GEOGRAPHICAL PERSPECTIVES ON ENVIRONMENTAL CRISIS AND SOCIAL CONFLICTS

Dissertation submitted to the Jawaharlal Nehru University in partial fulfilment of the requirements for the award of the degree of

MASTER OF PHILOSOPHY

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1997

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Date: 3/7/97

CERTIFICATE

This is to certify that the dissertation entitled GEOGRAPHICAL PERSPECTIVES ON ENVIRONMENTAL CRISIS AND SOCIAL CONFLICTS, submitted by SARFARAZ ALAM in partial fulfilment of nine out of twenty four credits for the award of the Degree of Master of Philosophy (M. Phil.) of this University, is his original work and may be placed before the examiners for evaluation. This dissertation has not been submitted for the award of any other Degree of this University or any other University to the best of our knowledge.

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To my Father
who visualises spatial variations
as evidence for the handiwork
and wisdom of Almighty God.

ACKNOWLEDGEMENT

I am profoundly grateful to my teacher, Prof. R.C. Sharma, for his continuous suggestions, comments and supervision in the completion of this dissertation.

I wish to express special thanks to Dr. Manoranjan Mohanty and Dr. P.C. Sinha for their suggestions.

I owe sincere gratitude to my friend Shafique Alam who helped in the organisational work of the dissertation.

My special thanks are also due to my friends Mukesh, Albert, Sangeeta, Anand, Om Prakash and Allauddin Khan for extending all possible help.

Thanks are also due to my family members for constant encouragement and moral support throughout my academic pursuits.

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CHAPTER I

INTRODUCTION

The connection between environment and social conflicts may be investigated in three different ways. First, where there is a social conflict and environmental destruction takes place as a result of it. Second, environmental crisis may itself bring about social conflict (environmental crisis as the direct cause of conflict). Finally, beside being the direct cause or the consequences of social conflict, environmental crisis may in many cases be a contributing (minor or decisive or triggering) cause of social conflict. The present study will choose to concentrate on the second dimension -- environmental crisis causing social conflict.

Before we discuss any further, it is important to note that the environment is but one variable in a series of political, economic and social factors that can bring about turmoil. Indeed, some skeptics claim that scarcities of renewable resources are merely a minor variable that sometimes links existing political and economic factors to subsequent social conflicts[1]. But, a large number of research findings show that environmental crisis in many cases becomes independent variable in relation to social conflicts.

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[1] Thomas F. Homer-Dixon and Others, "Environmental Change and Violent Conflict", *Scientific American* (New York), vol. 268, no.8 (1993), p.38.

1.1 LITERATURE REVIEW

A number of literature and research findings in recent years have sprawned up to demonstrate a relationship between environment and social conflicts. As one of the path-breaking works in this field, Homer-Dixon has developed three theoretical perspectives on environmentally induced conflicts[2]. First, the decreasing supplies of physically controllable environmental resources, such as clean water and good agricultural land, would provoke interstate "simple - scarcity" conflicts or resource wars. Second, large population movements caused by environmental stress would induce "group-identity" conflicts, especially ethnic clashes. And finally, severe environmental scarcity would simultaneously increase economic deprivation and disrupt key social institutions which in turn would cause "deprivation" conflicts such as civil strife and insurgency.

Homer-Dixon proposes elsewhere the role environmental change in acute conflict[3]. He defines acute conflict as conflict involving a substantial probability of violence. He also examines the relationship between renewable resource scarcities and violent conflicts in the developing countries.[4] He considers environmental degradation as independent variable.

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[2] Thomas F. Homer-Dixon, "Environmental Scarcities and Violent conflict", *International Security*, (Massachusetts) vol.19, no.1 (1994), pp.5-40.

[3] Thomas F. Homer-Dixon, ""On the Threshhold: Environmental Change as Causes of Acute Conflict", *International Security*, vol.16, no.2 (1991), pp.76-107.

[4] Ibid., no.1, pp.38-45.

Ashok Swain describes the types of social conflict which are likely to emerge in response to environmental destruction[5]. He has developed a conceptual framework of environmentally induced social conflicts in the developing countries.

Arthur Conacher presents an argument that environmental problems are nearly always conflicts amongst groups of people over the use of land and resources, and that an important immediate objective of environmental management -- to resolve such conflicts - requires integrated land use and environmental management in rural as well as in urban areas[6].

Narottam Gaan demonstrates connection between environment and conflict from the South's perspective[7].

Norman Myers study shows nexus between population, environment and conflict[8]. He considers population and environment within a general framework of development; and he looks at conflict in broad terms, including both civil disorder within nations and hostile relations between nations.

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[5] Ashok Swain, *Environment and Conflict: Analysing the Developing World* (Uppsala-Sweden, 1993).

[6] Arthur Conacher, "Environmental Management and the Resolution of Conflict", In Warren Moren and Others, ed., *Proceedings of Tenth New Zealand Geographical Conference*, (Auckland, 1979), pp.157-61.

[7] Narottam Gaan, "Environment and Conflict: The South's Perspective", *Strategic Analysis*, (New Delhi) vol.19, no.6 (1995), pp.827-41.

[8] Norman Myers, "Population, Environment and Conflict", *Environmental Conservation*, (Switzerland), vol.14, no.1 (1987), pp.15-22.

Raquel Pinderhughes examines the emerging body of empirical and theoretical work that social science is contributing to our understanding of environmental inequality[9]. There is mounting evidence that minority and low-income populations are asked to bear a disproportionate burden of the country's air, water and waste pollution problems. According to her, disproportionate exposure to environmental hazards is part of the complex cycle of discrimination and deprivation faced by minorities in the United States. She discusses the link between the environmental justice movement, which seeks to confront the causes and consequences of environmental inequalities, and social science research on environmental inequality.

Bruce Byers explores some of the consequences of incongruities between the natural boundaries of ecosystems and the political borders of states[10]. He argues that this mismatching has potential to stimulate conflict, and that mapping such incongruities can be a tool for predicting conflicts in time for preventive action.

Rudolf K. Molvaer discusses environmentally induced conflicts in the Horn of Africa[11]. He describes the worsening state of people, both physically and socially, because of factors in their environmental surroundings. He gives

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[9] Raquel, Pinderhughes, "The Impact of Race on Environmental Quality", *Sociological Perspective*, (London), vol.39, no.2 (1996) pp.231-48.

[10] Bruce Byers, "Ecoregions, State Sovereignty and Conflict" *Bulletin of Peace Proposals*, (London) vol.22, no.1 (1991), pp.65-76.

[11] Rudolf K. Molvaer, "Environmentally Induced Conflicts? A Discussion based on Studies from the Horn of Africa", *Bulletin of Peace Proposals*, vol.22, no.2 (1991), pp.178-88.

attention to both the worsening state of the environment, and the rapid population growth, which can have the same effect. Tobias J. Lanz addresses the specific relationships among environmental degradation, social degradation, and social conflicts in the Northern Highlands of Ethiopia, in Tigray and Wollo provinces[12].

Shaukat Hassan discusses the environmental sources of conflict in the South Asian subcontinent[13]. His article emphasizes three important points: first, it discusses the nature of environmental stress and its role in inter-state conflict; second, it examines the nature of resource rivalry and its contribution to inter-state conflict; and third, it explores ways in which environment related conflicts can be resolved and prevented.

1.2 OBJECTIVES

The basic objectives of the present study are:

- to postulates a causal link between environmental crisis and social conflict.
- to describe the environmental crisis in some of the most vulnerable geographical regions and the associated social conflicts in them.
- to predict the future of environmentally induced social conflicts.
- to present a viable environmental conflict resolution technique.

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[12] Tobias J. Lanz, "Environmental Degradation and Social Conflict in the Northern Highlands of Ethiopia", *Africa Today* (Boulder-USA), vol.43, no.2 (1996), pp.157-82.

[13] Shaukat Hassan, "Environmental Sources of Conflict in the South Asian Subcontinent", *DISARMAMENT*, (New York), vol.15, no.1 (1992), pp.79-95.

1.3 HYPOTHESIS:

- There is a close relationship between environmental crisis and social conflict, but the magnitude/degree varies with the intensity.
- Environmental crisis is mostly locational so as the social conflict.
- The frequency of environmentally induced social conflict will grow in future, particularly in the poor countries.

1.4 METHODOLOGY:

The study is mainly based on literature review and articles. The study is both descriptive and exploratory as it will describe the environmental crisis in various geographical regions and associated social conflicts and will try to establish a causal link between these two variables. The spatial pattern of environmentally induced conflict will be described at different scales -- local, regional and national.

1.5 CHAPTERIZATION:

Keeping in view the objectives of the study the work is organized into five chapters. The introductory chapter deals with the theme of the study and the main objectives and the hypothesis apart from literature survey.

Chapter two examines the causal relationship between environmental crisis and social conflict. The focus is on the human perception of environmental crisis and the reactions to it.

Chapter three describes the nature of environmentally crisis in some of the geographical regions.

Chapter four deals with the spatial perspective on environmental induced conflict at various scales -- local, regional and national.

The last chapter focuses on the future of environmentally induced conflict and gives some elementary ideas to prevent and resolve such conflicts.

CHAPTER 2

ENVIRONMENTAL CRISIS AND SOCIAL CONFLICTS:
A CAUSAL RELATIONSHIPS

The dictionary meaning of the word "environment" is a surrounding, the aggregate of all the external conditions and influences affecting the life and development of an organism. The above definition of environment involves three basic questions - What is surrounded? By what surrounded? And where surrounded? It is meaningless to discuss the environment in abstract term. It must be the environment of something. Primarily, the concern of all geographers is with the environment of humans. And in the present context also it is the surroundings of human being which is of interest. The human surroundings may be defined as "all the phenomena which affect human activities and all phenomena which are affected by human activities." [1] Thus, the environment of a person consists of physical or non-living environment and biological living environment. The physical environment comprises the land, water and air while the biological environment includes the plants, animals and other organisms. The environment of a person or a group of plants, animals and other organisms. The environment of a person or a group of people includes other people and their activities. The answer the third question is the geographical space or habitat or

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[1] Arthur Conacher, Op. Cit., 1979, p.158.

ecological system. The spatial system is made up of many different sub-systems. Each part of the earth's surface has particular characteristics such as locational, physical and biological conditions which affect the spatial relationships that man has within it. Geographer's task is to identify and analyze the form and nature of the ecological system in which man interacts with his environments being influenced by it an in turn modifying it[2].

Man's relationship with the environment indirect in that environmental behaviour depends on the image of the world that each person carries inside his head. This image is therefore as important as a objective environment. The image of the world that each person carries inside his head is called subjective environment, or the environment as perceived by man. Each person therefore has an image of the environment inside his/her head. This image is created as a result of interaction of humans with the real world (i.e. objective environment) through the process of perception and cognition, both personal and cultural. It is this image which affect human behaviour. Therefore, the questions of how the images of the subjective environment are created and how behaviour is affected by the individual's mental model will be examined in the next two parts of this chapter.

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[2] R. Knowles and J. Wareing, *Economic and Social Geography* (Calcutta, 1990), 9.2.

2.1 ENVIRONMENTAL PERCEPTION, COGNITION AND IMAGE:

The term environmental perception is defined as the process by which an individual gains knowledge of the world by receiving stimuli from the environment through his or her geneses[3]. The term cognition refers to the way information once received, is stored and organized in the brain so that it fits in with already accumulated knowledge that a person has with his or her value[4]. Cognition occurs in a spatial context when the spaces of interest are so extensive that they can not be perceived or apprehended at once[5]. Thus, these large scale space have to be committed to memory and cognitively organized to contain events and objects that are outside the immediate sensory field of a person[6].

The end product of perception and cognition is a mental image of the objective environment that each individual carries inside his/her head. The signals are filtered through perception, then further filtered through the cognitive representation given to these in relation to previous cognitive structures in the brain[7]. The mental image of environment that each individual carries inside

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[3] Ibid., 9.12.

[4] R.G. Golledge and R.J. Stimson, *Analytical Behavioural Geography* (London, 1987), p.38.

[5] D. Stea quoted in R.G. Golledge and R.J. Stimson, Ibid., p.38.

[6] Ibid., p.38.

[7] Ibid., no.4, p.38.

his/her head is very impact because it is the frame of reference within which he/she behaves.

The process of perception and cognition and its consequent mental image of the environment may happen through --

1. Direct experience, through sense - by touch taste, smell, hearing and sight. Direct experience is an actual visit to place and in forms the basis for the most accurate perception[8].

2. Indirect experience based on knowledge acquired through secondary sources such as books, films, newspapers, maps, advertisement, relatives and friends. Mass media has become a very important source of knowledge about the environmental issues. This kind of information is helpful but not always accurate[9].

An image is both an individual phenomenon and a cultural phenomenon. Each person receives uniquely. In other words, no two person share exactly the same image or idea. The perception of two individuals vary as a function of the differences in the content of the information presented and the differences in the ability of the individual to pick up the information messages[10]. The objective

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[8] Charles Whynne - Hammond, *Elements of Human Geography* (London, 1979), p.9.

[9] Ibid.

[10] Ibid., no.4

environment is complex one and present individual with so many images. Not all images are important for an individual. Therefore, a process of selection has to take place. It is culture which enables him to choose certain stimuli and not others. The culture through which the reality is perceived consists of such considerations as philosophy and ideology (beliefs, concepts and attitudes of individuals and groups), skills and tools (acquired abilities for manipulating the human and natural environment), social organizations (various social institutions) and communications (skills by which various cultural expressions and transferred). Thus, an image is both an individual phenomenon and cultural phenomenon to the extent that similar individual in similar milieu are likely to behaviour. That is to say, although each individual perceives uniquely, the resultant behavioural environments have much in common because they are derived from both common neurological mechanisms that are innate in people and form common super imposed socializing experience[11]. Thus the people of different cultures perceived the same environment differently. Geographers are concerned with the influence of culture on individuals view of environment and the ways in which perceptions of the environment way between cultures.

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[11] W.H. Ittelson quoted in D.J. Walmsley and G.J. Lewis, *Human Geography: Behavioural Approaches* (London, 1984), p.10.

2.2 BEHAVIOURAL ENVIRONMENT

In the preceding section of this chapter we explained the relationship between man and objective environment. We saw how the images of the subjective environment and created through the process of perception and cognition, Human response to objective environment (stimulus) is indirect. Perception forms a crucial intervening variable between stimulus and response (behaviour). Each person has an image of the environment inside his head. It is on this image that man's behaviour depends. It is also clear from the preceding section that the people different culture perceive the same environment that each individual carries inside his head, human response to the environment is also affected by the culture. That is to say, culture is the primary factor affecting the way in which human being respond to the environment and since there is a wide variety of cultures, there is a wide variety of cultural responses, even to the same environment. For example, in the semi-desert regions of Africa two distinct cultures can be identified each with a different relationship with the environment. Nomadic herdsmen utilize the land for the grazing of animals only even though such suitable for cultivation. The sedentary farmers utilize the land for crop cultivation even though such land is suitable for animal husbandry. It is the different cultural stage of each of these two groups which enables them to respond the same environment differently. This differential land-uses often causes social conflicts between them such similar contrasts can be found between Chinese and Malaysia and various agriculture groups in India.

2.3 ENVIRONMENTAL CRISIS:

Human's live in a state of dynamic equilibrium with their environments. As the environment is in a constant state of flux, human beings have to make internal adjustments in response to external changes in one or more environmental factors, to be able to survive, feed, grow and reproduce when the dynamic equilibrium between human beings and their environment either changes or break down, environmental crisis arises. Such a disequilibrium situation is manifested in various ways - depletion and pollution of fresh water supplies, degradation and loss of good agricultural land, degradation and removal of forests, depletion of fisheries and so on. In other words, if a change to or a breakdown of the dynamic equilibrium between human beings and their environment, possibly causes by human actions threatens or perceived to be such by some people as threatening their economic activities, social and cultural activities, to physical well-being, including comfort and health, to psychological well-being, including aesthetic appreciation and to consciousness/identity, the environmental crisis arises. For example, increasing pollution of freshwater is not an environmental crisis per se (that is to the stream itself); it only becomes a crisis when it threatens or is perceived as threatening, certain human activities and well-being -- the use of water for domestic purposes, to use in an industrial processes, or the development of concern over losses of aquatic life. Thus an environmental crisis maybe defined as the crisis produced by changes to or breakdown of relationship between human and their relationship between human

and their environment possibly caused by human actions, which threatens or perceived as threatening certain human activities or well-being.

A very important point emerges from the above definition of environmental crisis is that the term environmental crisis is usually discussed from human point of view. No environmental crisis occurs if it does not produce an adverse effect on human beings. Thus, the question is, what are the factors which are bringing about change or breaking down the dynamic equilibrium between human beings and their environment. In short, what are the causes of environmental crisis.

There are main causes of environmental crisis:

- environmental degradation and ecological changes;
- exponential growth in human population; and
- skewed distribution of environmental resources or unequal access to environmental resources.

These three origins of crisis can operate singly or in combination. Let us take environmental degradation and ecological change. Environmental degradation simply means overall lowering of environmental qualities brought in by human activities in the basic structure of the components of the environment to such an extent that these adverse changes adversely affect all biological communities in

general and human society in particular[12]. In short, the term environmental degradation means that the condition of the natural landscapes turns worst under the influence of human caused relations. Environmental degradation also causes ecological imbalance by reducing ecosystem and ecological diversity.

Following types of environmental degradation and ecological changes can be identified as plausible causes of environmental crisis:

- greenhouse induced coastal and island systems submergence;
- stratospheric ozone depletion;
- acid rain;
- degradation and loss of arable land;
- depletion and pollution of freshwater supplies;
- degradation and removal of forests;
- loss of biological diversity;
- extraction of minerals;
- disposal of water material;

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[12] Savindra Singh, *Environmental Geography* (Allabad, 1991), p.223.

- degradation of natural and cultural heritage[13];
- human induced environmental hazards; and
- loss of habit of indigenous communities.

Global warming will accelerate sea-level rise, modify ocean circulation and change marine ecosystems, with considerable socio-economic consequences. The predicted rise is about 20cm. in global mean seal-level 2030 and 65cm. by the end of the next century, and there will be significant regional variations[14]. A sea-level rise of this magnitude will threaten low-lying islands and coastal zones. It will render some island countries uninhabitable, displace tens of millions of people, seriously threaten low-lying areas, flood productive lands, contaminate fresh-water supplies and change coastlines[15]. Sea-level rise would hit hardest on agricultural societies in coastal plains, the main sources of grains in low latitude countries, and in island nations in the Pacific. In coastal lowlands such as in Bangladesh, China and Egypt inundation due to sea-level rise and storm surges

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[13] Cultural and natural heritage are defined as those places which are components of cultural and natural environments that have aesthetic, historical, scientific or social significance or other value for future generations as well as for the present community. For detail see Nicolo Gligo, "The preparation of inventories and balance sheets of the natural and cultural heritage", in United Nations Economic Commission for Latin America and Caribean, *The Environmental Dimension in Development Planning* [Santiago (Chile), 1990] pp.221-42.

[14] ICPC, quoted in Mustafa K. Tolba, *Saving Our Planet: challenges and hopes* (London, 1992), p.29.

[15] Mustafa K. Kolba *Saving Our Planet: challenges and hopes* (London, 1992) pp. 29-30.

could lead to significant social disruptions and economic losses. A sea level-rise if only one metre would threaten the life and survival in Maldives.

The increased incidence of ultraviolet radiation caused by ozone depletion is likely to raise the rate of disease in humans and livestock. The loss of stratospheric ozone may damage fish at larval stage and plankton that form the basis of the marine food chain[16]. It can also damage trees and crops. All of these could have serious economic results.

One of the most widespread pollution over the last decade has been acid rain. It causes serious environmental damage. Damage to crops and forests, lakes and rivers, and buildings and structures appears to be widespread, and increasing. Some of the most serious damage has been to freshwater lakes and river systems. Common symptoms of the early stages of acidification include reduced fish population, declining reproductive rates and decreased species diversity; advanced acidification brings wholesale fish death[17].

Loss of arable land is taking place due to soil erosion, salinization, alkalization, water logging and desertification. Erosion is one of the key elements in soil degradation. It leads to declining rates of productivity and, unless checked, can lead to abandonment of land. Desertification leads to reduce biological

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[16] UNEP, *Poverty and the Environment* (Nairobi-Kenya, 1995), p.52.

[17] Chris Park, "Transfrontier Air Pollution: Some Geographical Issues", *Geography*, vol.76, part 1 (1991), p.31.

productivity, with consequent reduction in plant biomass in the lands carrying capacity for livestock, in crop yields, and in human well-being. Degradation of land could result in decline of agricultural productivity. The per capita arable land availability decreases as a result of land degradation.

Freshwater is one of the most critical resource of mankind. It is used for domestic, agricultural and industrial purposes. The decline in freshwater due to pollution will cause water crisis. The percapita availability if water will decrease. This resource is not uniformly distributed. Many countries are already facing water shortage.

Forest is mainly used as a source fuelwood, timber and other minor forest products. Fuelwood and charcoal are a critical for the poor. They are the cheapest available fuels per ton and per unit of heat and they are used extensively and if not exclusively to provide energy for cooking, heating and light. The effects of wood cutting include fuelwood scarcity and even larger journeys made and man-hours spent on the quest for wood supplies, often by women and children. Forests are sources of livelihoods for the large and as a result of it massive displacement of people has take place. They are forced to seek their livelihood elsewhere.

Wild species and the genetic variation within them make substantial contributions to the development of agriculture, medicine and industry. Many species constitute the foundation of community welfare in rural areas, by

providing food, feed, fuel and fibre. Many species have been fundamental to stabilization of climate, the protection of watersheds, and the protection of soil, nurseries and breeding grounds. The loss of biological diversity will restrict all these socio-economic and environmental benefits and, in the long run, will compromise the ability of future generations to meet their needs[18]. The loss of genetic diversity among domestic plants and animals is an even greater threat to human welfare than does the loss of wild species, because that diversity is what will enable crops to adapt to future environmental change.

Mining is perquisite for industries; it supplies the raw materials and has impacts in the immediate vicinity of mining sites. Extraction of minerals is associated with land subsidence, underground mine fibres. It poses threats to settlements, aesthetic and socio-economic activities. Minerals generally occur in forested areas and mountains where poor indigenous communities live. Mineral extraction causes damages to their habitat. They way of life of the indigenous communities is threatened.

The industralised, urban ecosystems inevitably lead to huge quantities of domestic, industrial and nuclear wastes. Exposure to hazardous wastes and hazardous processes causes poor working conditions and may result in serious accidents as well as chronic health effects on workers and community adding to the already staggering health effects from lack of water and sanitation facilities.

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[18] Ibid., no.15, pp.79-80.

The heavy metal chemical pollute the water system which may be a threat to aquatic life and human health. Moreover, underground water and soils may also be contaminated by heavy metals.

Natural and cultural heritage have aesthetic, historical, scientific and social significance. The degradation of natural and cultural heritage due to deforestation, air pollution and other causes may lead to serious consequences.

There are some environmental hazards which are human induced--floods, droughts, landslides, outbreak of pests and diseases. These hazards produce serious threats to life, economic activities and aesthetic pleasure.

There are some 200 million people worldwide who can be described as indigenous communities. They live in isolated and semi-isolated places--forests, mountains, deserts and semi-deserts. Such people have strong ties to their traditional lands, which is more than an economic resource from which these people have learned to extract a living on a sustainable basis, it also forms the very ground of their being. In their identification with their lands indigenous people find their meaning as cohesive social and cultural groups. The forces of modernization is disturbing their way of life and cultural identity. The destruction of their habitat is posing threats to their very survival.

Thus environmental degradation and ecological changes are causing decline in the quality and quantity of environmental resources that occur faster than it is

renewed by natural processes. These events are producing an adverse effect on human being. With the change or break down of dynamic equilibrium between human beings and their environment, the economic, social and cultural activities or the physical and psychological well-being of human being are being threatened or perceived to be such by some people.

Population growth is main cause of environmental crisis as well as environmental degradation, it is actually has a dual impact on environmental crisis. The high population growth has multiplied pressure on all renewable resources -- fresh water, soil forests and biodiversity, as well as non-renewable resources -- minerals resources and fossil fuels. Population growth reduces a resource's per capita availability by dividing among more and more people.

The high rates of population growth are considered to be the fundamental cause of both poverty and environmental degradation. Population growth leads to the marginalisation of labour as the growth of the supply of labour out places demand. The pressure by the increasingly marginalised poor rural population on common lands is identified as an important link between socio-economic development and environmental degradation, especially in dry-land agriculture in arid and semi-arid areas[19]. Poor people are pushed towards the exploitation of marginal areas of low productivity, lacking resources and technology, they tend

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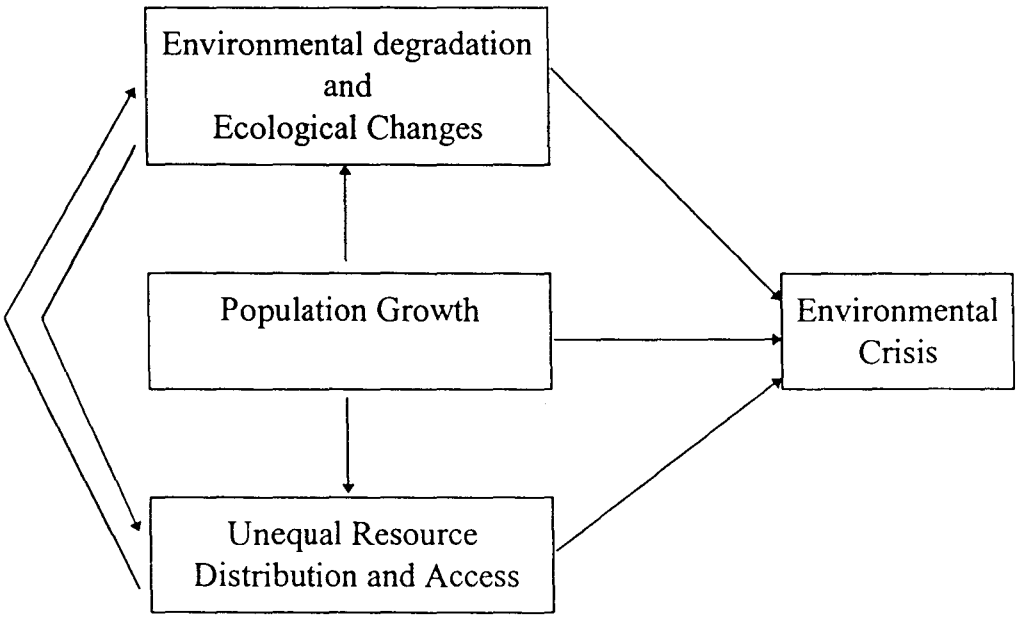
[19] P. Bifani, "Environmental Degradation in Rural Aeras", In A.S. Bhalla, *Environment, Employment and Development* (Geneva, 1992), pp.106-7.

to overexploit the natural resources (e.g. land, water and wood) with a consequent decline in poverty. A process of cumulative causation is set off, reinforcing poverty, which in turn-exerts more and more pressure on the environment, and so on.

Population growth also give rise to a rapid growth of demand for food and other necessities, which in turn lead to the adoption of policies mainly concerned with the maximization of foods production to the neglect of the environment and adversely affecting poverty through the marginalisation of labour. In this context, one vital factor is worth noting. To understand the pressure on the natural system, it is important to link increasing numbers of people with their respective consumption styles and excessive consumption levels. Consumption styles and excessive consumption levels. Consumption is directly linked to resource use and waste generation and hence the environmental degradation. The living standards prevalent in industrialised countries characterized by high consumption life styles can hardly be called sustainable. Although the population of developed countries is less than 20 percent of the world's population, they are responsible for most of the production, trade and consumption of chloro-fluorocarbons (CFC), carbon dioxide emission and sulphur emissions. The consumption patterns of less than 20 percent of the world's population (even if associated with a very low rate of population growth) are likely to exert a far more significant impact on the environment and the use of natural resources than the high rates of population growth of a much larger population with a much lower consumption



Figures 2.1 Resource Capture and Ecological Marginalisation.

Resource capture: Environmental degradation and ecological changes in combination with population growth causes unequal resource access.

Ecological Marginalisation: Unequal resource access and population growth cause environmental degradation and ecological changes (adopted from Thomas F. Homer-Dixon, 1994).

capacity. Thus, population growth has a dual impact on environmental crisis. On the one hand, it causes environmental crisis directly on the other hand, it causes environmental crisis via environmental degradation identity. The destruction of their habitat is posing threats to their very survival.

The third important source of environmental crisis is skewed distribution of resources and/or unequal access to resources. When farmers encroach on tropical rainforests or cultivate fragile hill sides or semi-desert areas, population growth is blamed, but the pressure typically stem from the concentration of land in large holdings. Population pressure on resources usually reflect an extremely skewed distribution of resources. Unequal resource distribution, concentrates a resource in the hands of few and subjects the rest to greater crisis.

The three causes of environmental crisis often interact, and two patterns of interaction are particularly common: "resource capture" and "ecological marginalisation" (see Fig 2.1). This is a modified model of Homer-Dixon[20]. The environmental degradation and ecological changes in combination with population growth encourage powerful groups within a society to shift resource dire environmental consequences (crisis) for poorer and weaker groups whose claims to resources are opposed by these powerful groups. Homer-Dixon calls this type of interaction "resource capture"[21]. Skewed distribution of resources

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[20] Thomas F. Homer-Dixon, Op. Cit., 1994, p.10.

[21] Ibid.

and/or unequal resource access in combination with population growth can cause land extensification. Since sites with good land tend to be cultivated first, land extensification increasingly requires the use of marginal lands, such as low land rainforests, steep slopes or semi-arid lands. High population density in these areas, combined with poor household's lack of resource and technology to counter the decrease in natural soil fertility and the incentives to invest in soil conservation (as poverty is highly correlated with landlessness), causes severe environmental damages. Note that the population growth is very crucial variable in both these patterns of interaction. The examples of resource capture can be given from the Senegal River Valley (Senegal and Mauritania) and Middle East. The examples of ecological marginalisation can be given from Philippines, Himalaya, Indonesia, Brazil, Costa Rica, and the Sahel.

The above three sources of environmental crisis are almost universal in nature. There are also the sources of environmental crisis other than these three, but are of minute importance and are very specific in terms of their occurrences. These causes will be taken in chapter three, where the spatial or regional patterns of environmental crisis will be described.

2.4 CONSEQUENCES OF ENVIRONMENTAL CRISIS

Environmental crisis occur when a change to or breakdown of dynamic equilibrium between human beings and their environment perceived by some people as threatening their economic, social or cultural activities or their physical

or psychological well-beings. The stressed which arise from these threats are as follows:

- disordering the distribution of resources
- decline in the standard of living.
- loss of sources of aesthetic pleasure
- loss of cultural identifies and way of life, and
- disruption of social institutions and social relations.

Due to environmental crisis, there may be reduction in the availability of arable land, fresh water, forest and fish resources for the consumption of human kind. In this situation, it will be impossible for the all social actors to be comfortable with the present availability or prospect of future availability of these resources.

The degradation and depletion of resources often affect economic productivity in poor countries and thereby contributing to decline in the standard of living. The depletion of fish stocks and forest lands may severely jeopardize the export earnings of a country and at the same time, may impoverish the local economy. Moreover, as a result of climatic change, increasing numbers of droughts and floods could drive countries with poor economies to virtual bankruptcy. A drop in agricultural output may weaken rural communities by causing malnutrition and disease.

Natural and cultural heritage form resources of aesthetic pleasure for future generations as well as for the present community. The degradation and depletion of these heritages would lead to the loss of psychological well-being including aesthetic appreciation.

In the developing countries, where agriculture is the most important source of subsistence, its decreased production might result in the loss of livelihood of millions of people. The shortage of clean water or lack of availability of raw materials might lead to the closure of industrial plants and a subsequent loss of jobs. The depletion and removal of forests and the depletion of fish stock will deprive a substantial number of people who are directly dependent on these resources as a source of living. Environmental crisis mostly deprives to the poor and other socially disadvantaged groups, the environmental foundations of their livelihood.

There are some 200 million people living in isolated and semi-isolated places who can be described as indigenous. Such people are often the original inhabitants of the area they live in and have developed ways of life in balance with their natural environment. They identify themselves with their natural surroundings and their way of life speak out the characteristics of their natural environment. Their territories are often the storehouse of renewable and non-renewable resources. These areas are seen as the frontier areas for human expansion. The construction of dams and reservoirs to generate hydroelectricity,

the extraction of mineral resources for industrial plant and the cutting of forests for industrial and commercial purposes not only deprive them of the environmental foundations of their livelihood, but also threatens their cultural identities and way of life, which has evolved through their interaction with their surroundings over milions of year.

Economic growth has always been one of the most important factors for integrating the dissatisfied sections into the existing social order without changing the structure of the society. The distribution of surplus among the people keeps them content and bring legitimacy to the social system as well as the regime itself. Economic decline may weaken the tax base and undermine financial, legal and political institutions. It can cause shifts in class relations. The widening gap between state capacity and the demand on the state will aggravate citizens grievances and erodes the state's legitimacy. The socially disadvantaged in many parts of the Third World are increasingly turning to overt strategies of collective resistance and, as manifested in environmental movements, such strategies represent a potentially potent challenge to local, national and even international political processes[22].

[22] Raymond L. Bryant, "Political Ecology: An emerging research agenda in Third World Studies", *Political Geography*, vol.11, no.1 (1992), p.27.

2.5 HUMAN REACTIONS TO ENVIRONMENTAL CRISIS

The stresses which arise from environmental crisis provide the stimulus for direct involvement of people in an environmental issue. Human's reaction to a range of different types of environmental crisis vary along a continuum of environmental stress (see figure 2.2)[23]. There are three critical point along the spectrum - the awareness threshold (below which we are simply not aware that the environment might affect what we do or how we do it, the action threshold (above which we consciously do something to cope with or minimize the impacts of environmental stress), and the intolerance threshold (above which we change what we do, or move somewhere else to do it)[24].

In this context it is most important to note that communities are heterogeneous, that various people react differently to the same event. Some (usually a minority) respond to stress by taking some action in an attempt to restore equilibrium; others (the majority) are either indifferent or unaware; and yet others (another minority) actively support the change[25]. As a result of these different responses, conflict between people develops.

As described earlier, when the environmental stress passes the intolerance threshold, the affected people react in two possible ways. Firstly, they remain on

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[23] Ibid., no.17, pp.21-22.

[24] Ibid., p21.

[25] T. O'Riordan, quoted in Arthur Conacher, Op. Cit., 1979, p.158.

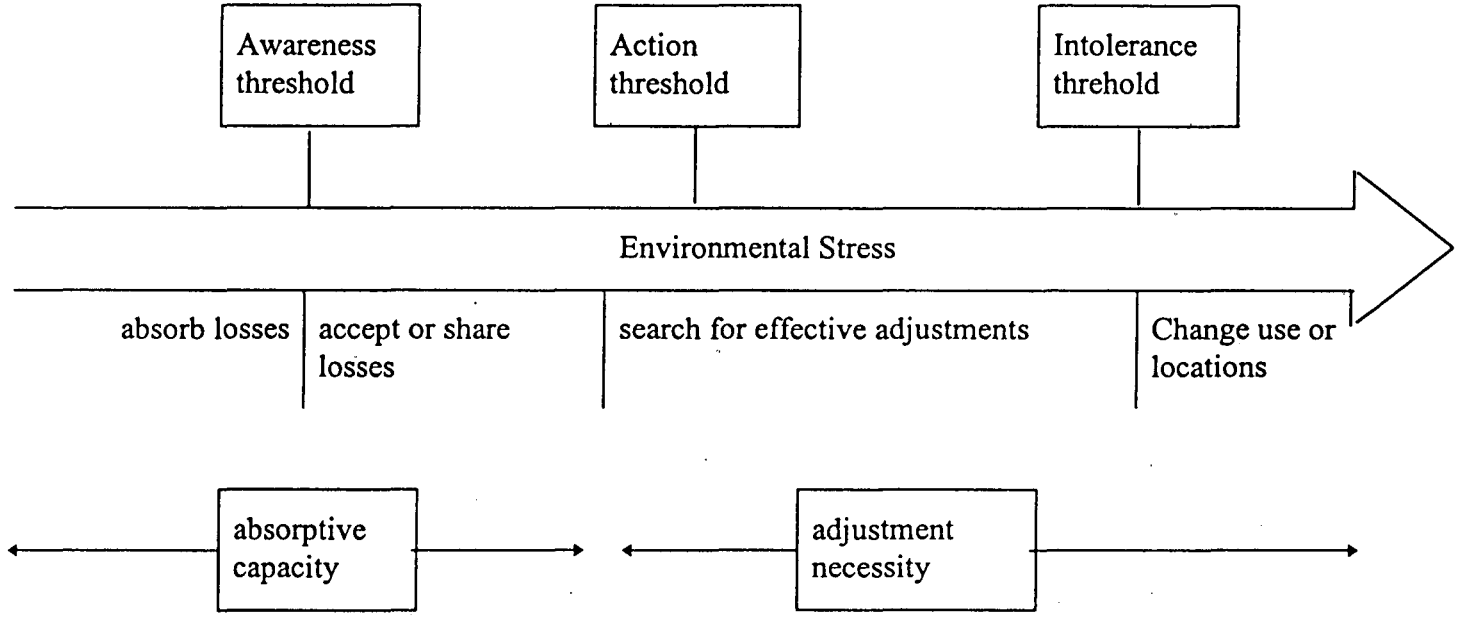

Figure 2.2. Human Reactions to Environmental stress (adopted from Chris Park, 1991)

land but change what they do, due to increasing competition, economic deprivation and frustrations. Secondly, they move somewhere else to seek livelihood. Both these processes have wider ramifications. Both of them produce conflicts. Let us take both of them in detail.

2.5.1 REMAIN ON LAND BUT CHANGE WHAT ONE DOES :-

As noted earlier, due to environmental crisis, there may be reduction in the per capita availability of environmental resources for the consumption of humans. Purposeful and conscious actions might be undertaken by the various social actors with having zero sum stand point, to work for their interests. The situation would eventually destroy the established resource sharing arrangement in the society/ This will cause competition among various actors of the society over the scarce resources.

Environmental crisis causes deterioration in the standard of living. The economic decline in a developing country increase scarcity in that society by bringing a "sustained increase in the costs of essential goods relative to income"[26]. This changed circumstance would lead to social frustration or relative deprivation. As developing countries, because of environmental stresses face economic decline it will be increasingly difficult for them to meet the material expectations of their

[26] Cantril Hadley, quoted in Ashok Swain, Op. Cit., 1993, p.16.

citizens[27]. The disadvantaged groups will be more frustrated than favoured one because the elite will use their power to maintain, as best they can access to a constant standard of living despite economic decline. This will cause social divides. The natural and cultural heritages have vital psychological functions. The degradation and depletion of such resources will deprive the psychological will being of humans. This will cause frustration among people. Similarly, the loss of cultural identity and life style of indigenous people produces strains and frustrations among them.

When the stresses produced by environmental crisis reach above intolerance threshold characterized by extreme frustrations and deprivation, people living in an area react differently to the situation. The reactions of the people will depend on the intensity of stresses and social and political set up of the society. The people will react in either of the following way depending upon the above factors.

- they may accept their situation and hope for help from the government or foreign aid,
- they may start non-violent resistance,
- they may become militarily active,

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[27] Ashok Swain, Op. Cit., 1993, pp.16-17.

- they may become subservience to the state and in the extreme cases, starvation or death.

People look for solutions through cooperation and hard work; but when this facts to yield the expected results, conflicts may be the only way some groups perceive as a means of retaining their hopes of life and life of quality of their own expectations[28].

The more profound the environmental stresses, the more profound the frustrations, competition and economic deprivation. Hence the more serve the level of environmental and social degradation becomes, greater the likelihood of social conflict. However, this trend reverses itself once a certain level of degradation has been reached. Once the threshold of human subsistence and survival has been crossed environmental crisis has an opposite effect[29]. After the human subsistence threshold has been reached the type of social outcome changes from active (armed resistance) to passive resistance (subservience to the state and, in the extreme cases, starvation and death).

The environmental crisis weakened state and other social institutions. The weakening of the state offers opportunities for challenger groups to denounce the legitimacy and normal authority of the dominant social order and system of

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[28] Rodulf K. Molvaer, Op. Cit., 1991, p.87.

[29] Tobias J. Lanz, Op. Cit., 1996, pp.176-77

governance. It becomes easier for challenger groups to express their grievances violently, against state or any other groups who perceived as responsible for challenger group's flight. Sometimes overthrowing of government takes place.

2.5.2 MIGRATION

The environment crisis can lead to the loss of sources of living. In the developing countries where agriculture is the mainstay of people, its decreased production might result in the loss of livelihood of millions of people. The depletion of fishing and forest might lead to the closure of forest and fishing industries and a subsequent loss of jobs. The depletion of fishing can lead to serious social degradation of fishing communities. The shrinking of green forests can lead to the loss of sources of living of forest communities. Similarly overpopulation and unequal resource access lead to the loss of sources of livelihood of poor people.

The loss of sources of living due to environmental crisis could lead to migration of affected people. The decision of abandon home is not always easy one. Human beings develop an attachment, sentimental or moral for their place of residence - to the house where they live in or to the place where it is situated. The sentimental attachment of their lands itself is sufficient to create resentment among them for any proposal to acquire their land.

People generally choose to stay in their native land and struggle to survive the impact of environmental crisis until their last hope of survival wears out. In other words, when the stresses produced by environmental crisis cross a critical

threshold, the people leave their homes. The people leaving their homes have following alternative before them :-

- they will migrate to urban areas within the state;
- they will migrate to marginal lands;
- they will migrate to other countries; or
- they will seek shelter in refugee camps.

Wherever the environmental refugees settle, they flood the labor market, add to local demand for food and other basic necessities of life which put pressure on society. The migration of people into particular region might also cause shifts in class relations and upset in the traditional balance of economic and political authority. Due to migration of people the ethnic and social divide may be manifested in the state between various groups causing political and civil strives and conflicts in the recipient society.

Within a state, migration of rural people to cities for better opportunities may result in rural urban conflicts and intra region conflicts. In the cities, various ethnic groups are more or less segregated by geography (urban social geography) but historically placed them with the same state. The concentration of numerous ethnic groups in an urban area might lead to racial tensions, communal riots, conflicts over locations, organized crimes etc. Migration to urban areas leads to slums, adverse sex-ratios and attendant vice and the delinquency.

The scarcity in urban areas due to immigration of rural people might help to generate strong feeling of nativism among the original inhabitants of the area. Nativism is a claim by a group of people that by virtue of its indigenous character, rooted in historical claims, it has rights upon land, employment, political power and cultural hegemony that are greater than those people who are not indigenous"[30]. The nativists organise themselves to protect their interests. This leads to conflict between the nativists and the migrants in the society. This feeling of nativism is common in both rural and urban areas.

The migration of farmers from overpopulated but high potential areas (where arable land is in short supply) to the marginal lands (arid & semi arid lands, mountains lands and forested areas) leads to land use conflicts.

The migration of people from one country to another causes inter state conflicts. The famous 1969 Soccer War between El Salvador and Honduras is one example of inter state conflicts due to environmentally induced migration from one country to another.

The concentration of people in refugee camps is far from stable conditions. The refugee camps are epicenters of volcanoes which can erupt at any time.

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[30] Myron Weiner, quoted in Ashok Swain, Op. Cit., 1993, p.32.

2.6 CONCEPTS ON CONFLICT

Social conflict is ubiquitous. It is a natural and inevitable part of all human social relationships. Conflict is a generic phenomenon that knows no system boundaries. It occurs at all societal levels -- intrapsychic, interpersonal, intergroup, intranational and international. Conflict is not necessarily bad, or the absence of conflict is not necessarily good. Conflict is not deviant, pathological, so sick behaviour *per se.* Conflict is also not necessarily opposite of order. Conflict is highly patterned and there is orderliness in conflict, although conflict can become disorderly. Conflict can be a very useful and helpful part of social relationships. According to John W. Burton , "Conflict, like sex, is an essential creative element in human relationships. It is the means to change, the means by which our social values of welfare, security, justice and opportunities for personal development can be achieved... The existence of a flow of conflict is the only guarantee that the aspirations of society will be attained. Indeed, conflict, like sex, is to be enjoyed."[31]

James Laue defines conflict as "escalated, natural competition between two or more parties about scarce resources, power and prestige. Parties in conflict believe they have incompatible goals, and their aim is to neutralize, gain

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[31] John W. Burton, *World Society* (London, 1972), pp.137-138.

advantage over, injury or destroy one another"[32]. Wellensteen defines conflict, "as a social situation in which a minimum of two parties strive at the same moment in time to acquire the same set of scarce resources"[33].

The social system is characterized by two or more organised actors. Those who are better off (or in power) would like to keep the system the way it is. They view conflict as a disruption in the system and as a possible threat to the current organisation of power and resources. Parties with this orientation seek to suppress conflict when it occurs. They are status-quo-oriented. Those who are negatively privileged tend to be change oriented, and will more likely to be interested in conflict to change the current distribution of resources. Social conflicts result from this clash of opposing interest. One can describe the same situation in a different way. If one actor in a two-actor relationship comes to realization that, with regard to the distribution of scarce resources, it is in an "underdog" position with regard to the other, who is in a "top dog" position, and the top dog denies this, then there is conflict in the sense of disagreement.

Further, in this relationship of scarce resource sharing, both parties attempt to undermine one another. To undermine ones opponent is to prevent him/he/them from achieving their objective. When parties attempt to undermine one another

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[32] James Jaue, "The emergence and institutionalization of third party roles in conflict", in Dannis J.D. Sandole and Ingrid Sandole Staroste, ed., *Conflict Management and Problem Solving* (London, 1987), p.17.

[33] Wallensteen quoted In Ashok Swain, Op. Cit., 1993, p.20.

via debates or fights, the process will involve some degree of frustration. The more the intensity of undermining, the more intense should be the frustration.

From the above definitions the following pre-conditions of conflict can be derived.

- Perceived scarcity of resources or locations;
- Two or more organised actors;
- Their conscious behaviour to achieve the mutually incompatible goods; and
- For the sake of point-3 they attempt to undermine each other.

2.7 PARTIES TO THE CONFLICT

The main actors in the environmentally induced conflicts are groups and the states. The conflict arising out of the environmental crisis may take place at the following social and/or spatial scales.

- groups versus group;
- group versus state;
- state versus state

Whether the conflicts have transboundary, regional or global dimensions, depends on the nature, intensity and scope of the conflict caused by environmental crisis.

The important point is that the perceived conflicting behaviour of these actors toward each other causes environmental conflicts. But, how conflicting behaviour is formed? The formation of conflicting behaviour takes place only when one of the actors in the situation perceives that his/her problem are due to the actions of another actor. For example, the perceived exploitation or overuse of common natural resources by one party might help to organize new parties or persuade the already existing parties to take up this issue in an intention to protect their interests. The battle for protecting their own share of water, forests, or arable land or acquiring those of others can potentially create conflicting groups in a society.

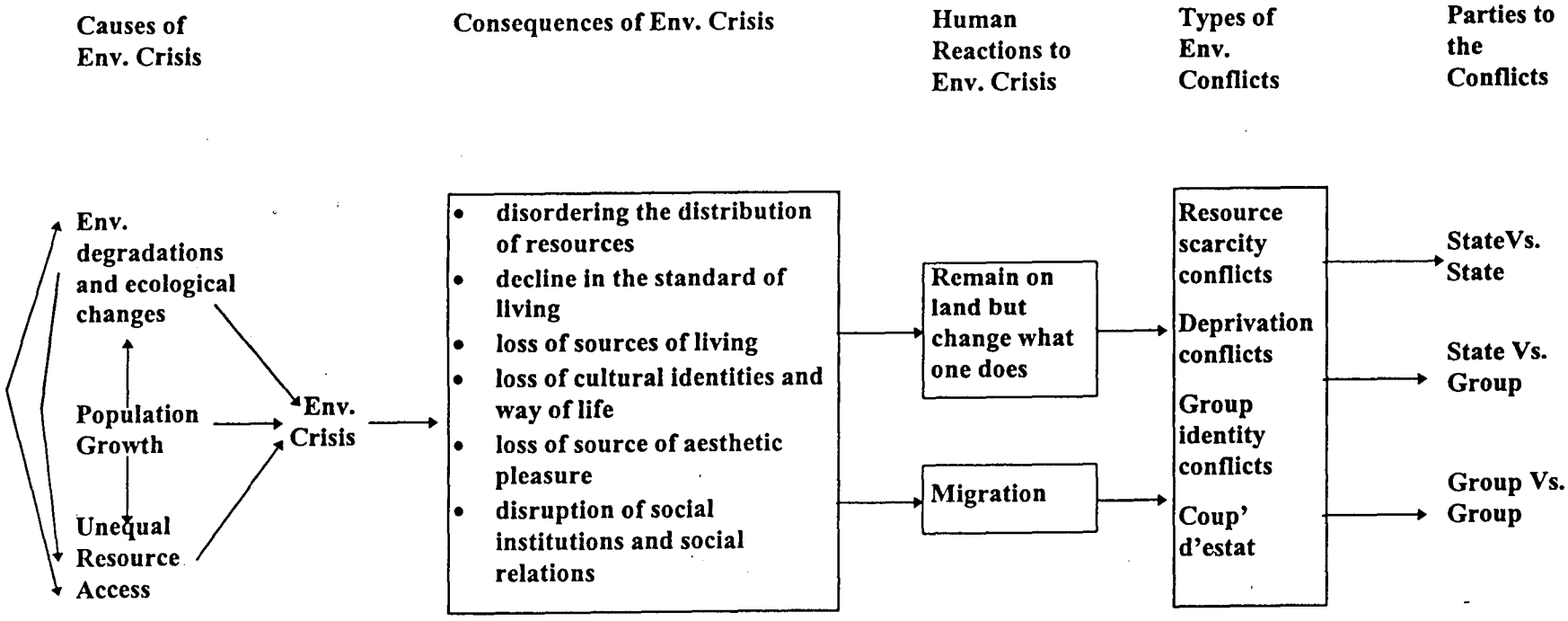

Fig: 2.3 Environmental Crisis and Social Conflicts: Interrelations

CHAPTER 3

GEOGRAPHICAL PERSPECTIVES ON ENVIRONMENTAL CRISIS

While no region appears to be immune from certain degree of environmental crisis, the most vulnerable areas include arid and semi-arid rangelands, tropical rainforests, steep sloped mountains and hills, river basins, coasted lowlands and islands, mining areas, and urban and industrial areas. It is the special responsibility of geographers to identify and seek to explain the spatial pattern of crisis areas. The geographic concepts can be used to explain the spatial patterns (Why some areas are more vulnerable than others?) and spatial interactions (Why and how source areas and problem areas are spatially related?). Source area and problem area will be defined later in this chapter.

What are geographic concepts? A geographic concept is the mental image we develop of the distribution of things on the face of the earth and the sequence of events that produce these events[1]. There are, therefore, pattern concepts and process concepts. Both kinds of mental image are useful to explain the spatial patterns and interactions of the environmental crisis conditions. The first part of this chapter describes the spatial concentration of environmental crisis and the underlying causes while the second part examines the spatial interactions of environmental crisis.

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[1] Preston E. James, "Geographic Concepts and World Crises", *The Journal of Geography*, vol.74, no.1 (1975), p.8.

3.1 REGIONAL CONCENTRATION OF ENVIRONMENTAL CRISIS

Following ecological areas are environmentally most vulnerable:

3.1.1 ARID AND SEMI-ARID RANGELANDS:

Tropical arid and semi-arid lands are those with an average of 100-400 and 400-800 mm of rainfall a year, respectively. The former cannot be cultivated without irrigation while the later can be cultivated-although the quantity of rainfall, its concentration in only a few months of the year and its spatial, seasonal and year to year variability limit the range of crops that can be grown, as well as their productivity.

According to a recent UNEP report, "more than 6.1 billion hectares, nearly 40 per cent of the Earth's land area, is dryland. Of this about 0.9 billion hectares are hyper-arid deserts. The remaining 5.2 billion hectares are arid semi-arid and dry sub-humid lands, part of which have become deserts through human degradation. These lands are the habitat and the source of livelihood for about one fifth of the world's population."[2] These people are among the poorest in developing countries.

According to the FAO, in sub-Saharan Africa 65 million hectares of grazing land have been turned into desert during the last 50 years, affecting the livelihood of

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[2] United Nations Environmental Programme (UNEP), *Status of desertification and Implementation of the United Nations Plan of Action to Combat Desertification* (Nairobi, 1992), p.13.

nearly 100 million people[3]. At the peak of the crisis in 1984 and 1985, 30 to 40 million people in 21 African countries" were seriously affected by droughts. Approximately 10 million were displaced and become known as environmental refugee[4].

Factors that contribute to desertification include over cultivation, overgrazing, deforestation, bushfires, wind and water erosion, and salinisation, which in turn, result from excessive human and animal pressure, poor management of farms and pastures and cultivation of cash crops. Desertification is closely related to severe droughts, which results from climate fluctuation but are themselves aggravated by desertification. Desertification in one are increases the pressure on near by, more productive areas endangering their productivity and increasing the risk of a further extension of the processes. The expansion of cash crops implies a reduction of land for food crops, which are then increasingly cultivated in more arid marginal land with low productivity.

3.1.2 TROPICAL RAINFORESTS

Roughly 0.6 percent of the world's rainforest - 4.6 million hectares -- is lost annually Asia leads losses with 2.2 million hectares per year. Latin America and the Caribbean convert 1.9 million hectares and Africa 470,000 hectares of the

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[3] FAO, quoted in P. Bifani, Op. Cit., 1992, p.101.

[4] E.El- Hinnavi, quoted In Mostafa K. Tolba, *Saving Our Planet: challenge and hopes* (London, 1992), p.62.

rainforest per year[5]. Brazil and Indonesia accounts for about 45 percent of global rainforest loss[6].

In the Brazilian Amazon, deforestation is moving from the edges to the center; fragmentation pattern are determined by the creation of roads and conversion of land for grazing and other uses. The main causes given to the destruction of Amazonian rainforest are higher population density, planned settlements and resource exploitation, but the pressure an Amazon rainforest typically stem from the concentration of land in large holdings. Brazil has 2.3 acres of farmland per person which is more than the United States, the world's greatest exporter of food. Taking potential farm land in account, but still leaving aside Amazonia, each person could have 10 acres. Instead 4.5 percent of Brazil's land owners own 81 percent of the country's farm land and the 70 percent of rural households are landless. The colonization of the Brazilian Amazon was viewed as a solution to resettling landless people without having to implement more troublesome agrarian reforms. Thus the environmental crisis in Amazon basin is produced by unequal access to resources in Brazil.

Deforestation has caused massive displacement of people forced to seek livelihood elsewhere. It is estimated that in Haiti, more than 100,000 people have

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[5] FAO, quoted In The World Resource Institute, *World Resource* (Delhi, 1994-95), p.132.

[6] The World Resource Institute, *World Resource*, (Delhi, 1994-95), p.132.

migrated as a result of deforestation[7]. In Indonesia, more than a million people are reported to have moved out of deforested areas of Java, and migrated to Borneo and other Islands[8].

3.1.3 STEEP SLOPED MOUNTAINS AND HILLS:

There are mountains and highlands in most of the world's climate zones, and their characteristics differ according to their latitude as well as their altitude. They do, however have common characteristics which differentiate them considerably from surrounding areas and give rise to similar issues of environment and development wherever they occur. Compared to lowlands, they have lower temperature and higher insulation rates; usually they also have higher rainfall and thus constitute water catchment areas of major importance. Historically, climatic factors, steep slopes and fragmented landscapes have provided special conditions for human activities, including agriculture, housing and transportation, thus conditioning unique and well established cultural and social systems.

The availability of water, moderate climate, pocket of rich soils (including volcanic soils) and easily defended settlements have permitted relatively dense and stable human occupation of tropical mountains and highlands, although less

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[7] Mustafa K. Tolba, Op. Cit., 1992, p.71.

[8] Ibid.

hospitable, some mountain areas in temperate and cold regions have also long been settled. Many mountain and highland areas have recently been subject to considerable and sometimes conflicting types of development for mining, tourism and recreation and for hydropower and related industry.

Rapid human population growth in the mountains and highlands of developing countries is placing growing pressure on natural resources. The introduction of intensive technologies in response to such pressure of population for agriculture, forestry and public works has led to the overuse of steeplands, increased deforestation rates, overgrazing, excessively rapid runoff, gully erosion and the aggravation of natural mountain hazards such as avalanches, mound flows and landslides. Consequently, many mountain and highland ecosystems are becoming increasingly unstable. The deterioration of living conditions in mountains and highlands is causing migration to low lying areas in all regions with possible serious effects on health of emigrants whose physiology is heavily adapted to life at high altitude.

The deterioration of highlands affects such areas as the Himalayas; non-Hindu-Kush Himalayan mountains of China; the high lands of Mexico and Central America; Central Africa and Ethopia; Central Myanmar; and the island mountain regions of Indonesia, the Philippines and the Caribbean[9]. For instance, in the eastern hills of Nepal, 38 percent of the land area consists of fields which have

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[9] P. Bifani, Op. Cit., 1992, p.102.

had to be abandoned because the topsoil has washed away[10]. As the forests retreat, more labour is needed for gathering fuelwood and animal hurdlings. These tasks are performed more and more by woman and children. It is reported that in Nepal woman spent as much time in fuelwood gathering us they did in farm activities.

3.1.4. RIVER BASINS

River basins are complex; they include both surface and underground water. These two categories of water are closely interrelated and must be considered together. River basins encourage high population density because of fertile lands and availability of fresh water resources. The majority of world's river basins are densely populated.

Many of the important water basins of the world are shared by more than one country. Common basins make up 60 percent of total area of Africa and South America[11]. The most common conflict occurs between upstream users who claim sovereign rights to water that originates or flows through their territory (including the right to use, store, divert, or pollute) and down streams users who demand that the water course be maintained in its natural state.

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[10] Mustafa K. Tolba, Op. Cit., 1992, p.59.

[11] Ibid., no.6, p.182.

Degradation of upland watersheds through soil erosion also affects prime agricultural area in the lowlands. Degraded upland include the highlands of Ethiopia, the uplands of the Andean region, the upper Himalayan watersheds, the central highlands of Central America, Haiti, the Dominican Republic and other Caribbean countries and are occupied by 500 million people. For example, population growth in the Himalaya induces deforestation as cultivators extract multiple resources, thereby causing soil erosion and landslides, which in turn leads to disastrous floods and increasing siltation in the Gangetic and Brahmaputra watershed.

River are also the source of hydrological power and irrigation. Irrigation projects tend to encourage human migration and displacements, as huge reservoirs are constructed to regulate the flow of water. Minority groups and tribal minorities can benefit from the increased economic development of a new irrigation area. However, they are often disadvantaged by irrigation development as they are excluded from the scheme because of uncertain land rights and may be pastoralists rather than farmers.

Rivers are also sources of fish resource. The degradation of river water causes deletion of fishes and thus depriving the river communities, the most important source of their livelihood.

In short, human intervention causes serious ecological disasters - decrease of water resources, water quality degradation, loss of biological diversity, damage

to fisheries and disturbed surface transportation. These changes in the river basins affect human society seriously.

3.1.5 COASTAL LOWLANDS AND ISLANDS

About two thirds of the world's people live within some 50 kilometres of salt water whether on small islands or within coastal corridors on the mainland, this high density of occupation and intensive use of space and resources gives rise to the special environmental problems of coastal and islands ecosystems[12].

Human pressure on coastal and island ecosystems continues to increase rapidly. Growing demand on space and resources result from rapid urbanization, especially along shorelines, accelerating industrialization, improved transport facilities, including ports and transportation corridors, and the development of the infrastructure for commercial and port fishing, recreation and tourism. Tourism is a rapidly growing industry and the coastal zones throughout the world are primary sites for tourism based development. Meeting these increasing demands has led to the destruction and pollution of salt marshes, lagoons and other wetlands and mangroves, the pollution of estuaries, beaches and the marginal sea nearby, changes in shore currents and the erosion of coastlines. Further consequences have been elimination of fish and wildlife habitats and depletion of their population, social conflicts over access to reduced resources,

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[12] UNEP, *The United Nations System-wise Medium-Term Environment Programme* (Nairobi, 1988), p.50.

loss of genetic resources and degradation of the recreational resources that is the basis of tourism. Continuing development that results in these sorts of destruction is neither sustainable nor reversible.

When these problems occur on islands, with their limited hinterlands and relative isolation, they are likely to be more intractable. Small island ecosystems with limited fauna and flora are usually very vulnerable to disturbance and exploitation. Coral reefs are particularly vulnerable. Because resources are limited in variety and extent, the potential for development of many island communities is low and the options limited to the renewable resources of agriculture, aquaculture, fisheries and tourism.

3.1.6 MINING AREAS

Mining is prerequisite for industrial activities as it supplies raw materials. Mining produces rapid changes in local landscape. Such changes include the permanent marks and scars of the mining itself. It produces new landscape features disused shafts, surface subsidence, dumps and spoils, heaps of waste material and disused mineral lines. Effects of mining process include alteration of local hydrology and water tables, contamination of surface and grounds water with acid mine drainage, sediment run-off sewage and mineral effluents, destruction of habitats, changes in landform and land instability. Other effects include air pollution from particles gases and vapours, ecosystem damage, degradation resulting from inadequate rehabilitation at closure, failure of

structures and dams, abandoned equipment and buildings, dust emission from sites near living areas release of methane from mines, occupational impacts, from dust inhalation, fugitive emissions within the plant, air emissions in confined spaces, exposure to toxic materials used on sites, heat and noise vibrants, physical risk, unsanitary living conditions, as well as aesthetic and socio-economic effects. Thus, mining produces such negative changes in the local landscape which is detrimental for local populations.

Although developed countries account for most metal consumption, significant amounts of mining and processing occur in developing countries and these activities are expanding, in part to meet the consumption needs of the developed countries and in part because of industrial expansion in the developing countries themselves. Mining provide few if any benefits to local populations. It is because of this mining is also called enclave economy. In Jharia (Bihar) land subsidence has produced cracks in the houses and the areas around mining site have become very vulnerable for any human habitation.

3.1.6 URBAN AND INDUSTRIAL AREAS:

The world is becoming increasingly urbanized. It is estimated that by the year 2025, a single generation from now -- 4 billion people will live in urban areas, constituting 77 percent of the world's population.

When poor people become concentrated in a precisely defined area, their problems grow exponentially. The increasing concentration of poor, mostly

minority people has been accompanied by soaring unemployment, increased and prolonged welfare dependency, public health problems and rising crime. Poor people in urban areas occupy the least expensive urban land that are next to industrial sites, dump sites and areas with high pollution. The concentration of various ethnic groups and people of different social status and economic class in a well defined geographical space leads to various types of ethnic conflicts.

The world is also becoming increasingly industrialized. The increasing number of industries is causing multifarious environmental problems. The two very critical environmental problems associated with industrialization are acid rain and disposal of wastes. Acid rain is created by the transformation within the atmosphere of gaseous pollutants, principally sulphur dioxide (SO_2) and nitrogen oxides (NO_X) which are emitted mainly from coal-fired power stations and vehicle exhausts respectively. Acid rain cause damage to crops and forests, lakes and rivers, and buildings and structures. The problem is widespread and increasing. The areas where acid rain is particularly problematic are, the north-east of North America (straddling north-east USA and Eastern Canada), and much of Western Europe (including Scandinavia and Britain).

The disposal of toxic waste is another problem of urban and industrial areas. There is mounting evidence that minority and low income populations are asked to bear a disproportionate burden of air, water and waste pollution problems. Three out of five Americans -- 15 millions individuals -- live in communities

with abandoned toxic waste sites. Three out of the five commercial hazardous waste landfills are located in predominantly African-American or Latino communities and account for 40 per cent of the nations total estimated capacity[13]. And African-Americans are heavily over represented in cities with the largest number of abandoned toxic waste sites including St Louis, Houston, Cleveland, Chicago, and Atlanta[14]. Thus, the concentration of ethnic minorities in urban areas and associated environmental inequity causes ethnic conflicts. The disposal of toxic wastes in a geographically well defined space which is inhabited by poor and minority produces unhealthy living conditions.

3.2 SPATIAL INTERACTIONS OF ENVIRONMENTAL CRISIS

Environmental crisis arises at various spatial scales from the local and regional to the national and ultimately international. This really represents a continuous spectrum of scales at which environmental problems occur and interact. But before describing the interaction of environmental crisis at various spatial scales, it is important to know two concepts. These are source areas and problem areas. The source areas may be defined as the areas where the sources of environmental crisis occur. The problem areas are areas of environmental crisis. These two areas often interact - particularly in cases of air and water pollution. The water

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[13] Denise Lach, "INTRODUCTION: Environmental Conflict", *Sociological Perspectives*, Vol. 39, no.2 (1996), p.213.

[14] Ibid., pp.213-14.

and air are mobile. The pollutants in the water and air readily mix and move with them. These pollutants are potentially harmful to people, plants and animals.

All forms of air and water pollution have spatial patterns which are controlled by natural environmental system (such as prevailing wind in the atmosphere, downstream flows within river systems, and tidal currents and ocean circulations at sea). Inevitably such flows show no respect for political administrative or economic boundaries, and so many pollutants ignore national sovereignty and transcend state borders.

On the basis of spatial scales two types of spatial interaction of environmental crisis is possible:

3.2.1 UPSTREAM-DOWNSTREAM INTERACTIONS:

In this case upstream (or upwind) countries benefit from the natural export downstream (or downwind) of polluted water (or air), and down stream (or downwind) countries suffer from receiving it. Winners and losers are determined by fortune of location in relation to natural environmental flows and pathways. Upstream donors have little incentive (other than political good will) to control their pollution. Downstream recipients have no control over the pollution they receive. For example, population growth in the Himalaya induces deforestation as cultivators extract multiple resources, there by causing soil erosion and landslides, which in turn leads to disastrous floods and increasing siltation in the Gangetic and Brahmaputra watersheds. In this case, the sources of environmental

crisis originate in one region or country, while the problems occur in other regions or countries. All the benefits of polluting processes are accrue to one region, whilst most or all of the environmental and social costs accrue to nations across the border.

The upstream-downstream interaction can be further subdivided on the basis of how many countries are involved.

(a) ***Binational Interaction:*** This involves the movement of pollutants across a national border, from one country to an adjacent country. Only two countries are involved. Such problems reflect the geography of the situation. In this situation, one country may be downwind (downstream) in relation to the other one. Acid rain which blows north words from the eastern USA across Ontario in Canada is a good example of the down wind situation.

(b) ***Multinational Interaction:*** This involves movements of pollutants between a number of adjacent countries. So that more than two countries are involved. In this situation more than one country may be down wind (down stream) in relation to more than one countries. For example, water quality and quantity in the River Nile is affected by land use in parts of Ethiopia, Sudan and Egypt. Similarly, land use practices in Nepal affect Ganga river watershed in India and Bangladesh. In this type of interaction, all or most of the benefits due to pollution activity accrue to one or more than one countries, whilst most or all

of the social and environmental costs accrue to more than one countries across the border.

3.2.2 RECIPROCAL INTERACTION:

In this case the costs and benefits of polluting processes are scattered through a number of countries including the source country or countries. These problems are world-wide in scale and distribution, and affect most if not all individual countries, directly or indirectly, even if they are not contributors.

The two important global problems are ozone depletion and green house gases. These problems are likely to affect a great many countries. The rise in sea-level will affect most countries directly or indirectly. Acid rain will become a global problem in near future, because it represents an incremental problem which builds up slowly through time. Damage to forests, lacks and buildings has been reported down wind from most industrial countries of the world, but the worst damage to date appears to be in Scandinavia, parts of Western Europe, and Eastern Canada and the United States. The most important characteristics of reciprocal interaction is that it is global in scale and it also affects the source country or countries.

Some of the developing countries, in order to meet the requirements of the international markets, have evolved their economies towards cash crops production. To give an example, in the Sudano Sahelian region millet and sorghum for consumption have been replaced by ground nuts for exports. The

expansion of cash crops implies a reduction of land for food crops, which results in food crisis. Similarly, the deforestation in tropical countries to a large extent can be explained in terms of its demand in the developed countries.

Thus, the source area of environmental crisis to a large extent is manifested in consumption pattern in the developed countries. The excessive consumption levels in the developed countries put increasing pressure on the natural system in the developing countries.

CHAPTER 4

GEOGRAPHICAL PERSPECTIVES ON ENVIRONMENTAL CONFLICTS

In the previous chapter while describing the spatial patterns of environmental crisis, certain vulnerable regions were identified. These are the regions where environmentally induced conflicts are most likely to be concentrated. In this chapter the nature of environmental conflicts will be described in each of the geographical regions identified.

4.1 ARID AND SEMI-ARID RANGELANDS:

State Vs State

The environmental degradation in the Sahel has generated unprecedented mobility and led to conflicts in almost all parts of Savannah belt. The massive trans-boundary migration of environmental refugees in Africa has made the whole region exposed to inter- state conflict. The situation in Ethiopia, Sudan, Kenya and Ivory Coast has already shown signs of all out conflicts between receiving and donor nations.

State Vs Group

The environmental crisis in rural areas might actuate the villagers to eventually migrate to the nearby urban areas. When droughts hit Sudan for three years from

1983/84 to 1986, an estimated four million people migrated to towns. The Khartoum government came to regard these internal refugees as a security risk; they demolished their houses on the outskirts of towns and chased them back to their home town by the use of police and the army[1].

Group Vs. Group

Surrounding the productive highlands of Kenya is an arc of arid and semi-arid land that comprises 83 per cent of the area. This land is characterized by low and variable precipitation rate, sparse vegetation and shallow soil. The area is inhibited by pastoral group Nandi, and Masai. Inspite of the harshness and ecological limitations, these drylands have been the destination of a substantial stream of migration. The advent of colonialism led to alienation of land for European settlement and later the creation of game parks deprived some of the people of their pastures. The colonial state did maintain however, strict market quarantines (due to animal diseases) in pastoral areas, which restricted the selling of surplus animals. This accelerated the overstocking and overuse of rangelands. When pastoralists moved their cattle to European controlled grazing areas, or when stock diseases in pastoral areas threatened settler's ranches, conflict arose between pastoralists and the Europeans[2].

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[1] Rudolf K. Molvaer, Op.Cit., 1992, p.81.

[2] Peter D. Little, "Land Use Conflicts in the Agricultural Pastoral Borderland: The case of Kenya", In Peter D. Little and Michael Horwitz, ed., *Lands At Risk in the Third World: Local-level Perspectives Lands*, (Boulder, 1987), p.197.

The onset of independence in Kenya (1963) brought a new dimension of land use conflicts in the pastoral areas. The spread of scientific medicine, hygiene led to accelerate population growth in Kenya. Population growth soared at a pace exceeding 3 per cent annually. This rapid growth strains the capacity of the area to provide enough food stuff even in the best years and led to unprecedented land pressures. Farmers are colonizing the better watered grazing zones of pastoral groups. Such changes restrict pastoral's territory, and it results in the over use of certain range areas, and increasing tensions/competitions between herders and farmers erupt at time into violent conflict[3].

4.2 TROPICAL RAINFORESTS:

State Vs. State

Tropical deforestation has been a focus of concern in the North partly because of fear that the loss of such a vast genetic storehouse would foreclose options for the development of new medicines, crops, and other goods and services of value for humanity. In addition, the well publicized threat to the traditional indigenous communities that inhibit tropical forests has stirred the consciousness of some circles in the North. The tropical forest has been one of the central cause of dispute between the North and the South.

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[3] Ibid.

State Vs. Group

Deforestation has caused massive displacement of people forced to seek livelihood elsewhere. It is estimated that in Haiti, more than 100,000 people have migrated as a result of deforestation[4]. In Indonesia, more than a million people are reported to have moved out of deforested areas of Java, and migrated to Borneo and other islands[5]. Such forceful migration of people have been cause of conflict between the state and the affected people.

Group Vs. Group

Schmink and Wood have anlaysed environmental change in Amazon Basin, looking at patterns of resource use among Indian's Cobaclos, Immigrant peasants and commercial ranchers[6]. While the impact of both Indians and Cobacols on the environment is modest, peasants and commercial ranchers follow land use strategies that are ecologically damaging. The immigrant peasants, who overcultivate and thereby degrade their small plots to earn needed cash come into conflict with the wealthy richer class, which wishes to transform the forests into grazing land for cattle. The peasant/capitalist conflict results in frequent peasant moves along the frontier, which gives rise to shifting cultivation. The whole

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[4] P. Bifani, Op. Cit., 19, p.105.

[5] Ibid.

[6] Peter D. Little and Michael Horowitz, Introduction: Social Science Perspectives on Land, Ecology and Development", In Peter D. Little and Michael Horowitz, ed., *Lands At Risk in The Third World: Local Level Perspectives*, (Boulder, 1987) pp.6-7.

system is reinforced by a national ideology of "growth mania" that in the Amazon pays only token (little) attention to the environmental consequences of economic expansion, especially by ranchers and other commercial enterprise.

4.3 STEEP SLOPED MOUNTAINS AND HILLS

State Vs. State

In Bangladesh, huge number of people whose habitats were destroyed by recurring floods and storms have been settled over the years in the Chittagong Hill Tracts (CHT) in the southern part of Bangladesh; this has completely changed the ethnic balance in the region, creating fears among native tribals about the continued sanctity of their distinct society. The upshot has been an insurgency, with the insurgents finding sanctuary, training and arms in India. Thus, what was an internal response to rehabilitate an environmentally ravaged people became a transboundary issue affecting the security of and worsening relations between, India and Bangladesh[7].

State Vs. Group

Butan's concerns with ecological degradation in its southern province have been one reason for expulsion of thousands of illegal immigrants from its territory. Many of those evicted, however, have joined up with the Gurkha separatist

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[7] Shaukat Hassan, Op. Cit., 1992, p.82.

movement located just across the border, heightening the security concern for Bhutan and India[8].

Group Vs. Group

Exploitation of the forest by outside entrepreneurs with government approval has been the source of conflict between the villagers and the contractors in Uttarakhand (UP). The effects of timber contractors have been massive and conspicuous on the local environment. With the help of Gandhian social workers, local labour cooperatives and small-scale producer cooperative were established by the villagers in each of the Himalayan districts of Uttar Pradesh during the early 1960. The goal was to allow the local people to share in the benefits of development. As a result, confrontation between the villagers and social workers, and the timber contractors and their employees often occur.

4.4 RIVER BASINS:

State Vs State

If a downstream riparian threatens to go to war against the upstream riparian, because the latter pollutes river water so gravely that it can not be used by the inhibitions of the downstream riparian who are highly dependent on this water (for irrigation purposes, drinking water, etc.), then the environmental character of

[8] Ibid.

the conflict is evident. In the wake of deforestation in the Himalaya, the annual flows of the Ganges River System are now characterized by flooding followed by reduced flows. This causes damages worth billions of rupees and loss of life in Bangladesh, which share the river basin. There has been clash of interest over the share of the Ganges water between India and Bangladesh. This is a major source of conflict between the two nations.

State Vs. Group

The World Bank supported Chico dam project in the Philippines which threatened to displace 80,000 tribal people from their ancestral lands. When the local protested against the project, the Macros regime responded with brutal violence, leading to an escalating conflict. Many tribals took to the hills and join the New Peoples Army in defiance of the imposed development programme. The conflict endured long after the World Bank pulled out of the project. Villagers were repeatedly bombed and subjected to counter insurgency programmes as a result.

Group Vs. Group

A chemical plant is located in the Apennine Mountains on the border between Liguria and Piedmont and at the head of the Bormida River Valley (Italy). The 1550 square kilometers of Bormida Valley contains a population of 220,000. Downstream, the local economy is largely based on agriculture, especially

vineyard. With 800 workers, the plant annually produces 30,000 tonnes of pigments and intermediate organic products for the chemical industry and discharge organic effluents into the river. Downstream, farmers and communities have protested the pollution of the river since the beginning of the century, and recent monitoring has found high concentration of toxic and carcinogenic substances. However the upstream communities for whom the factory is an important economic asset-are in favour of keeping the factory in operation[9]. This is a major source of conflict between the upstream and the downstream communities.

4.5 COASTAL LOWLANDS AND ISLANDS:

State Vs. State

The developing countries mostly catch their fish from their own exclusive economic zones, while the developed countries with their distant-water fleets, intrude upon other's exclusive economic zones. As the demand for fish grows in developing countries, it is plausible that this could lead to conflicts between coastal states and states with distant -- water fleets over the right to harvest.

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[9] Angela Liberatore and Rudol Lewanski, "The Evolution of Italian Environmental Policy", *Environmental Management*, vol. 32, no.5 (1990), p.14.

State Vs. Group

If the present trend of global warming remains unaltered, low-lying Maldives and Bangladesh will lose substantial amounts of their territory to a rising sea, with harmful effects on fresh water aquifers, agricultural lands and inland fisheries. This will create millions of ecological refugees, for whom finding a home in the subcontinent will be political nightmare. The movement of the refugees to India can be a cause of conflict.

Group Vs. Group

Marine aquaculture is a major cause of coastal habitat destruction which undermines marine fisheries. Worldwide, one of the major reasons people cutdown mangrove forests--half of which have been destroyed worldwide -- is to make artificial shrimp ponds. But coastal wetlands are essential nurseries for wild fisheries, and this destruction directly undermines marine fishing. In Honduras tension between shrimp fishers and shrimp farmers have led people on both sides to arm themselves; some believe that a conversation minded fisher was murdered by vigilant hired shrimp farmers[10]. Similar conflicts over shrimp farming have flared up around the world.

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[10] Chris Wille quoted in Peter Weber, "Facing limits in Oceanic Fisheries; Part II: The Social Consequences", *Natural Resources Forum*, vol.19, no.1 (1995), p.45.

4.6 MINING AREAS:

State Vs. Group

Bharat Aluminium Company (BALCO) has a plan to invest millions of rupees for the bauxite mining in the Gandhamardhan bills of Sambalpur (Orissa). The tribals like Kandha, Binjhal Gond and Sabara of the region depend on the minor forest produces for their subsistence. Large number of trees including their totemic plants, have already been butchered, which have dried up the hill streams traditionally used for irrigation and the subsequent soil erosion have damaged the agricultural fields. The affected villagers have constituted youth fronts to consolidate their anti-BALCO agitation. The administration has arrested large number of agitators including women. The anti-BALCO movement is continuing with greater social support.

4.7 URBAN AND INDUSTRIAL AREAS:

State Vs. State

Wind borne export of acid rain has been a source of friction in the relationship between Britain and Central European countries and with Scandinavia as well as between USA and Canada.

The accumulation of green house gases due to industrial emissions is another area of concern. The increasingly industrialized world is causing atmospheric pollution which has its social and economic repercussions. If some of the countries become convinced that their way of life or survival is truly threatened

by other countries due to unrestricted use of energy, they might become audacious and try to impose definite actions.

State Vs. Group

There is mounting evidence that minority and low-income populations are asked to bear a disproportionate burden of the country's (USA) air, water and wastes pollution problems. Three out of five African-American -- 15 million individuals - live in communities with abandoned toxic wastes sites. Three of five largest commercial hazardous waste landfills are located in predominantly African-American or Latino communities and account for 40 per cent of America's total estimate capacity[11].

The environmental justice movement grew out of grassroots struggles to confront environmental inequities at the local level. Activities have been organized to confront local and regional hazards, challenge federal regulations and policies, get federal and local officials to clean up hazardous areas and push the mainstream environmental movement to focus on the causes and consequences of environmental inequities[12].

Thus, the environmental conflicts are mostly location specific. Each regions are environmentally unique; and as a result of it, they experience different types of

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[11] Denise Lach, Op. Cit., 1996, p.213.

[12] Raquel Pinder Hughes, Op. Cit., 1996, p.243.

environmental conflict. It is the special duty of the geographers to delineate such regions and identify the underlying causes of environmental crisis and associated social conflict. Only then a viable plan can be made to reduce the frequency and intensity of such conflicts in the future.

No	Geographical Regions	Parties to the Conflict		
		State Vs. State	State Vs. Group	Group Vs. Group
1	Arid and Semi-arid Rangelands	√	√	√
2	Tropical Rain-forests	√	√	√
3	Steep Sloped Mountains and Hills	√	√	√
4	River Basins	√	√	√
5	Coastal lowlands and Islands	√	√	√
6	Mining Areas		√	
7	Urban and Industrial Areas	√	√	

Fig. 4.1: Geographical distribution of environmentally induced conflicts

√ Evidences cited in this chapter

CHAPTER 5

CONCLUSION

5.1 FUTURE OF ENVIRONMENTALLY INDUCED CONFLICTS:

Michael S. Teitelbaum has described the present world demographic trends as "revolutionary", because though the human species emerged perhaps 150,000 years ago most of its growth has been in the last forty years[1]. The world population took tens of thousands years to reach one billion mark around 1820, over a century to achieve the second billion mark in 1930, about 30 years to the third billion around 1960s, only 15 years to the fourth and 12 years to the fifth billion in the year 1987. At present the world population is over 6 billion. Within the next fifty years, the planet's human population will probably pass nine billion. The primary reason for the present world revolutionary demographic trends is the increase in population growth in developing countries at an unprecedented level since about 1950, due to the decline in death rate which was made possible with improvements in sanitation, communications and transportation, control of epidemics, and the increasing availability of antibiotics.

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[1] Michael S. Teitelbaum, "The Population Threat", *Foreign Affairs*, vol.71, no.5 (1992/93), p.64.

The world's population is now increasing by about a quarter of a million people per day or 90-100 million people every year[2]. As a result of this demographic trends, scarcities of natural resources may increase sharply. The total area of highly productive agricultural land will drop, as will the extent of forests, and the biodiversity. Future generations will also experience the ongoing depletion and degradation of aquifers, rivers and other bodies of water, the decline of fisheries, further stratospheric ozone depletion and, perhaps significant climatic change. As such environmental problems become more severe, the may cause domestic or international conflict.

There are several reasons that can be attributed to the relative susceptible nature of the poor countries to the environmental stress. The population growth of most of the developed countries is nearly stable or declining. According to the World Bank, 95 per cent of future growth will take place in developing countries of Africa, Asia and Latin America[3]. This high population growth in the developing countries will multiply pressure on natural resources, as most of the developing countries are extremely dependent on their natural resource base to sustain their economic activity. For example, about one-fourth of Central America's Gross Domestic Products is based on renewable resources, and they also provide more

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[2] N. Sadik, quoted Ashok Swain, Op. Cit., 1993, p.4.

[3] World Bank, *World Development Report 1992: Development and the Environment* (New York, 1992), p.26.

than half of all the employment as well as most export earnings[4]. The lack of alternative sources of living forces the poor and landless people to put unprecedented demand on these resources in their struggle to survive. This will aggravate the environmental problems already existing in these areas. Already existing material inequalities may become more acute, resulting in social unrest. Further, most of the developing countries are weak as states, lacking the effective bureaucratic and administrative institutions, legal regimes, financial agencies, productive research centers and efficient markets to deal with problems arising out of environmental crisis. Moreover, their ability to create and maintain these institutions may by the very environmental problem they wish to address. In the coming decades, the environmental problems will become more severe in the developing countries, they may cause civil strife, inter-group or inter-state conflicts with severity, speed and scale unprecedented in history.

5.2 MEASURERS TO CONTAIN ENVIRONMENTALLY INDUCED CONFLICTS:

In the coming years, the frequency and intensity of environmentally induced conflict will increase. This will cause increasing loss of life and property in addition to the socio-cultural and psychological threat to human-being. The standard of living will decline. There will be more environmental refugee. The

[4] Norman Myers, quoted in Ashok Swain, Op. Cit., 1993, p.5.

cross-border movement of population will increase. In short, coming years will be characterized by more human misery and social instability.

The question is how to address the problem of environmental crisis and associated social conflicts? Two types of strategy can be suggested. First, to create situation where there is no environmental crisis by reducing the sources of environmental crisis, so that there will be no conflict. This strategy can bee called prevention of environmentally induced conflicts. Second, once the conflict takes place, it can be resolved by peaceful means by joint participation of parties involved. This is known as conflict resolution. Following pages will look at both the strategies in detail.

5.2.1. PREVENTION OF ENVIRONMENTALLY INDUCED CONFLICTS:

The evidences presented in this and the previous chapters clearly suggests that there are significant causal links between environmental crisis and social conflict. To prevent such conflict, nations should put greater emphasis on reducing the sources of environmental crisis. This can be done by restraining population growth and over consumption, implementing a more equitable distribution of wealth within and among the societies by providing for sustainable development and international cooperation.

Environmental problems are often unique from region to region, and may therefore require unique solutions. For example, the problems of arid, mountanous, forested, coastal and urban regions have their specific

characteristics, although there are also certain similarities. Whilst they may all be sensitive to overall land use and environmental policies, objectives and methods, blanket solutions are clearly not possible.

Geography has a long history of regionalism, both theoretical and applied. The environmental problems can be best solved by integrated land use and environmental management at a regional level. For example, over use or inappropriate use of land due to over population and/or unsustainable agricultural methods is a major cause of land degradation in semi-arid areas. What possible steps can be taken to solve the environmental problems in this region? Familiar land use practice can not be changed over night. Peasants must have convincing incentives to change old age methods. Perhaps it is in such areas that foreign aid can help. Priority should be given to conservation and rehabilitation measures that have a chance to take effect in a relatively short time.

Agricultural methods must be environmentally sound. Land not suitable for agriculture must not be put under the plough even in times of food shortages. Limits must be set to the number of animals pastoralists can keep on various types of land. Trees must be protected from felling. Aforestation should be done on non-agricultural land. Water must be used and kept clean with future generations in mind.

In some cases, several states occupy parts of a single ecoregion. For example, in the Horn of Africa, an ecoregion characterized by desert and arid grassland wraps

around the Ethiopian highland, extending from eastern Sudan and Eritria into Kenya. The part of this arid ecoregion inhabited by Somali people is now divided among four states -- Ethiopia, Somalia, Djibouti and Kenya[5].

Regional cooperation in development among these countries which share the same ecoregion is a promising approach. For example, it is of limited value if any one of these countries tries to fight desertification through an intense tree-planting campaign, unless neighboring countries do the same. Deserts respect no borders. They can not be effectively combated unless their breeding grounds are found; for this cross-border cooperation is needed. Similarly, in the following ecoregions or resources that are global commons -- the atmosphere, ozone layer, high seas, and Antarctica, there is need for global cooperation for their development.

Thus, geographers have important task ahead -- the identification of the nature of contemporary environmental problems. The spatial concentration and spread of some specific environmental problems and their genesis can best the mapped by geographers.

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[5] Bruce Byers, Op. Cit, 1991, p.71

5.2.2 ENVIRONMENTAL CONFLICT RESOLUTION:

Conflict 'resolution' implies that there is joint participation of the parties in reaching the outcome. There is also an assumption that the outcome is -- at least to extent -- satisfactory for all the parties involved[6].

Before discussing the kinds of processes that might be undertaken, it is important to discuss some characteristics which are unique to environmentally induced conflicts. First, in environmental conflicts, one is dealing with the future, the decisions are made that are going to affect generations still to come, and one does not know how to represent their interests adequately. This is clearly different from labour and management settling on a contract which is good for the two years and which can not be renegotiated. In an environmental case, unforeseen things may happen in the next two years, either for good or ill. Also, life-and-death decisions are common in the environmental field; they may also be irreversible. For instance, once a decision has been made to strip-mine in a particular area, it may not be possible to reclaim the land.

Second, environmental conflicts are usually characterized by many parties, in contrast to the labour management model where there tend to be only two. The parties vary in their degree of organisation and they represent diverse interests often mutually contradictory to one another. Third, many of the environmental

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[6] James Laue, "The emergence and instituionalization of third party roles in conflict", IN Dennis J.D. Sandole and Ingrid Sandole - Staroste, ed., Op. Cit., 1987, p.18.

problems, occurring are either site-specific or issue-specific because of the multiplicity of parameters involved; hence solution tried elsewhere may not be enforceable in these specific circumstances. Lastly, human perception to an environmental problem is a complex phenomenon and it is connected to a number of unrelated subjective factors such as attitudes, beliefs, values, prejudices, and emotions. As a result of it, different groups perceive the same set of environmental problem differently. A major task in environmental conflict resolution is the understanding of such subjective factors.

Following processes might be undertaken in the resolution of environmentally induced conflicts:

Fact finding: It is perhaps one of the least labor-intensive type of processes that can bee undertaken. Facts are not always well known. A fact-finding analysis can be merely verifying what is true and documenting it[7]. As noted above, human reactions to an environmental problem depend on his/her perception. This perception is affected by a number of unrelated subjective factors. As a result of it different people perceive the same set of problem differently. The perception does not always represent the reality. Many cases can be solved simply by removing the misperception of what is true. Therefore, fact-finding which verify

[7] Ethan T. Smith, "Environemntal Conflict Management", In Dennis J.D. Sandole and Ingrid Sandole - Staroste, Ibid., p.151.

the genesis, nature and the scope of the problem is the most important aspect of conflict resolution process.

Conciliation: The object is to get the parties together to enable them to recognize each others as human beings, that they are not demons, and so on[8]. In this process, the parties are made to feel better about being embroiled in conflict.

Negotiation: In negotiation, the parties try to educate and bargain with each other.

Facilitation: It is also called cooperative problem solving. In facilitation, the parties require some one from outside. The facilitator assists in the development of a relevant definition of the problem.

Mediation: The mediator is similar to the facilitator except that he/she has more power: the mediator can get involved with the substance, and not just the process, of disputes[9]. The parties generally require mediator when the number of issues is unmanageable large, they are poorly organized or there are so many parties with multicornered interests.

Arbitration: In arbitration there is some kind of binding decision made.

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[8] Ibid.

[9] Ibid., p.155.

The above described approaches to environmental conflict resolutions is very general in nature. A deem light has been thrown, while there is need of much brighter light to resolve the environmental conflicts. Since there is much complexities in the environmentally induced conflicts, the management team must be multidisciplinary, with expertise in areas such as agriculture, mining, fisheries, fauna, town planning, environment, forestr, fuel and energy. There is need of cooperation among these expertise.

Before we close the chapter, two points are worth noting. First, the status of environmental conflict management in the developing countries and secondly, the role of geographer in this field. Environmental conflicts seem to be escalating in number, scope and cost, thereby reinforcing a public lack of confidence is an uncertain and difficult future. In the developed countries institutions have been created to deal with this issue. Numerous models have been developed by the professionals in this field. There are many cases of success.

In the developing countries where the future does seem to be uncertain, there are no such things as institution and professionals in the field of environmental conflict. In India, there is not a single institution which imparts the training in this field. The courts decide cases pertaining to environmental conflict. But due to public pressure the decisions are not implemented. The Cauvery River water dispute is one of the most recent example in which riots broke out in Karnataka

against the court decision to give more water to the downstream state of Tamil Nadu.

The role of geographer can be very crucial in the field of environmental conflict management. Geography forms a bridge between science and humanities. Human adjustment to his environment is one of the area of study for geographers. They study how and why human being adjust to various environment differently. They also enquire human reactions to the changes in the stage of the environment. The spatial patterns of environmental crisis and its spatial interactions are mapped by the geographers.

It would be beneficial if the services of geographers are taken in this field. Each region has unique environmental problems. Therefore, the conflicts associated with these environmental problems will display some degree of uniqueness. Since geography has a long history of regionalisation at both theoretical and practical level, it becomes very important for geographers to take a lead in this field.

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