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V. A. PAI PANANDIKER

*Managing Ecological Diversity, Simultaneity, Complexity and Change: An Eco-Political Perspective**

Anil K. Gupta

The need for uniformity in design of public administration system has always been uppermost in the mind of any central authority. It is easier to monitor and even easier to legislate. To fulfil this need, the state could either ignore the variability in the characteristics of people and their context or perceive only the common features.

The coercion in generating uniformity of perceptions in the mind of people having different historical subjectivity is bound to generate popular discontent sooner or later. The location, intensity and timing of this discontent could influence the social formations significantly.

These formations acquire the characteristics of nationalities or sub-nationalities. The ecological variability or diversity could then become an issue of reconciling conflicting definition of the nation state or with in it the sub-nationalities. It is this relationship, we contend, between socio-ecological diversity and diffusion of central authority which underlies most social tensions in developing societies.

We have looked at various studies, newspaper reports, debates on the ecological aspect of public administration. Since this subject has not received adequate

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PPST, 1989). The analysis of such data may provide some clues about the way the natural resources were managed in village societies at the onset of colonial rule.

Another way to look at the patterns in the evolution of man-nature interactions is to study the spatial and historical context in which different cultures/communities grew up. The cultures that evolved at the junction of major migratory movements have often shown far greater sensitivity towards scarce natural resources than the ones which evolved in river basins. In any country people living in most adverse ecological conditions have always been found to be most dogged in nature. The cultures on the margins like deserts and hills people have generated institutions for regulating scarce resources without external intervention. The resilience and pragmatism which characterised the "hydraulic" society based in river basins contributed towards consolidation of power in the hands of local elite. They assimilated cultural attributes of dominant power and thus prevented their own marginalisation. There could have been many factors explaining the greater respect for natural resources that existed among the people living in the forest, hills and desert regions. This respect, studies have shown (Singh 1985; CSE 1982, 1985), could not be sustained due to numerous pressures inherent in the capitalistic development. Market penetration and commoditisation of the produce from the common properties might have shortened the time-frame for appraising investment options of different social classes in these regions.

Climate and Development

The relationship between climate and development (Biswas 1979, pp. 238-58) has not been given the attention it deserves in various disciplines. There have been instances where people have used models implying ecological determinism. Huntington in his book *Civilization and Climate* (1915) maintains:

Different types of climates determined the varying levels of development and civilization of the different nations of the world, since climate affected human energy, and thus, achievements of the society. Huntington, unfortunately, popularized the vague feeling of pessimistic geographical determinism, i.e., the colonized people were somehow racially inferior to the European stock (Biswas 1979:239-40).

Several other authors during this period echoed the above prejudice (Tyler 1953; Harvey 1947). It is observed that while above conceptualisation was basically faulty still "the fact remains that no tropical country in modern times has achieved a high state of economic development" (Kindleberger 1965). The studies on history and capitalism have shown that lack of development of tropical countries had to do less with ecology than the colonial rule, hegemony of internal power groups and unequal exchange relations even in the post-colonial phase. It is brought out that the influential book of John Mellor (1966), *The Economics of Agricultural Development* did not have a single index citation

on climate.

Myrdal (1968) criticised the tendency to use Western concepts for analysing institutions, attitudes, modes and levels of living in developing countries. However, when the Western theories did not apply, the social scientists in developing countries often with training in the West also did not break fresh ground (Biswas 1979:244). Many social scientists felt climate to be a "parameter". There was a tendency to treat climatic conditions as boundary conditions keeping them out of the overall framework of analysis. Myrdal (1968:2121) emphasises:

Climate exerts everywhere a powerful influence on all forms of life—vegetative, microbial, animal and human—and on inanimate matters as well. Every serious study of the problems of underdevelopment and development in the countries of South Asia should take into account the climate and its impacts on soil, vegetation, animals, humans and physical assets—in short, on living conditions and economic development.

Streeter (1971) also observed that the conditions of developing countries between the Tropic of Cancer and the Tropic of Capricorn were comparable to the conditions with the pre-industrial Europe. It was noted:

Even though the interrelation between tropical climates and health or work efficiency have not been conclusively established, several comments can be made. Because of socio-economic and climatic conditions, diseases seem to be quite prevalent in the tropical and semi-tropical regions. Indeed, the whole situation gives rise to a vicious cycle. Lack of appropriate development means that people do not have adequate education, nutrition, sanitation, or health care, all of which contribute to make them more prone to diseases. This in turn affects efficiency of work, which further reduces rate of development. The warm and humid climates of the tropics further worsen the situation (Biswas 1979:254).

It is argued that various problems of development requiring modification of natural eco-systems could be resolved only if the existing ecological basis of the systems being replaced was adequately studied and understood. The tendency to pursue ad hoc research without linking it up systematically with a long-range programme could not achieve a major breakthrough. The need for more information, Biswas however stresses, need not be made an excuse for not using the information that is already available. He recalls, if Plato described some 23 centuries ago the way deforestation increased the soil erosion and floods and if ancient Indian texts provided the ways of coping with it than obviously arguments of more research even in those cases where alternatives exist may be counter-productive. This is not to belittle the need for continued research for improving the efficiency of existing alternatives.

In other cases the variability in the ecological and economic endowments has

"Reverse Sanskritisation" is manifested in this work (1987:30). It is mentioned that people of higher classes accepted the role of lower classes due to distress (perhaps caused by famine and other such calamities). To what extent "Reverse Sanskritisation" affected social relations and the process of making demands on public systems in the post-distress period remains to be studied (also see Richard 1979).

Recently while reviewing the need for bringing ecological demography in the sociological enquiries, Namboodiri (1988) identified several problems. While suggesting the way out he refers to the population ecology perspective which I assert almost corresponds to social Darwinism (Gupta 1989). In this framework in a community of organisations the most fit forms of organisation are supposed to survive (Hannan and Freeman 1977, 1984). The fit is defined in terms of what survives—an obvious case of tautology. (Mitra 1984) provides Indian perspective on relationship between population and environmental degradation.

Since the ecological approach which "eschews the subjective values and purposes of individual actors" (Robson 1969) is considered incomplete, the need for looking at normative pressures is identified. Finally, a case is made for closer correspondence between demography and human ecological approaches as a part of mainstream sociology.

In a move towards linking ecological perspective with political economic perspective on rural development, Burtel (1980) quotes Syzmanski (1978:25) to state:

The potential chaos that might result from the expression of so many particularities of class interests in the state structure will tend to be mitigated by actions by state officials to "aggregate" the interests of the dominant class. In other words, state functioning will be facilitated if it is able to forge a dominant class "will" so that this class can be more unified in its struggles with subordinate groups (1980:50).

The capital is supposed to have no "monolithic" interest in various policies such as agriculture, energy, environment, etc. Once the division over policy issues becomes considerably intense the need for consensual politics increases. The subordinate class groups, it is suggested, while advancing their own interests and demands, further complicate the policy determination process. It is in this context that Syzmanski talks of the potential chaos that might result from competing claims for resources. It is a very important insight which may help anticipate the role of a state in framing policies while dealing with numerous ecological and other social protest movements in the country.

Singh (1987) while reviewing various agricultural-economics studies on ecology and environment restricted himself to the methodological and technological issues involved in looking at environmental implications. The groups of economists which discussed various issues did not consider it necessary for economists to become ecological protagonists (also see Murty 1985, for discussion on

Economic Evaluation of Environmental Management Programme).

It was argued that ecological considerations could always be accommodated in the analytical framework of an economist for optimum use of the society's resources including the economic and ecological interests of the future generations. The conventional social benefit cost analysis in spite of its inherent conceptual deficiency was considered sufficient for the purposes of measuring and evaluating ecological and environmental problems.

While discussing the institutional problems it was stressed that research on the role of property rights and land tenure systems in soil erosion; institutional economic constraints in reversing land degradation and social economic aspects of alternative land use including farm technologies besides farming systems research was necessary (Singh 1987:533). In another study on relationship between agricultural development and ecology, Nadkarni argues for taking into account the three dimensions, viz., externality, sustainability and equity which form the basis of classical social ecology. Raghunandan (1987) argues against technical solutions to ecological problems and feels need for reorientation of policy for science and technology. The scientific knowledge, he feels, would influence the ideological struggles. For policy analysis in context of environment, the studies are scattered and often deconceptualised (e.g., Mrema 1982).

Ethnicity, Culture and Ecological Identity

Anthropologists and others have looked at the problem of ethnicity in different cultural groups set in ecological and social context (Khubchandani 1983; Roy Burman 1988:380; Duncan, Otis and Schnore 1959). It is believed that the language and its interaction with politico-economic establishments can be seen on a continuum of developed and underdeveloped stages of language. I feel that to consider language of tribals (ignoring the history of functions for which it was evolved) as undeveloped involves passing value judgements.

Gadgil and Malhotra (1983) provide evidence on adaptive significance of Indian caste system, particularly among pastoral communities in Western Maharashtra. The argument is that "castes more directly dependent on natural resources had so organized their mode of subsistence as to avoid excessive overlap with other castes in their demands for various resources". They further believe that the monopoly of lineages over particular resources in a given locality perhaps created the conditions for a culture to evolve rules of social restraint for resource utilisation in a sustainable manner (Gadgil 1983).

Perspective from Physical Sciences

It has been suggested that ecology and the new physics in their own way represent nature to be an internally related, systemic, integrated organic whole (Callicott 1988). It was believed,

The mechanical world view was laid to rest less by ecology than by the so-called "New Physics". The theory of relativity warped and dilated Euclidian

we could not have the tradition of culture either; we could be like orphans of imagination (Feuntes in Singh 1981:91). Krishna Chaitanya refers to similar ideas drawing upon illustration from Indian epics (Chaitanya 1982). The relationship between cultural variables, ecology and political economy has been traced in Chinweizu (1982), where the economic rationality of plunder is related to the culture of individual self interest.

A World Bank study on tribal people and economic development observed three dimensions of development: (i) the value of tribal culture to be recognised, (ii) potential harmful effects of contact between dominant plain vis-a-vis tribal culture and (iii) control of tribal members over pace and manner of their adjustment—natural, society and culture. A plea is made that cultural autonomy did not preclude training of selected tribal representative in the dominant culture and their role as mediators with the latter.

It is this understanding of cultural and eco-adaptation of tribals which generates pressure in public administration for co-optation rather than cooperation.

To contrast it, the Bishnois have been known as a religious community in Rajasthan and Haryana which took upon itself the role of protection of animals and plants. If one while passing through deserts in Indian west came across dense forests and wild life, one could assume that the Bishnois might be living in the neighbourhood. To what extent such cultural diversity closely patterned by the ecological diversity be maintained depends upon the way contradiction between national elite and regional identity are resolved.

The administrative thought, as a body of core concepts derived from different disciplines having bearing on people-state-nature interactions, is yet to evolve. However, the rich variety of questions being raised in different disciplines from ecological perspective promise considerable breakthrough in the next decade.

Global Dimension of National Environment

Lester Brown (1989), an influential voice on the global environmental science, writing on "Global Ecology at the Brink" felt that food security might substitute the military security as the principal preoccupation of the government. The pressure on water supplies was increasing in the US, China, the Soviet Union and India—11 per cent of cultivable land in the US is being "retired" for its conversion into grassland or woodland. The Soviet Union is presumed to have lost about 13 per cent of their grain land over the last decade due to erosion. In China, the loss is about 7 per cent. The US Department of Agriculture recently reported that one-fourth of all the irrigated land in the USA was being irrigated drawing down the underground water table by at least half a foot a year. In some case the drop was as much as four feet.

In the Soviet Union, much of the irrigation was concentrated around Aral Sea in the Asian Republics. This sea was fed by two rivers which had been diverted for irrigation. The sea began thus to shrink and one fishing Port Muynak was now thirty miles away from the coast, Brown (1987, 1989) observes. Brown adds that in Japan, rice yields have not increased since 1970 despite the fact that

support price offered to Japanese farmers is four times the world prices. The highest productivity (and not production) levels achieved in 1966 in Asia through the release of new varieties have not since been superseded. Thus the hope that reduced water and land would be made up by the increase in productivity was not very rational.

Each year, out of the total world area about 24 billion tons of topsoil in excess of the soil formed through natural processes was being lost. To get an idea, it is equal to the entire topsoil of Australia.

The drought of 1988 in the USA reduced the world grain stocks from 101 days of world consumption at the beginning of 1987 to 54 days in early 1989. The world prices increased by 50 per cent over last year.

The climatologist fear that drought could become part of US destiny. The annual food production in 1988 in the US fell below the domestic consumption first time in modern history. Most alarming pointer to the global politics and its bearing on environmental policies the world over is that by the beginning of 1989 harvest, the US grain reserves built over a long time would largely disappear through export commitments and reduced production.

If the year 1989 was a drought America would have no exportable surplus. Argentina, Australia and France would occupy the centre stage. The price increase, Brown fears, might shadow the gravity of 1972-73 oil price shock.

Global Warming

Brown further adds, the three droughts of 1980, 1983 and 1988 in the US coincided with five warmest years of the century which could or could not be a coincidence. It is often ignored, he feels, that increase in temperature by 3 to 8 degree Fahrenheit by the year 2030 or 2050 would not be uniformly distributed over globe. The equatorial countries were not likely to be affected much.

The countries in the higher latitudes of Northern and Southern hemisphere—the grain-growing regions—would be affected most. The increase in carbon dioxide levels in the atmosphere due to industrialisation and other processes was the price future generations have been committed to pay. Norway and Canada were the only two national governments that had urged the world to think about reducing the consumption of fossil fuel. Brown warns that governments would overnight become so preoccupied with measures to meet food shortages and increased prices that energy conservation (and ecological security) may not even remain on the agenda. This, we feel, is the real challenge to the students of administrative expediency in the light of catastrophic crisis. The growth rate of population in India is about 2.2 per cent, China 1.2 per cent, Bangladesh and Pakistan 3 per cent and Kenya 4 per cent. It is not sustainable at all.

Even if the fertiliser consumption was doubled in the USA, the production might not much change. The diminishing returns had set in all the high growth regions. In the USA fertiliser use was lesser now than what it was six years ago (not surprising, the increased emphasis is being given on organic farming). If one looked at the soil erosion and the decline in water table, one could see the

arid and arid regions world over prevent any possibility of "modern" technologies diffusing widely. The politics of not paying due price for preservation of this genetic wealth to poor dry region people has to be properly understood.

It is not often recognised that variability in genetic resource was maintained through institutionalisation of certain rituals requiring different varieties of rice/ragi or other such crops for different occasions. In whichever commodities taste is important, the behaviour of social system is comparable, be it grapevine growers for making wine in France and other parts of Europe or paddy growers in Eastern and Southern India.

How is this variability being preserved? The international community is divided on the matter. The International Bureau of Plant Genetic Resources (IBPGR), which is responsible for indexation and preservation of genetic variability, is located in the US and is covered by the US laws though every country practically has contributed to this pool. Many developing countries fear that they may be denied access to this pool should some political conflicts arise. Further the right of agri-business firms to draw on this pool without disclosing the genetic constitution of the varieties developed by them for commercial exploitation is also being debated. Administration of this exchange needs to be studied.

Another dimension was added by the decision of the Government of India under new seed policy to permit import of certain fruit vegetable seeds under open general licence through almost a non-feasible quarantine. As is well known, there is no concept of sampling in quarantine. Either there is quarantine of every unit of plant material imported or there is not any at all.

Research on Margin: Technology Assessment

In the context of the agricultural research towards improving the ecological balance it is important to note that the boundary issues which don't lie in the mainstream of any particular discipline are often ignored even in the developed countries (Rennie 1988). Several examples are given in the proceedings of the Select Committee on Science and Technology, Agricultural and Environment Research, House of Lords, Fourth Report (1984), UK. One of the most important instance is where the Director of Research of Game Conservancy Institute complains that in the hope that Rothamsted would carry out research on environmental aspects of certain technologies no funding to other institutions for those problems was being provided. The scientist notes:

Part of the reason why above work (Research on Long Changes in Biomass particularly insects in the farm land because of various changes in environment) is now so difficult to finance is that the responsibility for solving the questions does not rest clearly with any one source of funding. There is no one customer for such a broad watching brief on farm land which is not clearly associated with either agricultural or environmental interest (1984:159).

The problem in India is even worse because institutional arrangements for

review of fringe areas do not exist. Related to this is the problem that certain types of studies such as on the *Environmental Impact of Pesticides* are not published even in the UK (1984:19). The ostensible reason is that commercial confidence would be violated if such information was shared. The research resources for soil science were cut in the UK leading to abandoning longer term basic science work. In India the situation is alarming. The total contingency budget for dry farming available for experiments was hardly 2 1/2 per cent of the total allocations for the purpose in one of the leading Agricultural Universities of South India (for example, see Loeffler and Schillhorn 1988: Livestock research related to environmental aspects in Africa).

Biotechnology is another area which is likely to affect the environment in various Third World countries significantly. A number of companies in the United States are manufacturing substitutes of Vanilla, Cocoa, Sugar, Arabic Gum, etc. which will substitute the natural products exported by Latin American and African countries. Once this is disturbed the whole ecological system evolved around these export crops would come under strain (Jamal 1988). There is a need for constant monitoring of such technological changes in the global system so that anticipatory measures can be taken.

II. ECOLOGICAL VARIABILITY AND ADMINISTRATIVE UNIFORMITY: IS MARRIAGE POSSIBLE BETWEEN THE TWO?

Literature on organisational behaviour and public administration includes many references to the need for reappraising current methods of analysing interactions between people and institutions. However, these concerns have excluded any reference to the way social formations emerge in different ecological contexts, for instance, Nef and Dwivedi (1981), Khandwalla (1984, 1988-89). Comprehensive review of Indian studies on organisational effectiveness after 1976 (Khandwalla 1984) does not include a single reference on the need for taking variability introduced by ecological endowments in social experience, articulation and interaction with organisations.

How has the question of "space" or "region" figured in the study of governance? Jain felt uneasy that due to the conflicts between Centre and States, "an uneven situation exists in various states regarding environmental management and the implementation and reinforcement of national policies" (1984:303). The remedies for inappropriate implementation of environmental policies included (a) greater technical competence in Department of Environment and the Boards set up at State level; (b) funds for setting up expert committees, preparation of environmental appraisal projects and (c) greater attention by the State governments. It was believed that "financial stringency, coupled with inadequate attention being paid by state government to their whatever environmental departments/committee 'that' exist is affecting the dedication and motivation" (Jain 1984:304-5). This is an example of the problem identified quite rightly by the Third Review of Social Science Research in India by the ICSSR (New Delhi

higher level is conspicuous by absence. The ones pursued in terms of the concern and objectives defined by the Department of Environment or other bodies at central level (Jain 1984). We need studies that look into the influence foreign aid agencies had in setting up of the Society for Promotion of Wasteland Development (SPWD), involvement of several retired environment/resource administrators in the SPWD besides the involvement of academicians; the genesis of the National Wasteland Development Board (NWDB); issues on which the conflict took place between the Chairman and the Secretary (former a non-official and latter a career bureaucrat who later became Cabinet Secretary), influence on policies towards involvement of private corporate sector, voluntary organisations, academics and administrators in resource augmentation programmes, the evolution of the NWDB into a technological mission and resultant diminution or enlargement in its role.

Similarly, we need explanation for extraordinary number of activities with regard to the NWDB: whereas the sister body, viz., National Land Use and Conservation Board has not even met for two years (Vohra 1988). Does it have to do something with the fact that former relates more to public/forests/revenue/panchayat lands (i.e., common or public properties) whereas the latter may involve choices regarding private individual land? Both these bodies are expected to report to a national council chaired by Prime Minister. How do these relationships evolve, grow or get diluted, influence or are influenced by central interventions in matters pertaining to state's realm, are questions that remain to be analysed.

There are studies which indicate that there could be structural dysfunctional features of hierarchy in dealing with people living closest to nature (i.e., tribal population). In a very thought-provoking analysis of bureaucratic system dealing with the nature-tribal interactions, Dr. Sharma (1985), a seasoned administrator notes: (a) Higher-level officers in the hierarchy are more amenable to manipulation (by the vested interests, p. 370); (b) time frame of top administrators is very short (p. 374); (c) conceptualisation of adapting delivery system to local needs through delegation rather than inherent power at local level is invalid (374-75), (d) the touchstone of the modern public system is often a set of rules and regulation rather than experience and judgment of people involved, (e) the notion of representative leadership in designing modern administrative system for tribal is invalid and (f) increasing abstraction of the nature of discourse at higher level of administration may create barriers to articulation and participation by tribal leaders. He argues that models of governance being thrown up by some of these nature-loving tribal communities can be a rich source for designing public administration even for what we may call eco-alienated elite.

Sharma cites example of Mizoram government which decided to evolve the concept of rotational leadership when no party got clear majority. The first Chief Minister resigned after his term and the leader of the opposition took over. By implication, it is suggested that the principles of eco-adaptation may offer new styles and structures for mainstream public administration. It is of course neces-

sary for such styles and structures to be identified and tried. The researchers in public administration have to shed their obsession with analysing a phenomenon only in local, isolated, disconnected and autonomous terms.

Sectoralisation of Environment

While reviewing governmental response to environmental needs in India, Mathew (1982) complained that no durable mechanism had been created to appraise the extent to which environmental factors had been taken into account while formulating various public policies. The problems arising out of (a) poverty and consequent resource conflicts or (b) the very process of "development" could not be adequately tackled in public policy for two reasons: (i) the environmental safeguards required to be maintained were ignored due to usual bureaucratic inertia. Also, resistance to learn the complexities of different disciplines involved in understanding these problems came in the way; (ii) "even the well intentioned planners" and technocrats tried to think environmental protection as something new—an additional sector of government. Fresh allocations of men, money and material were to be made for this sector amidst competing demands from agricultural and industrial sectors. There are some who allege that clearance of projects by the DOE has generated the same "rent" extraction mechanisms as any other licensing system may do (Arun Agarwal 1989).

There are several studies which confirm the above perspective. It has been pointed out after reviewing various models of environmental management followed in different states: "there is no such thing as a 'model' structure for environmental management" (ESG 1982; Vohra 1982). I would rather wish that we search a range of models rather than any one suitable model.

Evolution of State Structures

Given the emphasis on sectoralisation of ecological consciousness, various efforts have been made in the government to provide administrative platforms for negotiation, dialogue and dispensation of "justice" (Khoshoo 1984; Ram Krishna 1984; Sapru 1987; special issue, *IIPA* 1981; *Law Review* 1983; *Administrator* 1984; State Structures, ESG 1982).

The Government of Gujarat was the first state government to set up the "State Council of Ecology" in 1970. A private sector body, the Wankaner Ecological Foundation was established in 1971 (Baskar 1985). The National Committee on Environmental Planning & Coordination (NCEPC) was set up in 1972 headed by Pitamber Pant. Being housed in the Department of Science and Technology, it relied more on technical inputs rather than policy and institutional inputs.

It has been recognised that neither the NCEPC nor its successor (NCEP) have made any significant practical impact on the environmental scene (ESG 1982:3). We have several studies which describe the working of these bodies (Subba Rao 1985; Sinha 1984; Biswas 1982) but none provide rigorous analysis of the way decisions were made, or interactions held with various constituencies. Setting up of the Department of Environment headed by the Prime Minister in 1980, aimed

slums which elite characterise as pollution of urban environment. Given the powerlessness of the poor they either become totally helpless or assume that public administrators would do something about their problem. Sometimes when the grievances do not result in any action they internalise the perception of elite about the system and poor people. The result is that they may develop a lower self image which comes in the way of mobilisation or articulation (Fernandes 1984). This illustrates the weakness of grievance-induced SMP. Another view is that the conflicts around natural resources are inherent in the very concept of development which we have adopted (Agarwal 1983; Gupta 1981, 1985; Ninan 1980; Khosla 1983).

While analysing the probability of emergence of extremist struggles it has been hypothesised that the areas where movements would emerge could have (a) high percentage of tribal population, (b) difficult terrain and forest area, (c) failure of land reform, (d) exploitation by outsiders and (e) tendency towards increasing disparity in income (Das 1983:73). While reviewing various tribal movements (Sen Gupta 1988; Dubey 1987; Singh 1987) we notice that an integration of the perspectives from the ecological, political-economic, anthropological, historical, psychological and sociologic perspectives remains to be achieved.

It has been argued that in the North-East the alienation of tribal population from the mainstream society and solidarity with the similar people in the neighbouring countries generated strong sense of deprivation and alienation. Sub-nationalism was generated in the economically backward regions in the North-East. Isolation, low population density, ecological endowments making very low rate of capital accumulation possible coupled with high literacy rate generated new identity (Bose 1967; Dubey 1987). The ethno-political movements of tribals got intensified after Independence when non-tribals continued with their exploitation (Dubey 1987). The Christian identity is suggested to have also fueled the alienation (Ninan 1980). I see these explanations as a part of continuing search for frameworks that explain why so few people protest despite so widespread deprivation.

Guha (1986) regrets that otherwise a very comprehensive and pioneering report on the State of India's Environment (CSE 1985) it ignored the militant movements of ethnic minorities in Chota Nagpur and North-East. He emphasises that this neglect could be an outcome of the assumption made by the editors about the "vanguard" roles for voluntary agencies.

It is added "the ecological innocence of our political parties is not an adequate reason for the abandonment of traditional forms of political expression" (Guha 1986:626). It is not that the environmentalist have not been sensitive to the contradictions in the development process, it is just that the role of state, voluntary agencies and historical consciousness in the society has not been made very explicit.

This problem, as mentioned earlier, has been characteristic of some of the most eminent environmental professionals/scientists. For instance, Dr.

Swaminathan exhorts the people to live harmoniously in rural and urban regions for ensuring sustainable ecological and social development (1986). He had earlier coined the phrase, "Ecological Refugees" (also mentioned in CSE, 1985) to characterise the migration of people to urban areas. He like many others failed to notice that if only people from drought-prone regions, tribal or hill areas migrated to cities it was not just an ecological phenomenon though it had ecological origin.

Undoubtedly, the spectrum of ideological position of various ecological movements may range from Gandhian to Marxian (Guha 1986). However, to suggest that these two tendencies were creating the space for appropriate technology as a third strand is to perhaps misread the situation. The "appropriateness" of technology in different time frames has been widely considered a matter of political choices. Various technological combinations reflect a whole range of these choices.

In fact, there are several dimensions of these movements which remain to be properly assimilated in a comprehensive framework. For instance, the involvement and perception of women is seen to be influenced sometimes by factors totally different from the one influencing involvement of men. It has been suggested that Chipko Movement began by the men of regions protesting not so much against deforestation as for a share of the forest produce. While men opted for fruit and timber trees women are reported to have preferred fuel and fodder trees (Majumdar 1986:102-03; Jain 1988; Rao 1989). Otherwise the women studies have generally ignored the ecological dimensions altogether (exceptions are the studies by Indian Social Institute, New Delhi; Centre for Science and Environment, New Delhi; Lokayan and Dietrich 1988, etc.). In the model curriculum designed for women studies (Raj, M.K. 1986) no consideration was shown for the study of very systematic relationships between women, ecology, deprivation and public policies. It has not been understood that the proportion of the women headed household is maximum in drought-prone regions and hill areas. It is also important to note that public policies for various systems such as banks discriminate against women borrowers (Gupta 1983, 1985). Recommendations for removing the requirements of male co-obligants for such women borrowers have been dismissed at the highest policy-making levels (Gupta 1983). If such concerns do not occupy central attention of the ecological movements it is obvious that the politics emerging from such assumptions would only serve limited purpose. Of late the bias against gender issues has been giving way. In fact, some very exhaustive but polemic studies (Shiva 1988) and other more rigorous but impressionistic ones (Agarwal and Narayan 1985; Rao 1989) have contributed in focussing attention towards women issues in ecological movements.

To illustrate the way ecological movements are incorporating deviance or plurality of perspectives the example of the Save the Western Ghats Movement (SWGMM) is useful. Dr. Madhav Gadgil had presented a viewpoint of technocratic participative reforms which was contested by the participants in the

below.

Data on Conflicts

We looked at a wide range of sources primarily for the last five years but in some cases for the last ten years to scan writings on ecology. Given the fact that public administration as a discipline has not given much attention to this subject, we decided to cast our net wide. We looked at 55 journals, 83 books and reports, 24 newspapers and magazines to collect information for this review.

In Table 1 the physical and moral pressure tactics have been presented for 63 cases. It may be added that each case may have many events/reports. Various physical pressure tactics implied either threat, *rasta roko* (obstructing the movement of traffic or the officials of the concerned agencies), *gherao* (physical encirclement of the concerned officials/decision-makers, resource destruction such as uprooting the plants (for instance, Eucalyptus seedlings were uprooted in Karnataka and Tamil Nadu by the people's movements), *Morcha* (procession of people) has been distinguished from *saryagrah*. The latter is included in physical pressure tactics in the sense that it is coercive whereas the *saryagrah* is persuasive.

Moral pressure tactics include fasting (individual or groups), invoking religious sentiments, issuing appeals, etc. What is most remarkable is to note that the fasting as a means of Gandhian technique to persuade the opponent did not seem to be very popular with the protesters. In the absence of longitudinal data we can not suggest whether there is a declining trend. The fasting implying *Hatha Yoga* has been a long standing method of putting moral pressure on others through self-torture. In contrast issuing appeals seems most popular option among the moral means of protest compared to *morcha* and physical obstruction among the physical means.

Another feature which strikes us is that only a minuscule number of protesters have chosen to use resource destruction as a means of protest. Apparently the non-violent persuasive strategies seem still to have primacy over more militant alternatives. If we take out *morcha* out of physical tactics and shift it to the moral methods of protest the difference between the two groups becomes much more significant.

The message is that if public administrators and policy makers continue to resist pressure for negotiations and dialogue there is no escape from protesters using more militant means of articulation.

The styles and legal means of protest are described in Table 2. The primacy of forest and dam-based protests is maintained. Among various strategies of campaigns, public meetings followed by informal associations, procession and press seemed more popular. The fact that postcard campaign or inter-State networking were of very minor importance perhaps indicates the localised nature of most campaigns. The implications of such a style are that it would be easier for the state to put one group against another or ignore till the mass mobilisation takes place.

TABLE 1: STRATEGIES OF PROTEST

Resources/ Sectoral Project	Physical Pressure										Moral Pressure									
	Boy- cott	Threat to Actual	Rasta Cheruo	Reson- Des-	Obstruc- tion (Upro- tation)	Pro- test (Physi- cal)	Morcha	Others	Total	Fast	Group	Sayya- griha	Reli- Appeal	Others	Total					
1. Forest	1	7	2	3	4	1	1	1	19	-	1	4	1	12	20					
2. Hydel Projects/Dams	-	2	-	-	-	2	1	5	19	-	-	3	-	12	16					
3. Mining/Quarrying	-	4	1	-	-	2	2	9	9	1	-	-	-	1	2					
4. Effluent/Water	-	-	1	-	-	1	2	4	4	1	1	2	1	1	7					
Pollution	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
5. Thermal Power	-	-	-	-	-	2	-	-	2	-	-	-	-	2	2					
6. Nuclear Power Plant	-	-	-	-	-	-	-	-	-	-	-	1	-	4	6					
7. Depletion of Marine Resources	-	-	2	3	-	4	1	10	10	-	-	3	-	4	7					
8. Urban Area/Slum Improvement	-	-	-	-	-	1	-	1	1	-	-	-	-	3	3					
Grand Total	1	13	6	7	4	14	5	50	50	2	2	13	2	39	63					

TABLE 4: REGION AND RESOURCEWISE—CASES OF CONFLICTS/EVENTS

Resource/Region	Forest	Hydel Project	Dams	Quarrying/	Effluents/	Water Polln.	Air Polln.	Nuclear	Marine	Urban Slum	Total
North India	05	53	02	18	05	36	02	17	-	01	126
West India	05	39	05	43	-	-	01	08	-	07	126
South India	04	28	01	08	-	-	03	07	4	10	47
East India	01	04	03	14	01	10	-	-	-	-	53
Central India	03	16	04	38	-	-	-	-	-	-	53
Total	18	140	15	121	06	46	07	51	03	25	496

Type of Negotiation										Negotiation Level						
Tribu-	Boa-	Visit	Coer-	Clos-	Open	Elec-	Free-	Others	Total	Enter-	Cen-	State	Muni-	Vill-	Others	Total
nal/	rds	of	clve	ure	of	Bar-	total	zing		prise	tral	Govt.	cipal	age	Panch-	ayal
Comm-	e.g.	Govt.	Offi-	cial	ing	(Govt. &	decl-	ston	People)							
tee	Polln.	cial														

TABLE 3: PROCESS & LEVEL OF NEGOTIATION

1.	Forest	5	3	8	1	6	23	-	2	68	4	15	52	6	1	1	79
2.	Hydel Projects/Dams	4	5	-	7	1	19	-	2	6	-	4	12	2	-	-	18
3.	Mining/Quarrying	2	-	2	-	-	6	-	-	5	3	1	5	-	-	-	6
4.	Effluent/Water Polln.	1	2	-	-	-	5	-	-	2	2	1	6	-	-	-	10
5.	Thermal Power/Ind. Pollution	-	1	-	-	-	2	-	-	1	1	2	3	-	-	-	6
6.	Nuclear Power Plant	-	1	-	-	-	2	-	-	4	4	4	4	-	-	-	8
7.	Depletion of Marine Resources	2	-	1	-	1	9	-	-	-	-	-	2	3	-	-	4
8.	Urban Area/Slum Improvement	-	-	-	-	1	2	-	-	-	-	-	1	-	-	-	6
Grand Total		14	3	14	11	-	14	2	7	68	4	15	52	6	1	1	79

terms of environment the small sector is even more guilty (Vyasulu 1987). In Jodhpur about 1500 small-scale textile units released a huge amount of effluents into open drains, river beds, reservoirs, etc. affecting the drinking water supply through contamination of underground water table (CSE 1985: 28-48). The CSE report provides detailed evidence about the water pollution through industrial and urban wastes and other environmental hazards.

Eucalyptus controversy has been one of the most talked about issue in the field of forestry in recent times. While the FAO study showed that eucalyptus consumed more water in humid tropics and regulated the water flow less well than the natural forest. It also reduced the water content of the catchment. However, the report concluded that there was a need for proper balance between ecological and social needs (NH 1988). On the other hand, the expert committee in Karnataka concluded that much of the criticism against the eucalyptus was baseless. It was considered useful for regions receiving 20-45 inches rainfall (DH 1983). People somehow remained unconvinced and therefore resorted to uprooting the eucalyptus seedlings as a part of Appiko movement. The cases against the decision of State government to allocate land to private sector unit for commercial monoculture plantation is still pending in the Supreme Court. Recently, a study has been taken up by the State Forest Department, Karnataka, in collaboration with the Oxford Forest Research Institute to look at the water uptake by eucalyptus and its effects on adjoining ragi crop (Nayaknur 1988). To the extent that this study reflects willingness of a State bureaucracy to learn empirically it is a tribute to sustained social movement by people supported by the NGOs and professionals in Karnataka and outside. Contrast this effort with unequivocal judgement given in 1983 (also see for research on Eucalyptus Effects, Nayaknur 1988).

Disputes over rights to eucalyptus grown on gornal lands in Dharwad District has led to a protracted struggle on the part of people. They are demanding that the wood be sold to the villagers at a concessional price rather than auctioning it in the open market. When Mandal Panchayat and Zilla Parishad could not negotiate the matter with Village Panchayat the issue went to the High Court (Reddy 1980). One of the lessons from various studies about the eucalyptus mentioned here is that when issues of empirical nature are transformed into polemical or rhetoric an informed debate is unlikely to take place. The environmentalists, professional researchers, administrators and the NGOs have to recognise the cost of populist struggle without backing it up with rigorous data. The SWGM in Karnataka and Kerala did open a new path by way of organising research-based social movement.

In one of the insightful studies on the issue of tree and tenure an administrator-researcher raised the debate on "who owns the trees" (Saxena 1988). The argument was that the forest laws did not provide any incentive to people to grow trees because the right to harvest these trees had to be obtained from the forest department.

In West Bengal a new approach of participatory management of forest re-

sources has been developed under which 25 per cent of the usufructs from the rehabilitated forest was to be shared with people (Raha 1988).

Fisheries both Inland and Marine have been a source of conflict between the poor fishermen families and the mechanised fish owners. The problem is quite complicated because any disruption of the ongoing system had costs in terms of loss of employment and decline in export of prawns. On the other hand, the fishermen were suffering and becoming worse off. The Kerala Swatantra Matsya Thozhilali Federation (KSMTF) had been pleading for a ban on trawlers during monsoon months (CSE 1985: 331). While the government has enacted appropriate zoning legislation it did not strictly enforce the laws due to various reported constraints (Kurien and Achari 1988). The NFF, as mentioned earlier, has been networking with various regional unions within the country and outside to protest against the non-sustainable fishing by trawlers and purse-seiners (*Lokayan Bulletin* 1986).

Another dimension of conflict around fishing relates to the problem of "Panidari" just like zamindari in Bihar. The Patna High Court has decided that zamindari abolition did not imply abolition of Panidari in 1964. After more than 20 years the case is still pending in the Supreme Court (CSE 1985: 47). In Goa the coastal ecology and tourism have been in conflict even though so far the large hotel owners have been able to manage concessions (APPEN 1988).

The marine eco-system in the Gulf of Kutch had suffered due to cutting of mangrove for fuel and timber, camel grazing, industrial construction, mining, salt ponds or brine evaporation ponds, oil and the chemical hazards, waste disposal by the steamer as well as oil tankers (Chavan 1986).

The movement against limestone quarrying, mining activities for other purposes have also been gaining strength in different parts of the country. When would an ecological conflict assume a dimension of law and order problem is difficult to state. The debate on the Doon Valley eco-system has finally reached the Supreme Court (Bandyopadhyay and Shiva 1987; Ramamurthy 1984). Often the people living around the mining zones are unaware of the long-term consequences of the pollution through dust and dislocation of undergoing hydrological systems. The issue is whether the state would consider its duty to share information before undertaking, 'development through mining' (CSE 1985: 26).

Legal activism, as we mentioned earlier, has played an important role in defining the boundaries of debates around ecological issues. After the 42nd amendment in the constitution in 1977 two articles, i.e., 48A and 51A, have defined the duty and responsibility of state as well as people. In a perceptive analysis Professor Baxi (1984) has stressed that the most fundamental flaw with the institutional design of law, particularly in environmental arena, was its neo-colonial orientation. Overloading of statutory authorities was another mechanism for perhaps deliberate non-performance or mal-performance of statutory task. It was paradoxical that environmental expert or the law commission were never consulted by the environmental law making or modifying committee. He adds:

deserved, Professor Mathur argued that change in the role of bureaucracy after Independence was aimed not in the structure of public administration but the attitudes, behaviour and achievement orientation of civil servants (Mathur 1972:2).

If the definition of what is normal or not-so-normal in terms of eco-development becomes a function of behavioural styles of the administrators, I am doubtful if we will ever be able to unravel the politics inherent in what Sen called "Description as a Choice" (Sen 1980; Gupta 1985c). Thus, widespread malnutrition or vulnerability to occupational hazards in mining or quarrying activities or large-scale disposal of assets to cope with drought or flood damage may be considered "normal". The report by the Government of India on Drought of 1987 does not even once discuss the policy framework for arresting the income transfer from poor to rich in drought years.

How do we conceptualise the way public administrators treat a phenomenon as "normal" or "abnormal". If defined as "abnormal", the issue arises whether the event is just worthy of some extra attention or calls for reformulating the whole strategy? Whether it is a crisis or catastrophe? Can it be anticipated in terms of location, timing, intensity and consequences for different social classes?

Answers to these questions will depend upon how administrators deal with risky and uncertain events. The risk is defined as a situation when probability of an event can be anticipated. The uncertainty is when chances of an event can not be anticipated.

How does one learn to cope with such events? Whether the coping strategies suitable for risky events work for uncertain ones too? Whether individual learning leads linearly to organisational learning (Gupta 1984).

Public administrators would want to perceive the problem of "uncertainty" as a "risky" problem when they want to exercise strong control. On the other hand, they will do the opposite when they wish to reduce the zone of their responsibility.

The public policy cannot be considered analogous to the growth of scientific knowledge (Wittrock 1977). By implication the learning could be planned to be low just in order to justify the poor or weak assumptions behind public policies. This is the oft-repeated defence of public administrator in the event of being confronted with evidence which he/she could have used but did not.

The "learning by doing" could be preferred over an informed and analysis-based solution of social problem (Lindblom and Cohen 1979 in Wittrock 1977). However, the counter view is that learning by doing could be preferred if the cost of the error was not very high and also if the "risk makers" of the public policy were not the same as "risk takers" of the potential error or disaster. Further,

It makes supreme sense to argue for trial and error, and sometimes it may be legitimate to deride risk-aversion in policy planning which talks about *trial* but does not allow for *error*. However, muddling through by way of "interaction" may sometimes be just a euphemism for error without trial; if you do not have any idea of what you are doing, there is all error and no trial and

therefore no learning (Wittrock 1987:23).

The cost of not paying heed to the warning issued about the possibility of disaster in the Union Carbide plant at Bhopal was not paid by the administrators and the politicians who believed in "learning by doing". One wonders whether appropriate lessons were even learnt after the disaster (Gupta 1984a).

The report of CSE (1982, 1985) *Lokayan Bulletin* (1985), Gupta (1981, 1985c, 1988d) records several experiences of persistent refusal to learn by the public administration in the government as well as science and technology institutions in case of soil conservation, irrigation management, dams and most importantly the Bhopal disaster.

Vishwanathan and Kothari (1985) demonstrate evidence of systematic attempts to prevent proper data collection even after the disaster in Bhopal so that people who were dying could be given remedial treatment. Despite the fact that the leakages were reported from the plant in 1981 and 1982 with persistent warnings by Keswani, a local journalist, no cognizance was taken.

The Multi National Corporation (MNC) in this case did not share the information about the poisonous gas. Officially the information was prevented from flowing to the voluntary organisation and even public health doctors engaged in the treatment. The controversy over sodium thiosulphate treatment revealed how various public administrators systematically prevented large-scale availability of the antidote lest it confirmed the presence of cyanide. Protecting the interest of the MNC became a matter of "public interest". There are many other aspects of this tragedy which highlight that a problem of risk was deliberately converted into that of *uncertainty* so that public administrators could justify their inaction.

The environmental effects of the tragedy would have required a long-term research programme but support for such research was not available to those who were most articulate in mobilising support for the victims such as Medico Friends Circle, Patriotic People's Science and Technological Group, Kerala Sastra Sahitya Parishad, Ekalavya, Zaherili Gas Kaand Morcha, etc. (*Lokayan Bulletin* 1985:59).

The next case for analysing the response of public policy to environmental uncertainties relates to drought. Numerous studies have been done on short and long-term impact of drought on social systems (Jodha 1975, 1978, 1983; Rustamji 1979; Bhatia 1988; Gupta 1980a, b, 1981, 1982a, b, c, d, 1983b, c, 1984a, c, d, e, f, g, h, 1985a, b, c; Mathur and Gupta 1984, 1988). There are few studies which have tried to look at the way households adjust with the risks vis-a-vis the organisational adjustment with risks (Gupta 1984d, 1986a, b, c, 1987a, b, c, 1989).

I will discuss first the report of the National Commission on Development of Backward Areas (NCDBA, Planning Commission, (1981) and contrast the perceptions in the report with a recent report "Drought of 1987: Response and Management" brought out by the Department of Agriculture and Cooperation, Government of India.

Massive employment problems were organised after the droughts of 1972. The drought of 1979-80 "underlined the need for taking (*sic*) durable and productive assets to enable the people of the affected area to withstand future droughts better" (1989:9). The relief manuals were supposed to include the latest approach to Drought Management. It is worthwhile to note that the focus of the strategy to deal with the drought of 1987 was on

the need for providing access to food to the affected people, but also to maintaining their quality of life. It is no more a question of saving life from the threat of widespread starvation during such a natural calamity. The central theme of relief today is to meet the food and nutritional needs of all sections of the people keeping in view their normal energy requirements, supply of drinking water, providing adequate health care and fodder for the cattle (1989:9).

It is against this claim that the research on survival systems should be examined to look at the efficacy of public measures.

A study on "Small Farmer Household Economy in Semi-Arid Regions: A Social Ecological Perspective on Risk Adjustment" (Gupta 1984) had looked into the drought and the post-drought recovery of the losses by the concerned households during 1979-82. Earlier, Jodha (1975) had looked at similar changes during and after the drought of 1967. These are the only two studies to our knowledge which have looked at the drought loss-replenishment process.

One of the major findings of the study by Gupta was that the importance and sequence of asset disposal in the risk adjustment repertoire of households had undergone basic change in the last few droughts. Livestock disposals remained an important means of risk adjustment as also the income transfer. Accordingly, a warning of the continued loss of livestock assets was issued in January 1988 so that the government could find ways of preventing (*a*) liquidation of the savings of the pastoralists still available and (*b*) increase in the surplus generating potential of richer pastoralists and cultivators (Gupta and Kumar 1988). Much of the damage had been done by January 1988. However, all was not lost. The policies of the Government of India did not include then or later any measure to arrest such immiserisation. Discussions were held with most of the concerned officials at senior level. >

The fact that drought did not affect all the classes equally has been known to the planners for quite a long time. But, the persistent bias towards preventing absolute and visible misery but ignoring the short- and long-term ecological and economic losses for the poor continued. Several suggestions were made based on earlier research referred above. For instance, it was recommended that the policy for drought management should discriminate among those who had deficit in their budget, who could just subsist and those who had surplus in their budget. It was suggested that people who had lost their assets may become muted and not raise their voice in any political institutions. Suggestions were made regarding

(*a*) scheme for calf-rearing and support price for calf buy back scheme, (*b*) since the proportion of infant bovine was far higher in dry regions compared to the rest one had to devise suitable fodder concentrate combinations and prevent distress disposal of good quality calves, (*c*) a large number of measures were suggested which were necessary in case the rains were good in the coming season, (*d*) in view of the special skills of women, particularly in non-farm activities, the drought relief should include organisations of production and marketing of these goods, (*e*) the interest subsidy would need to be given to those who could not pay their debts to the banks in addition to rescheduling and rehabilitating finance, (*g*) cattle camps to be used for mass vaccination and popularisation of improved livestock and range management technologies, (*i*) the implications of stress fodder, fuel and food needed to be shared with the people along with the remedial measures to be taken in the post-drought period to overcome the adverse effect (also see Mahar Homji 1988), (*j*) the beneficiaries of the relief programme should be made conscious of their responsibility towards less fortunate pastoralists, (*k*) mobilisation of science and technology institutions for improving drought proofing mechanisms, (*l*) documentation of indigenous knowledge for survival (also see, Gupta 1988b, c, 1989b) and (*m*) restriction of PDS only for the affected regions so that rest of the society could pay higher prices and save public resources which would have been necessary if everybody was to be subsidised.

Despite the fact that relief Commissioner and relevant secretaries to the government were contacted nothing much happened. So much for the claims for improving or maintaining the "quality of the life" of the affected peoples. Despite widening budget deficit and increasing balance of payment problem the government maintained that "the central theme of relief today is to meet the food and nutritional needs of *all* sections of the people" (GOI, 1989, p. 9). The government has to recognise that just the way everybody was not equally affected by the drought, everybody did not need to be subsidised equally. This simple lesson has not been learnt.

There are studies on famine foods (Bhandari 1974), stress fodders (Rangnekar 1989) and veterinary medicines evolved by the people (Varma and Singh 1969) which deserved to be drawn upon while drawing the public policies for drought-affected regions.

Contrasting the Gujarat government's perspective (Koshy 1987) with that of voluntary organisations, Bhatia (1988) very perceptively records the misery that poor women and men had to bear during the drought of 1987. The labourers to be hired for public works had to report at 8 o'clock in the morning and they were marked absent if they were slightly late. Those who did not have ration-cards suffered just as in case of Bhopal tragedy. If the ration-cards would not be available with the poor did it require a great imagination or administrative acumen to anticipate who would suffer under such guidelines. There was no way by which a person who was sick could be substituted by another family member. There were many other anomalies which were documented by Bhatia and others.

independent route established relationship between ecological habitat and composition of enterprises such as livestock species among pastoral castes. They have shown that with the degradation of the ecological habitat the composition of herd shifted from buffalo to cattle and then to goat.

The portfolios of enterprises could be classified on the basis of a return-variance matrix (Gupta 1981, 1989). One could have households with high-return, high-variance, low-return-high-variance, and low-return-low-variance types of portfolios. These portfolios will influence the investment options of different classes.

Access

Access to risk adjustments would influence the perception and response to risks. These options can exist at the level of household, but also of common property or communal or public institutions such as drought-relief or public works programmes. The household options can further be divided into intra and inter-household ones. The intra-household options imply reduced or modified consumption, migration, asset disposal, etc. The inter-household options include entry into credit, labour, and tenancy contracts (Gupta 1989:70, 1985).

The consequences of differences in perception and response could be deficit, subsistence or surplus household budget. This in turn would influence the ecological conditions through aggregation and interaction of household choices.

If organisations were to take a short-time perspective as is apparent from the reports of the NCDBA and GOI on Drought (1987), only those portfolios of activities may be supported which could payoff in short-time frame. We should not be surprised if we noticed that the portfolios of the better endowed people with high-variance-high-return or low-variance-high-return were selected.

The contrast between household options and the organisational strategies can be studied through the 4-S Model (Gupta 1985, 1989). Imagine a three-dimensional matrix with the space, sector and season as three dimensions. Each dimension can be dichotomised. "Space", for instance, could be understood in terms of high or low population density, undulated or plain topography etc. "Sector" can be dichotomised as specialised or diversify, public or private, agriculture or industry, etc. "Season" can be dichotomised into uni-model or bimodel rainfall or low or high rainfall conditions.

Given any two conditions third can be anticipated. In regions with low rainfall or high seasonal influence with low population density, one can anticipate the absence of private organisations, a specialisation-based economy, and single or specialised crop conditions. The diversification of the household portfolio in risky conditions over time (i.e., over seasons), space (through migration, pastoralism, etc.), and sectors (crop mixtures as against single

crop, crop-livestock-craft inter-linkages as against any one as a dominant enterprise) can thus be understood

Thus, in regions where private market forces are strong today thanks to historical factors, favourable ecological conditions, and public investments in irrigation, transport, and other services, public management of resource delivery may not be warranted. The state may merely perform the role of regulation and reinforcement of social accountability of private and voluntary organisations. In regions where private market forces are weak and demand and supply of different resources do not clear at reasonable prices because of various imperfections in the mobility of factors and dispersal of information, public organisations have an important role to play (Gupta 1989:73-74).

The fact that poor households survived through informal pooling mechanism (of resources, information and trust) reinforced by caste and kinship implies that social stratification in such regions will be very different compared to the other regions. The conceptual issue before the students of public administration is how one should characterise the environment of the organisation. I have argued that classical efforts by the organisation theorists to define the environment as placid or turbulent (Emery and Trist 1965) or homogeneous versus heterogeneous (Thompson 1967) are subject to multiple interpretation. There is a need to anchor the organisational environment to objective characteristics.

Since risk averse organisations can never reach the risk averse households, the role of organisation is not merely adapting to the environment but in modifying it has to be recognised. The perception of an environment by the policy-makers and the administrators (Smith, Latham and Thoolen, 1980) has to be distinguished from its objective characteristics (Gupta 1981). The socio-ecological perspective makes it possible to characterise environments of organisations objectively.

The transition from the socio-ecological perspective to eco-political perspective requires incorporation of several other dimensions which we discuss next.

If the diversity in ecological endowments influences the type of occupations in which poor peoples are engaged in, then the nature of support the state provides to different markets dealing with each of the occupations would make a substantive difference to the survival of people. For instance, if poor people survived primarily through reliance on common property resources (Gupta 1984; Jodha 1985; Kalla and Ananth Ram 1988) and through non-farm activities, a weak response of policy-makers and public administrators would reflect on the nature of the state. The changes in political perception of the needs of forest dwellers and artisans may have to be inferred by looking at not just the policy statements but also the organisational arrangements. The policies have to be interpreted by analysing the institutions (Clay and Schaffer 1984) that act as filters or conveyor belts. There is no point in drawing a false contradiction between policy and implementation or between regulatory and development administrations.

The gaps in the research on public administration from ecological perspective can be located in:

The need for recognising that the risk averse organisations can not serve risk averse households. The administrative response to risk and uncertainty has to be conceptualised properly. The Four-S model and the eco-political perspective may help. However, empirically more robust frameworks have to be established.

The neglect of ecological variables in the theories of public administration in primarily agrarian societies is indefensible (Reddy 1980; Gupta 1989). The local and global adaptations with changes in ecology (climate, soil, water, trees, air, ozone layer, global atmospheric temperature, etc.) required new forms of organisation and governance. How these forms will evolve may depend upon the way protest against uniform administrative structures is responded to by the state. More coercive response may lead to demand for greater autonomy through reinforcement of sub-nationalities.

The role of *access* (to natural resources and the institutions governing their use), *assurance* (Horizontal—that is about others' behaviour vis-a-vis one's own; Vertical—future returns from present investments) and *ability* (the skill to transform resources into outputs) in design of public systems needs to be properly conceptualised. The interaction between spatial, sectoral, seasonal and social variables have to be studied properly so that ecological diversity, complexity, simultaneity and change can be treated as indigenous variables in the process of development.

If development is defined as widening the choices of the poor and extending the time frame for appraising their choices then there is no escape from looking at the divergence in these parameters in case of social classes besides in the case of civil servants at various levels.

The role of common properties or their erosion in the evolution of national and sub-national consciousness has to be studied. The relation of these layers of consciousness embedded in culture with perception of state and its instruments has to be more rigorously studied for understanding strengthening of ethnic and regional formations.

Search for sustainable technologies building upon indigenous/local knowledge of peasants, pastoralists and artisans will require closer participation of these groups in the formal research system.

Finally the tendency in public administration to convert *risky* problems into *uncertain* ones to reduce the zone of responsibility and *uncertainty* in some cases into that of *risk* to increase control needs careful scrutiny.

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