such operational parameter is the efficacy of social sanctions. A decline in their efficacy due to the incursion of outsiders or of outside interest through the operation of market forces is expected to lead to a breakdown of the cooperative norm.

Notwithstanding the existence of limits to local level participatory management of resources, evidence from studies of farmer managed irrigation systems in Nepal, the Philippines and other developing countries shows that such management is marked by a degree of innovative adjustment in dealing with variations in physical systems and participants' endowments. Ostrom and Gardner (1993) show that farmer managed systems lead to skillfully crafted rules which result in enhanced agricultural yield and efficiency. The design of such institutions needs hard bargaining between stakeholders over extended periods of time resulting in an acknowledgement of

¹⁷ For a comparison of per hectare investments see Alagh (1989,90). For the cost-benefit analysis of the Sukhomajri project, see Chopra, Kadekodi and Murty (1990)

¹⁸ The institutional forms in existence included management by the forest department, by the revenue department and by the community. Three districts in the region are studied.

mutual interdependency. The outcome in terms of the forging of longer term relationships makes for stability of the systems that survive.

All this has in it a lesson for the management of the global commons as well. In the management of climate change and CO₂ emissions, a considerable amount of attention is centered around tradable permits and the use of market instruments. Developed countries, on whom the onus for limiting emissions to predetermined levels falls, are so to say able to buy the right to a greater share in the use of the atmosphere, a global common. As Bardhan (1993) points out, tradability often undermines the reliability of a long term relationship between beneficiaries. It may be more useful to have nation states work out innovative bargaining solutions to the problem.

At another level of analysis, it has been pointed out that local level institutions must operate within a fast globalising world, where information technology exposes the most distant hamlet to happenings and lifestyles in the metropolises of the world. This rules out segregation of the countryside. The demographic reality of the future is most likely to be a rural-urban continuum. The challenge for local level institutions is that of establishing links with the rest of the world, in particular with institutions such as the market. In doing so, they shall enable value-addition for their stakeholders and shall also extend the frontiers of their operation.¹⁹

In areas where participatory modes have expanded into organised participation, they have started impacting the nature of the other actors such as the state. The example that comes readily to mind is that of forest management in India, which has seen three distinct phases in the evolution of an interface between government and non-government institutions. Initially, the preoccupation with different forms of grass-roots interventions as alternatives occupied center-stage. In the second phase, the initial euphoria with respect to possibilities of success with natural resource management outside of conventional government organizations faded. This was due in part to the proliferation of organizations purporting to bring about participatory change. Contradictions sometimes emerged within their internal structures and a distinction came to be made between non-governmental organizations and resource-specific user group associations. Next came the adoption of joint forest management by the government²⁰. As observed by Haagenon (1998), there has emerged a kind of "adaptive bureaucracy" in certain states, with a blurring of the distinction between governmental and non-governmental institutions. The sharp distinctions, sometimes even adversarial postures, implicit in the debates of the eighties, are gradually dissolving into a more integrated picture as each institution seems to have acquired characteristics of the other. This is particularly true when complementarities are found to exist between the two kinds of institutions. Note for instance, the area of watershed management requiring both technology and institution creation. The large network of government institutions could provide the first and non-governmental organizations the second²¹. It seems that new forms of linkages between conventionally differentiated institutions could emerge.

V TOWARDS SUSTAINABLE DEVELOPMENT: POLICY INITIATIVES AND MODES OF GOVERNANCE

At a more aggregate conceptual level, the concept of sustainable development encapsulates concerns regarding the linkages between environment degradation and development. Both the macro and the micro

¹⁹ To elucidate, it is often found that once rules of behavior and monitoring and conflict resolution mechanisms have stabilized, local level organizations often reach a plateau in terms of their activities. At this juncture, a second phase in their evolution indicates that they link to processing, marketing and selling of forest or farm produce. While experiments of such second phase development do exist, they are still few and only indicative.

²⁰ The June 1990 order of the Ministry of Environment and Forests is seen as instituting the formal beginnings of joint forest management. It was followed by the passing of resolutions which gave content to the institution in a number of states. By 1999, about 12 million hectares of forest land is reported to be under different forms of joint management. (The figure is taken from information presented to the Standing Committee on Joint Forest Management, Ministry of Environment and Forests, 1999).

²¹ See Chopra (1998) for an analysis of relative strengths in the context of watershed management.

approach constitute efforts in the direction of evolving policy initiatives leading to it. We examine briefly the evolution of this concept from concerns with growth and development before positioning it as the guiding principle for environmental policy and governance in the 21st century.

In the fifties, the most important driving forces behind growth and hence development were: an increase in capital per head and an improvement in the skill levels of a population and in the methods of production used. Anand and Sen (1996) relate this concept of development to the old 'opulence-oriented approach' or 'wealth maximization approach' within mainstream economics. The concern with development assumed wider contexts over time. Already in the 1950s, changes in the sectoral structure of the economy were seen as an additional dimension of economic development, and concerns about income distribution have led to the broadening of factors taken into account. In the nineties 'human development' is defined by UNDP as a process of widening the range of human choices, and operationally focused on productivity, equity, sustainability, empowerment (UNDP 1995), security and participation (Anand and Sen 1996). One speaks of human development when the range of social, economic and political choice of groups and of individuals is expanded, when a decent standard of living is assured not only in terms of education, nutrition and health, but also in terms of freedom, democracy and human security (Anand and Sen 1996). And this includes 'sustainability' as one of its dimensions: meeting the needs of the present generation without jeopardizing the ability of future generations to meet their needs. The World Commission on Environment and Development described sustainable development as:

"a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all compatible and enhance both current and future potential to meet human needs and aspirations" (after WCED 1987:46).

It is in this sense, i.e. in this structural approach that looks at *processes and capacities*, that the notion of sustainable development resembles that of human development as used by UNDP. Human development is about enhancing capabilities (UNDP 1996:27), about mechanisms ensuring access or (re)distribution, and about institutions (government or civil society based) all expanding choice and the exercise of it; sustainable development is about changes resource management systems, patterns and processes of production, resource reallocation through altered investment patterns and the institutional requirements to bring about all of that to an adequate degree. The notion of 'sustainable human development' thus is far more than 'another kind of economic growth'. It is dimensionally richer in capturing much of what social scientists refer to as well-being or welfare, and it is interested in structural and institutional aspects of development, in a time frame even embracing generations to come.

However, it is in this very conceptual richness that the notion sweeps under the carpet a number of the dilemmas that development policy faces in countries such as India. While it can serve as an approximation to a desirable situation, what does one do to reach there? Operationalisation of the concept has a number of dimensions, both at the aggregate and the regional level (Chopra and Kadekodi 1999). It may be more useful to view sustainable

development as the goal to be pursued, and to delineate implications for policy and for modes of governance that the macro and micro views of environmental degradation and development point towards.

Some of these rules of thumb which environmental governance can keep in view are stated below:

- Renewable resources be used at a rate less than their rates of regeneration
- Use of exhaustible resources should depend, among other things on the rate at which they can be substituted for by renewables and by technological progress
- Waste generation should not exceed the assimilative capacity of the environment
- In critical areas where economic activity could result in irreversible and non-reparable changes in crucial life support systems, a limit needs to be imposed on it
- In such areas, instruments of policy should move in the direction of leading to changed preferences or changed technology
- Adoption of a precautionary principle to allow for a degree of imperfection in the present state of knowledge

The objective at different levels of governance then is to evolve instruments that help economies, communities and the global society to take into account these guiding principles. While national governments continue to be significant, environmental governance in the next century is increasingly going to be mandated at two other levels: the global level and the local level.²² The issues to be addressed and the policy instruments relevant for them shall be different at each of these levels. The guiding principle needs to be the setting up of modes of governance that can integrate the strengths of market and non-market institutions for management, with a focus on the medium and long run. A range of environmental policy instruments is available to the policy maker. The options center round the use of markets, the creation of markets, environmental regulation and engaging the public and consumers in environmental management.²³

The shift to environmentally sustainable economies presents one of the major challenges before us. It also presents an opportunity. Such a transition can create some of the new century's most potent drivers of investment and technological change. Provided of course that economic and social institutions provide the correct incentives. This comprises one of the challenges before the global community at the turn of the millennium.

²² See in this connection the emphasis on globalization and decentralization in World Development Report (1999).

²³ See World Bank (1997) for a recent documentation and critical examination of relative strengths and efficacy in particular situations.