UNIT 1 NATURE-HUMAN INTERFACE

Structure

1.0 INTRODUCTION

The humans represent the most developed stage of life form on earth.They, however, appear on earth at a considerably late stage in a long process of evolution. This process of evolution began with the formation of earth some 4600 million years ago and involved the evolution of life forms and nature, both. Many living organisms have come and gone in this process and many changes in nature have simultaneously occurred. A closer examination of this process reveals that there has always existed a close relationship between life forms and the nature surrounding those life forms. With the emergence of humans this relationship assumes a qualitatively different form. It is our attempt to present in this Unit an outline of nature-human relationship. Admittedly nature-human interaction has been a complex process and involves a basic understanding of the different dimensions of nature as well as the unique ability of humans to influence and mould the nature in tune with their own needs. It also involves a similar understanding of human adaptability to the peculiarities and pressures of nature.

As we start on an exploratory tour of nature-human interface in the context of the geographical boundaries loosely set by the Indian sub-continent we begin to see a few features emerging so clearly as not to be able to miss them at all. We see the relationship between human groups and the environment/s assuming the character of interchange i.e., reciprocal exchange between humans and nature, where each influences the other and also gets influenced by the other. We also see the environment of the Indian sub-continent providing a diversity of situations, from deserts to regions of high rainfall and from vast alluvial plains to high mountains and rocky table-land. There is also visible a clear divide, between north India receiving highly productive soils as a result of a continuous process of soil erosion and south India, with fewer deposits of alluvial material and therefore showing greater stability.

It is also to be understood that the historical evidence for the study of nature-human interface has been somewhat irregular with a few periods extensively examined while a few others having not received adequate attention.We have attempted to paint a general picture of the relationship between humans and their environment/s with the help of available archaeological and historical material. The narrative in this Unit begins with the emergence of human groups using stone artefacts and closes with the rise of modern industrial societies when a marked shift in nature-human interface occurs. In discussing human interchange with nature it will be useful to obtain a basic understanding of nature, which, commonly speaking, is used as a term inter-changeable, with environment.

1.1 DEFINING NATURE

Nature is not an easy term to define as it incorporates most of the visible manifestations of geography. Raymond Williams defines nature as, 'the material world itself, taken as including or not including human beings.' Tracing the history of the term he suggests that 'nature' has often been used to describe the 'countryside', the 'unspoiled places', as also 'plants and creatures other than man.' (*Keywords*, 1976, Fontana, pp.184-189). Surely the general sense in which nature has been described relates to environment, where even the human has been an integral component. In the context of our discussion, thus, nature and environment convey nearly the same meaning.In exploring human-nature/environment relationship we consider the natural conditions and influences that affect and sometimes determine the actions of human groups. Over a long period of time in history this relationship operates at two different levels; at one level it wields influence as a widespread ongoing process, and at the other it acquires the form of the relationship of specific human groups to their "immediate environments". For our purpose we do not especially favour any one of the two and provide a narrative that tends to draw information from both as the situation demands.

In the case of the Indian sub-continent a very wide range of climatic and topographic situations prevail to influence the environment.As a result a delicate balance is maintained between extreme environmental conditions which is comparatively easily disturbed and we experience varying degrees of uncertainties extending over one or more climatic zones.In the context of nature-human interface these environmental changes have had their role in determining the development of human history.We shall discuss this in detail in the following section.

1.2 LOCATING MAN

In providing an identifiable status to man vis-à-vis environment our objective has been to start at a point where human groups become discernible as a collectivity.The question of the origin of humans is not our primary concern here.In fact an understanding about the process of evolution of humankind is more important to us as it helps us grasp the simultaneous evolution of man-nature relationship.

Till recently, up to the post-enlightenment era, the concept of a divine origin of nature and humans had been in prevalence.The human beings were also subject to an evolutionary process was a theme strengthened by the theory first proposed by Charles Darwin (1809-1882 A.D.). In his work *The Origins of Species*, Darwin argued that different species had undergone to process of evolution and this evolution was the result of minor variations in the characteristics of the individual members of species. These features were inherited by the successive generations and as a result of this long sequence of inheritance new species were able to evolve and emerge distinctively. Darwin also proposed that the adaptive capacity of species influenced the chances of their survival and he termed it as the process of the 'survival of the fittest'. The evolutionary model had made another important contribution towards our understanding of man as a 'unique animal', an animal who could adapt to different natural conditions and most importantly could modify the nature/environment for its survival.

The process of human adaptation to environmental conditions was accompanied foremost by the introduction of tools and their use by the primitive man. The significance of tools in the study of the evolution of humankind can be realised from the fact that this entire process has been classified in terms of the quality of tools and the nature and quality of the material used in making the tools. Thus the earliest period in human history, also called pre-history, has been termed as Paleolithic. This was followed by Mesolithic, Neolithic, Chalcolithic, Iron Age, and so on. For the convenience of also accounting for implements other than tools, we term this process as the development of artefacts and begin our investigation of man's relationship with nature during this important phase of human activity.

1.2.1 A Maker of Artefacts

The human beings are endowed by nature to be reflective and active. Their biological evolution has given them the capacity to establish adaptive relationship with nature. However, we can only be speculative about the factors and adaptive impetus responsible for the development of human ability to forge artefacts. Indeed this ability must have evolved over a very long period of time and would have begun with the local materials that were easily available and were suited to serve the purposes intended by the objects.

We know from archaeology that the first artefacts made by humans were of stone and had made their appearance more than two million years ago. This had marked the beginning of the Palaeolithic Culture. It was a remarkable occurrence and showed "a high level of forethought and knowledge of materials" on the part of the Stone Age Man "suggestive of acute powers of observation and deduction and of a sensitive awareness of much of the available potential of the world around". Like other animals, the initial mode of sustenance for humans was hunting and gathering. Most of these artefacts were made with the objective of assisting them in their quest for food, hunting and gathering. Stone tools

were used primarily for cutting plants, digging root crops, scrapping wood and obtaining honey. There were two broad groups of stone tools for the period: 'core' tools and 'flake' tools. Core tools were those tools which were made from the larger blocks of stone. Flake tools were those tools which were made from the small bits or flakes which would come off a block of stone when it was hit probably for making core tools.The most important core tool was hand-axe. Hand-axes were basically used for processing of meat and did reflect great physical dexterity. In the making of the stone tools here was a definite evidence of the beginning of man's attempt to adapt to the nature by applying his mind and making use of locally available material for better functioning. The appropriation of natural conditions was still confined to the most rudimentary stage, yet the act was very significant for it heralded the process of modification of natural conditions for better management of natural resources.

The Palaeolithic developments were followed by the growth of microlithic tools and this stage is termed as Mesolithic Culture.We are now witness to a greater control of man over the tool-making industry as the tools now become lighter and more efficient.In addition to stone we now find more variety in the use of materials for making microliths.Bone, animal horn, bamboo and wood make an appearance. The quality of artefacts produced during this period is suggestive of an improved technological competence. It is logical to assume that such competence would also have helped grow several other skills of working on materials other than stone e.g., wood, bamboo etc. The knowledge of using fire for clearing grasslands and forests along with these additional skills was a definite advance over the previous stage in so far as the management of natural resources was concerned.

It is around this time that early rock art specimens become available. An analysis of the depictions made in these specimens brings out the fact that the humans had by this time become acutely aware of the animal world and had begun to show signs of seeking refuge, even if temporarily under rock shelters, mounds and other natural sites. This should be considered a significant development in nature-human interface.Here was the beginning of the process of domesticating animals and utilising their power in the service of the mankind.

We must draw a word of caution here before the almost euphoric feelings at having managed nature in an efficient manner than the preceding Palaeolithic stage leads us astray.The fact was that in spite of these developments the humans were even now at the mercy of their immediate environment and were "in a very real sense dominated" by it. What seems closer to reality is a situation that exhibits, on the part of the human groups, a conscious awareness of the environment based on a close relationship with the environment. This relationship was fostered by activities such as "hunting and gathering animals and plants for food; lighting fires for cooking, warmth and protection; perhaps felling trees to make further wooden artefacts (as people are known to have done with stone tools elsewhere in the world); perhaps also burning grasslands

and forests to facilitate their hunting activities or improve the grazing for their favoured food animals".

1.2.2 Social Animal

The relationship between nature and man was redefined with the advent of agriculture. Till the beginning of agriculture, the sources of food had only been naturally available and man had no control over these sources. An important contribution of agriculture has been the cultivation of cereals. The fact that the shelf-life of cereals is very long whereas fruits and meat have a limited shelf-life must have added immensely to human capabilities.It is also significant to note that this property of cereals encouraged accumulation which was one of the principal causes for social stratification to emerge and with it a complex society to emerge with many different communities existing within and interacting with each other.

In the initial phase the agriculture was highly unreliable and as a regular source of food did not meet the demands of man. In fact transition from the hunter-gatherer stage to the agriculture stage was a long drawn process. The development of technology/tools to increase the production was also a gradual process and it was only after the development of irrigation technology that agriculture acquired a key role in food production.Initially the agriculture was confined to highly favourable locations with natural irrigation.With the growth of population, however, man was forced to migrate to less-favourable locations necessitating the development of irrigation facilities that demanded larger social participation and better skills of management.

Food security and greater control over agriculture enabled man to have some spare time as agriculture had been a seasonal activity. At the same time demand for better tools for agriculture and technology for irrigation to ensure greater production as well as a relative shortage of raw material for tools (as man moved away from foothills to open plains) forced man to look for other sources/ kinds of materials.This gave rise to the use of metals and their extraction through metallurgy.With the beginning of metallurgy thus, a new stage of development was attained.The discovery of metallic ores once again liberated man from the dependence over nature. The major advantage of metal tools over stone was their reusable character: stone tools once broken could not be used again whereas metal tools could be remolded. However, relative scarcity of ores together with the resources needed in processing the ores, right from procurement to transportation and extraction, made the making of metal tools a labour intensive and in many ways an expensive proposition. An important feature of metallurgy had been the requirement of highly specialised knowledge and expertise thus making it a full-time occupation. Such specialists could be sustained with the help of the available agricultural surplus. In this process we clearly see the emergence of a section of population that was not directly involved with the process of food production, yet was able to sustain itself on the labour produce of others.The "parasitic" character of this section of

population had in fact given rise to the possibility of sustaining solely on the basis of the acquisition of special skills without having to participate directly in the process of agricultural production.

The character of the agriculture based societies could now be defined in terms of complex social formations having stratified social and occupational groups within. The growing ability to manage the nature for social needs allowed agricultural societies to start systematic exploitation of natural resources for the benefit of the larger community giving, in turn, rise to socio-politico-economic hierarchies.In this process a gradual alienation of man from the immediate environment was quite perceptible.

It should be noted here that though the emergence and subsequent growth of agricultural societies was a gradual and steady process indicating man's control over nature, there were still numerous instances of the vagaries of immediate environments affecting this growth and thus creating troughs and peaks in the graph of agricultural development in place of an imagined smooth line only indicating consistently onward march. The few archaeological sties that have been investigated in detail yield interesting information. The earliest site is at Mehrgarh located on the Bolan river in Baluchistan.The down-cutting and lateral movements of the distributaries of Bolan are possibly "the outcome of the natural instability of the region" and "due to pressure on the environment caused by human activities such as harvesting grain, collecting firewood, felling trees and herding animals in the immediate locality and in the mountainous areas that form the head waters of the Bolan river". Almost similar is the case of the cities of the Indus civilisation.It is generally accepted that the region has not seen any major shift in the climatic conditions since the emergence of Indus civilisation.Yet "evidence of a period of somewhat increased humidity coinciding approximately with the high urban phase of the Indus cities (c. second half of the third millennium BC)" has also been noted. A point of great significance here is that the return to rather more arid conditions, like the present, appears to coincide approximately with the collapse of Mohenjo Daro, and apparently also with the failure of the wider infrastructure of the Indus urban world".

1.3 NATURE-HUMAN INTERFACE: CHANGING CONCERNS

We have hitherto been describing the nature-human interface in the context of human adaptation to the limits determined by the nature.Till the advent of agriculture the relationship between man and nature was highly tilted in favour of nature, where man was mostly the recipient of the benevolence of the nature. Tools of the lithic ages-Paleolithic, Mesolithic or Neolithic were basically instruments of facilitation towards the benevolence of nature. Man had to manage with the subsistence offered by the nature and could do little to influence the processes or patterns of nature. The subsistence pattern of this age was termed as

'hunters and gatherers' and life-style was nomadic. The society was moving from simple social structure to complex social structure gradually.

A fully manifest complex social structure emerged with the advent of agriculture that helped generate surplus and began the process of urbanisation. Upto this time the relationship between man and nature was to a considerable extent determined by the harshness/benevolence of nature to existing levels of technology.

A qualitative and epoch-making shift in the nature-human interface became evident with the onset of industrial age. The level of technology of industrial age liberated man from physical labour and introduced the exploitation of abiotic sources of energy that replaced human and animal energy. Since ancient past thermal energy had been used in direct applications, but during industrial age it was used to mechanise tools. Industrial age introduced the conversion of thermal energy to mechanical energy, hence expanded the possibilities of its exploitation.The ever increasing demands had also led to the search for newer forms of energy and to the discovery of hydrocarbons, i.e., coal, petroleum products, etc., as their principal source.Unlike earlier renewable sources of energy, though, hydrocarbons, are non-renewable. The introduction of non-renewable sources of energy redefined the relationship between nature and man and the concept of the conservation of natural resources came into existence.

A phenomenal growth in production possibilities and abundant availability of finished goods were two major features of industrial age. The replacement of animate forms of energy with the inanimate forms presented huge possibilities of harnessing natural resources. The technological advancement facilitating better and commercial use of new forms of energy expanded the demand for raw materials as also the markets for finished goods.

Another area where a major impact had occurred due to an extensive use of energy was that of agricultural production. Increased productivity and food security gradually led to a sizeable increase in population. Due to extension of cultivation and population there was now a major strain on forests and other natural resources.It was not that human civilisation had not witnessed the growth of population in the past; but the magnitude of this growth in the eighteenth century was fraught with serious implications.Braudel has attempted to define it in terms of an ecological watershed, i.e., the end of a natural regime that was determined by the characteristics of pre-industrial societies."What was shattered" wrote Braudel, "with the eighteenth century was a biological 'ancien regime', a set of restrictions, obstacles, structures, proportions and numerical relationships that had hitherto been the norm". (Ferdinand Braudel, **Civilisation and Capitalism 15th-18th Century, Vol- I: The Structures of Everyday Life-The Limits of the Possible,** tr. Sian Reynolds, London, 1985). The relationship of harmony and a tacit co-existence with nature now gave way to human endeavour to completely harness and exploit natural resources.

The ever-increasing mechanisation of even the day-to-day activities increased the demand for energy to new heights.An almost reckless use of energy sources of the fossilized form and blind growth of industries of all kinds gave rise to problems of environmental pollution. We are today faced with serious environmental threats like the 'green house effect'.

Another major cause of concern in this regard has been the development of materials not naturally available in the world, i.e., the polymers. The chemical revolution of the 1930s and 1940s developed an artificial material which was not biodegradable, thus difficult to destroy and decompose. At the same time, the wider applications of the material at industrial and domestic front at low cost of production encouraged its wider circulation. Similarly, the question of the viability of nuclear fuel as a source of energy has been a major issue of debate. The production of non-natural radioactive substance for energy production has been a major scientific and technological development but again the decay or the proper and cost effective decomposition of residue has been a major technological failure.

While according due importance to the role of new technologies in the portrayal of a comprehensive picture of human-environment interface, we must not neglect the socio-political considerations. Until 1700, the rights and rewards of exploitation of the natural world lay largely in the hands of an elite aristocracy. The democratic revolutions of the late 1700s, including the American Revolution of 1775-76 and the French Revolution of 1789-1799, triggered a restructuring of the framework of society throughout most western societies. With this change came increasing access of individuals to productive resources, and an increased ability to use them for improving economic and social status. The legitimate rights of exploitation of nature were now extended to individuals at large in society. The 1800s were the culmination of a period of worldwide spread of western culture through colonialism and establishment of world trade. The western system of environmental exploitation was thus spread widely, so that it became the operational system even in areas where the basic philosophical view of human and nature was quite different. (Ranajit Guha, *History: At the Limit of World History*, New Delhi, 2003.)

Human acts were henceforth seen as socially constructed and man got located at the centre of creation. As a result the relationship between nature and man was redefined. The breakdown of 'biological regime' led to an exponential growth in human population. Initial demand of labour by the early industrial revolution and relative food security sustained this growth.At the same time, scientific knowledge along with technological development provided a world vision where technology was portrayed as a solution to all human problems especially hunger and poverty.

These are the few concerns that tend to redefine nature – human interface.We, however, cannot afford to remain insular to these

developments in the name of preserving a pristine man-nature relationship.We must be open to new perspectives in our understanding of society and scientific developments. Daniel B. Botkin (*Discordant Harmonies*: *A New Ecology for the Twenty-first Century*, New York, 1990) says that 'We must distinguish between merely the persistence of some kinds of life and the maintenance of a biosphere that is desirable to human beings' (p.182), inherent in it is his vital question that nature is not constant and even the change is not constant, thus the only way to interact with nature is to enlarge our understanding of environment and its functioning at the same time to realise the limitations of human capabilities to manage nature according to his wishes.

1.4 SUMMARY

Most of the writings on environmental history deal with the interaction between society and environment through the analysis of socio-economic impacts. We now know that interaction between environment and society has also been mediated by the technology, which helps in the appropriation of environment for social/individual good. It is the level of technological development, which influences the extent of human intervention in the functioning of environment, and determinates the nature of human comprehension of their environment.

Since the beginning of universe and more so with the evolution of mankind as thinking animal we have been witnessing the change in nature's landscape caused or at least influenced by humankind. Some of the important technological introductions influencing the environment have been the beginning of agriculture and discovery of iron. These introductions led to far reaching changes in the landscapes and thereby influenced the functioning of environment. Similarly, industrial revolution has been a landmark technological introduction for the appropriation of environment. It is in this way that a comprehensive picture of man-nature relationship should be investigated. At the same time it is also true that even at the present level of scientific development we cannot claim that we have been able to comprehend fully the functioning of environment.

1.5 EXERCISES

1) Describe the features of nature-human interface during Palaeolithic and Mesolithic Cultures.

2) In what ways did the beginning of agriculture influence the man-nature relationship? Discuss

3) Why is the beginning of the industrial age considered as marking a major shift in nature-human interface? Elaborate.

1.6 SUGGESTED READING

Daniel B. Botkin, *Discordant Harmonies: A New Ecology for the Twenty-first Century*, New York, 1990.

Ranajit Guha, *History: At the Limit of World History*, New Delhi, 2003.

F. Braudel, *The Perspectives of the World* and *The Structures of Everyday Life*, Vols. I & II respectively of *Civilisation and Capitalism 15th-18th Century*, tr. Sian Reynolds, London, 1985.

Ramchandra Guha, *Environmentalism*, Delhi, 2000.

D.K. Chakrabarti, *India, An Archaeological History*, Delhi, 1999.

[All the quotations in this Unit, unless otherwise noted, have been gratefully taken from *Bridget Allchin*, 'Early Man and Environment in South Asia 10,000 BC-AD 500' in *Nature and the Orient*, ed. Richard H. Grove, Vinita Damodaran, Satpal Sangwan, Delhi, 1998.]

UNIT 2 INDIAN LANDSCAPE

Structure

2.0 INTRODUCTION

We have discussed in the preceding Unit the contours of nature-human relationship in the historical context and have found that a detailed understanding of the Indian landscape is an inescapable necessity.We therefore intend to familiarise you, in the present Unit, with the Indian Landscape and discuss in detail the complexity of the relationship that exists between physiographic features of a place and its society. The focus here is on the evolution of settlement patterns in India and the emergence of ecologically sensitive zones.

India is a vast geographical region and assumes the scale of a sub-continent. It has diverse climatic and bio-geographic features sustaining a wide pattern of human settlements.The patterns of living, material culture and consumption behaviour of these settlements differ in response to diverse ecological settings.It is therefore, worthwhile to examine the landscape features in India in relation to patterns of human settlements.

2.1 PHYSICAL FEATURES

A detailed description of the physical features of India will enable you to understand better the visible differences in the topography of the different parts of the country.It will also help you see the underlying environmental factors that also determine the relationship between the physical geography of any region and its settlement patterns.The location and expanse of India's landforms (plains, plateaus, hills and mountains) have played a significant role in influencing her past history.Since associated features such as climate, land-use, means of transportation, distribution of population, etc. directly relate to history the study of physical features in relation to man and his needs is vital.

India can be divided into the following four major physiographic divisions:

- A high mountain barrier formed by the Himalayas in the north and the Eastern Highlands in the east;
- The Plains of Northern India or the Ganga-Yamuna Doab;
- The Plains of Peninsular India, south of the North Indian plains, also known as the Indian Plateau; and
- The Coastal Lowlands fringing the Plateau of Peninsular India.

These four regions are distinctly different from one another in respect of their surface configuration. The Himalayas are young fold mountains with great rise, highly uneven surface, very steep slopes, little level land and young river valleys. Against that Peninsular India is an old shield block having plain areas, relict mountains and old river valleys. The Plains of Northern India are flat and alluvial without much local relief except bluffs of the old banks of the rivers and are of recent origin. The Coastal Lowlands are flat with deltas and land generally rolling.

2.1.1 The Himalayas

The Himalayas form a highly rugged and continuous stretch of high mountainous country, which flanks northern India for a considerable length and runs from the Brahmaputra gorge in the east to the Indus in the west. They cover an area of nearly 2,500 km. in length and 150 to 400 km. in width. Rising abruptly from the plains, the Himalayas rest against Ladakh district of Jammu and Kashmir and the Tibetan Plateau in the form of an arc-like rim. They are one of the youngest fold mountains on the earth. Uplift of the Himalayas, at irregular intervals has helped rejuvenate the rivers.The Himalayas exhibit practically all those land forms which develop when strata is intensely folded. However, intermontane plateaus and large-sized basins are conspicuously absent in these intensely folded mountains. The Vale of Kashmir, about 135 km. long and 40 km. broad, is the only large level strip of land in the Himalayas. In general, the Himalayas consist of three main ranges – the Siwalik Range along the southern margin, the Great Himalaya along the Tibetan border and in between these two is the Lesser Himalaya. Additionally there is a range in the east known as the Eastern Highlands.

The Siwalik Range

This range has low parallel ridges made up mainly of boulder and clay and these ridges are the foot-hills of the Himalayas. From a breadth of nearly 50 km. in the west, it narrows gradually towards east and loses its identity in the Bengal Duars. The height of these ridges usually does not exceed 1,220 metres.Most of these ridges had formed after the formation of the Himalayas, thus they obstructed the courses of the rivers draining to the south and west and created temporary lakes in which debris brought by those rivers was deposited. As the rivers had cut their courses through the Siwalik Range, the lakes were drained leaving behind plains called

Duns. One such plain formed as a result of the draining of lakes is **Dehra Dun** (600 metres above sea-level), in Uttaranchal.

The Lesser Himalaya

These ranges rise north of the Siwalik Range and being deeply cut by rivers are highly rugged and ill defined.They are more clearly defined in their expanse towards west where they are known as the Dhaola Dhar, the Pir Panjal and Nag Tiba. The Mahabharat Range (Nepal) and the Mussorie Range (Kumaun Himalayas) are two other ranges of the Lesser Himalaya that run as continuous ranges for long distances. These ranges vary a lot in height but are generally less than 3050 metres above sea-level. Some of their peaks rise to heights of even more than 4570 metres particularly branches closer to the Great Himalaya and are also known as Himachal. The Lesser Himalaya are about 80 km. in breadth.

The Great Himalaya

Also known as *Himadri*, it is the longest continuous range among the Himalayas. It is also the highest range in the world with an average height of 6100 meters. The top of this range, about 25 km. wide, is dotted with numerous snowy peaks. The highest peak of the world, the Mount Everest (8848 metres), is situated at the northern border of Nepal. The other notable peaks in descending order are Kanchenjunga (8598 metres), Makalu (8481 metres), Dhaulagiri (8172 metres) and Nanga Parbat (8126 metres). In the north-west the Great Himalaya ends in Nanga Parbat (8126 metres) whereas in the east it culminates in Namcha Barwa (7756 metres) close to the Brahmaputra in Tibet (Brahmaputra is known as the Dihang, in this section of the Himalayas). The Great Himalaya is snow-bound throughout the year and creates glaciers which descend to a height of 2440 meters above the sea-level in Jammu and Kashmir and about 3960 metres in the east. At their lowest limits, glaciers melt and ensure continuous supply of water to the rivers of North India. During early summer when there is no rain in the plains, the water in these rivers has a particular significance as it is tapped for irrigating the parched land during the dry months.

Being snowbound for larger part of the year, this range is forbidding and can be crossed only by a few passes. These passes also become inaccessible during winters when the range is snow-bound. Journey through these passes is hazardous and strenuous as they are generally higher than 4570 metres above sea-level. Pack animals like mules, yaks and goats were used earlier in the absence of metalled roads for carrying goods across these passes. The Burzil Pass and the Zoji La in Jammu and Kashmir the Bara Lacha La and the Shinki La in Himachal Pradesh, the Thaga La, the Niti Pass and the Lipu Lekh Pass in Uttar Pradesh and the Nathu La and the Jelep La in Sikkim are some of the prominent passes to cross the Great Himalaya. This range has served as a natural barrier between India and Tibet (China).In addition to its being an insurmountable barrier, this range shuts off almost completely the icy cold-winds of inner Asia in winter and confines, again on account of its

formidable height, the moisture laden monsoon winds for the benefit of India.

In the northern part of Jammu and Kashmir there is another high mountain range called the Karakoram. It is a trans-Himalayan range, which runs roughly in the east-west direction. Some of the peaks of this range rise above 4620 metres. The second highest peak in the world, K-2 (8611 metres), which happens to be the highest peak in the territory of India, rises majestically like a cone in the midst of other slightly less high peaks of the Karakoram Mountains. This range merges in the Pamir Knot in the west. This bleak, desolate, lofty mountain waste, snow-covered throughout the year like the Great Himalaya, protects India from the very dry winds of Central Asia.

The Eastern Highlands

These mountains consist of hill ranges which pass through the north-eastern state of Arunachal Pradesh and run in north-south direction in the form of a crescent. To the north lies a high mountainous land called the Dapha Bum (highest point 4578 metres). From the southern end of the Dapha Bum starts the Patkai Bum. It forms the international boundary between India and Burma for some distance southwards and then it merges into the Naga Range. Saramati (3926 metres) is the highest peak of the Naga Range. The Patkai and the Naga ranges form a watershed between India and Burma. Further south, this mountainous belt is called the Manipur Hills (generally less than 2500 metres in elevation) in Manipur State, the Mizo Hills in the state of Mizoram and the Tripura Hills in Tripura State. The ranges are folded and alternate with valleys. This range and valley character of the topography has developed a special drainage pattern known as trellised drainage. Simply speaking it is a type of multichannel drainage which criss-cross to form a lattice pattern. The ranges and the valleys run generally in north-south direction. They are covered with thick forests and are difficult to cross. Passes are very few.

The sources of the three important rivers of India, namely, the Brahmaputra, the Sultej and the Indus have their sources near Lake Manasarowar (Tibet) situated to the north of the Great Himalaya. The source of these rivers varies in height from 4570 to 4875 metres. The Great Himalaya which is about 1.5 km. higher than the level of the river sources is cut across by these rivers to form very deep narrow gorges. According to the view of some geographers and geologists, these rivers are older than the mountains they cross. These rivers began entrenching their courses in these mountains when they began to rise slowly. Gorges deeper than 3 km. are not uncommon. The deepest gorge (5180 metres deep) is found in the course of the Indus where it crosses the Himalayas near Nanga Parbat. A few other rivers such as the Bhagirathi, the Alakananda, the Karnali, the Gandak, the Arun Kosi, the Tista and the Manas have completely cut back their courses in the Great Himalaya and have thus formed very deep gorges. These rivers, for some distance, run

parallel to the mountain ranges before they descend on the Plains of Northern India. Along the river courses at some places occur river terraces, which show that the uplift of the Himalayas at intervals has rejuvenated the rivers.

2.1.2 The Plains of Northern India

These plains stretch in the east-west direction between the Himalayas in the north and the Deccan Plateau of Peninsular India in the south. They form a continuous stretch of alluvium land varying in width from 500 km. (Punjab and northern Rajasthan) to 240 km. (east Bihar Plain). The Sutlej Plain in the west, the Ganga Plain in the middle, and the Ganga Delta and the Brahmaputra Valley in the east constitute these plains. The desert in the west of the Aravalli Range being largely a plain is also included in the Plains of Northern India. These plains continue to the west beyond the Punjab and Rajasthan and converge with the Indus Plain in Pakistan. Measuring about 650,000 square km., these are amongst the largest plains of the world and they account for one-fifth of the area of India. These are primarily level plains without any interruption except for a few outliers of the Aravalli Range. The most prominent of these outliers can be seen in the vicinity of Delhi. They form isolated low hills or ridges and emerge out of the surrounding alluvium as islands. This region was formerly a deep trench, six to eight km. in depth, which was formed as a foredeep when the Himalayas rose as fold-mountains. Uniformity in the level of these plains is mainly due to two facts (a) deposition took place in water and (b) no earth movement disturbed their flatness later. In the drier parts of the western fringe of Haryana and neighbouring parts of Rajasthan, deposition of windblown dust accounts, to some extent, for the formation of these level plains. Numerous ravines turning the fertile alluvial land into unusable lands break the southern fringe of the Ganga Plain, particularly between the Chambal and the Son.

The courses of the rivers in these plains create several meanders. In the rain deficient parts of Punjab, Haryana, and Uttar Pradesh these rivers have been tapped for irrigation without which famines could not have been eliminated from this densely peopled plain tract. Along with canal irrigation, hydroelectric power has also been developed for power supply to industries and for domestic use. The rivers are liable to sudden and disastrous floods during the rainy season. Owing to flatness of the plains and large loops of meanders, the rivers are sluggish and fail to carry away water quickly after heavy continuous rain, which leads to a situation of severe and sudden floods.In some areas of high water-table, the flood waters may stand for a few months and thus impede the sowing of rabi crops. In winter, the volume of water is so small that the rivers appear misfits.

2.1.3 The Indian Plateau

It is also called the Plateau of Peninsular India as it stretches south of

the alluvial Plains of Northern India. It looks like a large triangle with its apex in the south at Kanya Kumari.It is far older than the Himalayan mountain ranges and is formed essentially of the ancient igneous rocks. The earth movements have brought some changes in the landscape of this otherwise stable block of the earth's crust. These movements were vertical and resulted in the formation of faults along which some areas sank forming faulted basins or rift valleys. This occurred sometime during the Gondwana period when drainage of the adjoining area flowed into these basins, deposited sandstones, clays and shales (finely stratified stone) which subsequently turned into sinking of the basins, and formed the coal beds and lay preserved. The valleys of the Damodar, the Mahanadi and the Godavari roughly mark the position of the Gondwana region. The Narmada and the Tapti valleys leading to the Arabian Sea are rift valleys formed long after the Gondwana period. The Narmada Rift valley continues to the north-east and is occupied by the river Son. North of the Narmada-Son is the Malwa Plateau, which extends to the Aravalli Range in the west and Bundelkhand region in the north-east. The Malwa Plateau is inclined towards the north and is formed by horizontally bedded sandstones, limestones and shales laid down during the pre-Gondwana period. It is suggested that during this era the Malwa Plateau was submerged under the sea.

South of the Satpura Range, the peninsula is called the Deccan Plateau. It is believed that large-scale volcanic eruptions took place in the Cretaeous period which spread far and wide over the Indian Plateau covering completely the land forms existing at that time. Repeated flows of melted basalt from fissures built up a basaltic plateau. The basalt so deposited has, however, been eroded away by rivers from a large area and is visible only in Maharashtra, southern Malwa Plateau and large parts of Kathiawar and covers an area of 520,000 square km. at present.The sub-regions of the Indian Plateau are described below.

The Aravalli Range

It runs in the northeast-southwest direction from Delhi to the north-eastern fringe of Gujarat State. Between Delhi and Ajmer, it can be characterised by a chain of detached and discontinuous ridges running also in the northeast-southwest direction and forms basins of inland drainage here and there. The range is almost continuous south of Ajmer.The highest peak of the Aravalli Range is situated in Mount Abu.

The Vindhya Range

The Narmada Valley is flanked in the north by a steep sided escarpment (long steep face of plateau) formed due to presence of the Malwa Plateau. This escarpment, considered wrongly as a mountain sometimes, is known as the Vindhya Range and runs roughly north-eastwards along the northern fringe of the Narmada-Son for about 1200 km. The height of the escarpment generally averages less than 610 metres. The western part of this range is covered with lava. The eastern part of this range, not covered with lava, is known as the Kaimur Hills.

The Satpura Range

It starts from the West Coastal Plain and runs eastwards between the Narmada and the Tapti-Purna rivers and continues up to Amarkantak covering about 900 kms. Its western extremity is known as the Rajpipla Hills and the easternmost part as the Amarkantak Plateau and in the middle we can find the Mahadeo Hills. Throughout its length, the Satpura Range has steep sided plateaus of elevations varying from 600 to 900 metres. The eastern part of the Amarkantak Plateau known as the Maikala Range overlooks the Chhattisgarh Plain. Dhupgarh near Pachmarhi is the highest point of the Satpura Range. The Rajpipla Hills and the Pachmarhi Plateau are deeply dissected with a strong local relief. This range is covered mostly with thick layers of basalt. It has two important gaps; one can be reached by the Bhusawal Khandwa rail section and the other can be reached by Jabalpur Balaghat rail section.

The Chhattisgarh Plain

It is a basin drained by the Upper Mahanadi. It lies to the east of the Maikala Range and low Khairagarh Plateau separates it from the Wainganga Valley. The basin is laid with nearly horizontal beds of limestone and shales and is enclosed by hills or plateaus. It is a large area measuring about 73,000 square km.

The Chota Nagpur Plateau

It lies to the east of the Rihand. It includes the Bihar Plateau and the adjoining eastern fringe of Madhya Pradesh with Purulia district of West Bengal. The Ranchi Plateau in the south, the Hazaribagh Plateau in the north along with the Rajmahal Hills in the north-east constitute important physiographic sections of the Chota Nagpur Plateau. In the same region, the Ranchi Plateau lies to the south of the Damodar. It is in fact a group of plateaus elevated to different heights. The surface of the plateau, which is mostly rolling, is occasionally interrupted by conical hills. Parasnath in the eastern part is the highest point. The north-eastern edge of the Chota Nagpur Plateau is termed as the Rajmahal Hills and it runs in the north-south direction. Consisting mostly of basalt, these hills have been dissected into separate plateaus.

Other Sub-Regions

In addition to the above we can trace the rocks of the Indian Plateau in Meghalaya where it forms a rectangular block known as the Shillong Plateau or the Meghalaya Plateau. The western part of this plateau is called the Garo Hills whereas the central part is known as Khasi-Jaintia Hills and the eastern part as Mikir Hills.The central part of the Khasi Hills is a table-land and Shillong town is situated on it. This table-land is the highest part of the Meghalaya Plateau. Moving to the central India, we can locate Tapti Valley which lies to the south of the Satpura Range. To the south of the Tapti Valley is another east-west range commonly

known as the Ajanta Range, which again is formed of basalt and has an appearance, at the top, of that of a plateau.

The eastern side of the Indian Plateau is bounded by the hills called the Eastern Ghats. Several rivers break these Ghats from the East Coast, namely the Mahanadi, the Godawari, the Krishna and the Penner, before they fall into the Bay of Bengal. The Nallamala Hills between the Penner and the Krishna and Bastar-Orissa Highlands between the Mahanadi and the Godavari are prominent blocks of the region. South of the Krishna, height of the Eastern Ghats is generally less but north of the Godavari, it is higher and rises to 1680 metres near Vishakhapatnam district. Mahendra Giri in Orissa with the height of 1501 metres is the second highest point. The Deccan is fringed in the west by the Western Ghats also known as the Sahyadari, which run from the lower Tapti Valley to the south as a continuous range and merges with the Eastern Ghats in the Nilgiri Hills. The Western Ghats rise abruptly from the western coastal lowlands and rise to an average height of 920 metres in Maharashtra and above 1000 metres in Karanataka State with Doda Betta as the highest peak of the Nilgiri Hills.

As the Deccan plateau slopes gently towards the east consequently the rivers Godavari, Krishna, Penner and Cauvery flow to the east. These rivers and their tributaries have carved broad valleys leaving highlands between them. These highlands form long low ranges particularly in the Deccan region of Maharashtra, Andhra Pradesh and northern Karnataka. The range lying to the north of the upper Godavari valley is called the Ajanta Range whereas one lying between the Bhima-tributary of the Krishna, and the upper Godavari is called the Balaghat Range. These ranges provide in between, broad valley plains extending about 450 metres.

In the extreme south are the Cardamom Hills. These hills are gneisses (Coarse-grained rocks of quartz, mica and felspar) and schists a (foliated rock presenting layers of different minerals) and separated from the Nilgiri by a gap called the Palghat Gap. The Cardamom Hills' prominent peaks are named as the Palni Hills and the Anaimalai Hills to the east. The Anaimalai Hills with Anai Mudi the highest peak at 2695 metres above sea-level are the highest in South India. These hills end almost abruptly in the Plains on either side.

2.1.4 The Coastal Lowlands

The Plateau of Peninsular India is fringed with narrow coastal lowlands. Raised beaches and wave-cut platforms above the high water mark signify that these lowlands are essentially the emerged floors of the seas adjacent to the land. After the emergence of these lowlands, fluctuations in sea-level, though limited to small areas, have brought some changes in the general surface features of the littoral (shore areas). The west and east coastal lowlands are described below:

West Coastal Lowlands

The physiography of West coastal lowlands is varied. It contains marshes, lagoons, mud-flats, peninsulas, creeks, gulfs and islands. The Rann of Kutch, the peninsulas of Kutch and Kathiawar and the Gujarat Plain are the major physiographic regions.

The Rann of Kutch lies to the north of Kutch. Earlier a gulf and now a vast desolate lowland it was formed due to the deposition of silt brought mainly by the Indus in the past. Its surface is only slightly above sea-level and is interspersed with mudflats, marshes and creeks.It is covered with shallow water during the rainy season and is being continuously filled up by the silt brought by the rivers. There are a few islands in the Rann, with Bela, Khadir and Pachham islands as the only ones of significant size.

Kutch, once an island, lies to the south of the Rann of Kutch. It is an arid area with generally broad sandy terrain along the coast and the Rann of Kutch and bare low rocky ridges in the interior. Kathiawar is located to the south of Kutch. It is hilly in the central part and elsewhere it is a rolling plain. Gorakhnath in the Girnar Hills in Junagadh is the highest peak in Kathiawar. The Gir Hills extending in the east-west direction lie to the south of Kathiawar and are connected with a broad hill-mass lying further north in the central part of Kathiawar which runs north-south forming a low narrow dissected range. In the north-east there is a belt of low country which is marked by Lake Nal and Marshes.

Along with several small rivers, long rivers like, the Tapti, the Narmada, the Mahi and the Sabarmati deposit enormous load of sediments in the Gulf of Cambay leading to siltation of the gulf. This has resulted in the creation of a broad fertile alluvial plain north of Daman extending towards north up to the Aravalli Range and termed as the Gujarat Plain. South of Daman, the coastal lowland narrows to a width of around 50 km, which occasionally broadens by a few kilometres at places where streams have gnawed back into the steeply rising Western Ghats. Between Daman and Goa the western littoral is called the Konkan. Coastal lowlands of Goa and the Konkan, to the south of Bombay are marked with the low hills separated by river courses which form creeks near the sea. The fact that the drowning of the lower courses of the rivers has taken place clearly suggests that there has been some recent submergence, though on a small-scale, of the coast, north of Marmagao.

Coastal plain in the vicinity of the Palghat Gap and in the south of Kerala is relatively broad reaching to a width of 96 km. Off-shore bars have enclosed lagoons which run parallel to the coast in southern Kerala and are known as Kayals. These lagoons receive water of a large number of rivers before discharging that to the sea with which they are connected by narrow openings. Formation of lagoons and off-shore bars indicate

INDIAN LANDSCAPE

Different Colours Indicate Various Landscape features

MOUNTAIN RANGES

INDIAN FORESTS

Different Colours Indicate Various Types of Forests

INDIAN – SOILS

Different Colours Indicate Various Types of Soils

that there has been a slight emergence of southern coastal plain not in the very distant past.

The West coastal lowland south of Surat is drained by several small rivers, which become torrents during the monsoon. In the normal course these torrents should have formed deltas. However, as at this time strong sea-waves also develop due to south-west monsoon winds and these waves having an unusually great scouring power, the mouths of the rivers are desilted and thereby impede the formation of deltas on the west coast. Instead of deltas, long off-shore bars which enclose lagoons, particularly in the south, develop as suggested above.

East Coastal Lowlands

East coastal lowlands is broad compared to the western lowlands and it is broadest in Tamil Nadu where its width ranges from 100 to 120 km. North of the Godawari Delta the coastal lowland is narrow as the Eastern Ghats closes on the sea. At some places it is as narrow as 32 km. in width. Since the Plateau of Penninsular India, especially of the Satpura Range, is tilted to the east, all rivers of the Deccan with the exception of the Tapti flow eastwards and reach the Bay of Bengal. These rivers have spread alluvium over almost whole of this plain and have built large deltas at several places. Sea waves being far less furious than those impinging on the west coast, the sediments brought by large rivers – the Mahanadi, the Godavari, the Krishna and the Kaveri have formed deltas. These deltas being fertile and properly irrigated are densely peopled. At some places spits, lagoons and off-shore bars have also developed along the coast. The coast is fringed at some places with dunes. Mangrove forests grown along the seaward front of the deltas have been a major characteristic. As the sea is shallow near the emerged lowland coasts, deep natural harbours except Bombay and Marmagao are absent along both the coasts.

2.2 VEGETATION

The Indian sub-continent has been witness to a very long period of human activity. During the course of this activity the vegetation cover present in the earliest time has been considerably modified. As a matter of fact, little trace of this vegetation except on the higher reaches of the mountains is to be seen today. If one has to imagine the features of the natural original vegetation, one would most definitely be struck by the fact that it essentially was a tree vegetation or forest cover. Over several millennia of human activity involving clearance and degradation of this forest cover, today only about one fifth of the total area of India is regarded as under the forest, treated as the protected forest. Half of the protected forest area has been designated as the reserved forest where all kinds of degrading activity are prohibited. In any case the least degenerated forests in India have to be found in the Himalayan region

and one of the chief reasons for their preservation is the inaccessible terrain.

The situation described above was not the same in historical past.There is evidence to suggest that central Panjab and the Ganga-Yamuna Doab was covered with vast forest at the time of Alexander's campaign.A notable feature of Indian forest, according to spate and Learmonth, is that "the floral landscape is rarely marked by an absolute preponderance of one species or even an assemblage of species". Further "(the) nearest approaches to this condition are the Himalayan rhododendron belts (a tree having flowers of blood-red colour), the semi-desert vegetation of the northwest, and bamboos locally in the south and the northwest, usually on old clearing" [O.H.K. Spate & A.T.A. Learmonth, *India and Pakistan*: *A General and Regional Geography*, Indian Edition, New Delhi, 1984, p.74].

The vegetation cover of India has been classified on the basis of the types of trees present.Accordingly, it has been divided into the following five categories:

- Moist Tropical Types
- Dry Tropical Types
- Montane Subtropical Types
- Montane Temperate Types
- Alpine Types.

This classification is based on the study conducted by H.G. Champion in 1936 and slightly modified subsequently [see *India and Pakistan*, p.77].

Moist Tropical Type

The forest of this type is basically the rain forest that is wet and evergreen or semi-evergreen. It is found in the high rainfall areas where the dry season is short. In places where the dry season is either intermittent or more prolonged the forest becomes semi-evergreen. The tree cover in the forest of this type is very dense and very high. It is found along the Western Ghats to the south of Mumbai and in Assam. Perhaps, in the past, the coastal areas in Orissa and Bengal were also covered with this kind of forest, but have been denuded now.

Dry Tropical Types

This type grows in areas which have moderate rainfall and that too concentrated in a short period of time.The remaining dry season that is fairly prolonged harbours the growth of this type.The area occupied by the forest of this kind extends in central and Peninsular India as also along the Siwaliks in Himachal Pradesh. The trees grow up to a medium height and permit the undergrowth of shrubs and spiny vegetation.

Montane Subtropical Type

The subtropical types are rain forests having a stunted growth. The two main areas where they are found are the Nilgiris and Anaimalai-Palani Hills in the south. It may have covered the Satpura and Maikal Hills and Mount Abu in the past, though most of it has now vanished.

Montane Temperate Type

This type of forest extends in the lower reaches of Himalaya where the rainfall is moderate though regular. The main trees found are oaks, chestnuts and laurels. It also grows pines, cedars, silver firs and spruces. Rhododendrons and some varieties of bamboo are also seen in good numbers in this forest.A notable feature of this type of forest is that it supports exportation of timber wood.It is also prone to frequent fires.

Alpine Type

This type grows in the middle levels of Himalaya. The main types of trees and vegetation are silver firs, juniper, pines, rhododendrons and birches. The forest types in India and their geographical distribution has been depicted in the map appended here.

2.3 SOILS

Soils support vegetation as also agriculture and have therefore been of vital importance in giving Indian landscape a definite view. The traditional classification of the soils in India, as noted by Spate and Learmonth, was in four main categories: alluvium, regur (black cotton soils), red soils and laterite. We have already taken note of heavy alluvium deposits in the Indo-Gangetic plains as a result of erosion and river floods occurring at frequent intervals. An early attempt to classify soil types was made by the Russian scientist Z. J. Schokalskay in 1932. This was essentially an attempt at synthesising the existing knowledge and its value lay in the fact that it prepared ground for systematic soil study. In India a Soil Survey was set up in the year 1956, and it has been working since then to map the soil distribution pattern in India. We have given here a map on the pattern of soil distribution in India but it is based on Schokalskay's study as the Soil Survey of India work has not been completed.

Soil conservation has been an important environmental concern as it sustains vegetation and agriculture both. Many human activities have directly and indirectly resulted in soil erosion in a major way causing in some cases an irreparable loss of the soil for posterity. Since consolidation has to precede conservation, the task becomes more difficult as persuasive measures requiring cooperation on larger scale need to be adopted. Soil fertility and soil productivity are other related issues but they need to be addressed by scientists primarily.

2.4 PERCEPTIONS OF LANDSCAPE

The description of the physical features of India provides the ideal

backdrop to examine the social perception of landscape as it evolved since ancient times. The beginning of civilisation in India is traced to the semi-arid region of Sind. The river valleys of the arid region provided suitable conditions for the emergence and growth of a society based on agriculture. At that time the 'technological constraints' forced humans to notventure to the densely forested areas of Ganga-Yamuna Doab and the foothills of the Himalayas. It is only in the early Vedic literature that glimpses of the expansion of human settlement from the north-western India towards the Ganga-Yamuna Doab are provided in ample measure. A shift from the semi-arid region to more wet regions of Ganga-Yamuna Doab was a clear manifestation of the different needs of the settlers. The nomadic character of the new settler necessitated movement towards a greener region and with the 'advent of iron' settlement in the densely forested region became a reality. This was also the beginning of an assault on the forest frontiers. Gradually the agriculture spread, forests shrank and empires began to take shape.The period also witnessed the establishment of republics along with monarchical kingdoms. It is interesting to note that whereas the monarchies were concentrated in the Ganga plain, the republics, most of which pre-dated the monarchies, were ranged round the northern periphery of these kingdoms in the foothills of the Himalayas, perhaps due to the fact, that it was easier to clear the wooded low-lying hills than the marshy jungles of the plain. It also suggests that there had been continuous interaction between the settled agriculture and the adjoining forest areas, a fact substantiated by Kautilya. He visualised forests and mountains as providing effective barrier against the enemies. He also supported management of forests to generate revenue as well. Thus we can suggest that forests and mountains were perceived in terms of their economic and strategic significance.

It should be noted that the landscape was visualised not only in terms of the economic and strategic significance but also its aesthetic value that was appreciated. Ancient literature is full of references where landscape has been eulogised in terms of the bounty it provided and the visual pleasure it offered. In the ancient Tamil poetry, love of man and woman is taken as the ideal expression of 'inner' self as well as outer world. The moods of separation and union are described by borrowing certain attributes from the wider natural world and placed within the rituals of the poetry. There are four kinds of "place"; each is presided over by a deity and named for a flower or tree characteristic of the region:

- *Mullai*, a variety of jasmine, stands for the forests overseen by *Mayon*, the dark-bodied god of herdsmen;
- *Kurinci* (pronounced *Kurinji*), a mountain flower, for the mountains overseen by *Murukan*, the red-speared god of war, youth and beauty;
- *Marutam*, (pronounced *Marudam*), a tree with red flowers growing near the water, for the pastoral region, overseen by *Ventan*, the rain-god; and

1 *Neytal (*pronounced *Neydal*), a water flower for the sandy sea shore overseen by the Wind God.

A fifth region, *palai* or desert-waste, is also mentioned. *Palai* is given no specific location, for it is said that any mountain or forest may be parched to a waste land in the heat of summer.It is named for *Palai*, supposedly an ever-green tree unaffected by drought. (A.K. Ramanujan, *The Interior Landscape: Love Poems from a Classical Tamil Anthology*, Delhi, undated).

Information about landscape is also available for the medieval period.A close examination of the Persian sources of the medieval period reveals that the region of Ganga-Yamuna Doab then had a different landscape. During Alauddin's reign, the region between Delhi and Badaun was densely forested unlike the vast expanse of agriculture spanning the area today with only sparsely wooded areas in between.Alauddin had given orders for clearing the forest to make the passage safe for the merchants in particular and travellers in general. However, it seems the vanishing act suffered by the forest here, began in the thirteenth century. Munhta Nainsi, the seventeenth century courtier of the Marwar state, while describing the mountains of Mewar region specially mentions the availability of water on mountains. Similarly, we have information on the political boundary of states defined along the courses of rivers. An interesting landscape detail can be seen in the following example. In the medieval period the territory between the two warring states of Mewar and Marwar were defined according to the cultivation of specific trees.The *anwla* plantation was seen as demarcating the Mewar region whereas Marwar was identified with the *babool* tree, suggesting a broad division of the territory in terms of the semi-arid and wet regions.

Landscape was visualised not only in terms of the kind of agriculture it could sustain, but also in terms of the animal the region could harbour. Historical works of ancient, medieval and even British period carry sufficient references to suggest that certain landscapes were defined in terms of the wild animals found there. Books like *Man-eaters of Kumaon*, tend to project a particular image of the region based on the availability of certain species of animals in the region. Francis Zimmerman, in his seminal work, *Jungle and the Aroma of Meats*, has constructed the details of the landscapes on the basis of the type of animals found in various regions.

The landscape experienced a different kind of change with the beginning of the colonial period. India's biological diversity was scientifically documented by the British. But it is also true that the policies of the colonial rulers greatly altered the character of the Indian landscape. Demand of timbre, initially for the ship-industry and later on for making the sleepers for the fast expanding railways, forced an unmanageable demand on the wood. Interior landscapes were penetrated to secure wood. When the impact of this reckless act became imminent, the cutting of

diversified natural forests was compensated by the cultivation of monoculture of commercially viable species. This penetration and promotion of commercial varieties changed the entire landscape of the region. Similarly, propagation of plantation economy in the southern and north-eastern part of the country led to extinction of natural forest cover replaced again by the monoculture of the commercial plants.

It is not only the forest cover, which provides a glaring testimony to the alteration in the landscape of the region. Creation of canal networks in parts of upper India and eastern India led to drastic change in the landscape of these regions. Rohan D'Souza has pointed out the changes in the Orissa delta due to construction of canals in the initial phase and later on railways to protect the imperial interests.

2.5 SUMMARY

The general features of Indian landscape and the changes in these features in the historical period have determined the types of human settlements in different areas and their subsequent growth. Annual deposition of rich alluvial soil in Indus gave rise to civilization and settlements that lasted in that region for nearly two thousand years. It was only when the need for expanding the agricultural base of the settlement was felt that a shift to the forested region of Doab occurred.There was then an expansion in the agricultural frontier and a simultaneous contraction in the forested areas. Unlike this the more settled South India saw the emergence of more clearly demarcated environmental regions in the form of *Mullai, Kurinji, Neytal* and *Marutam*. In a scenario of this kind the colonial control ushers in a process of major change in the landscape. The priorities change dramatically and development overtakes all other considerations. The landscape changes and often results in irreversible losses of vegetation forms. The lesson for us is: developmental priorities of a democratic country like ours should be decided keeping the concerns of environmental conservation and factors giving rise to degradation in the foreground.

2.6 EXERCISES

1) Trace the northern boundary of India and name the passes, which connect India with Tibet along with their location.

2) Name the major physiographic divisions of India and give an account of the surface features of the Himalayas. Describe the main surface features and drainage of (i) the Plains of Northern India and (ii) the Indian Plateau.

3) How does the surface configuration of the east coastal lowland differ from that of the west coastal lowland?

4) Describe the vegetation of India with special reference to the forest.

2.7 SUGGESTED READING

Daniel B. Botkin, *Discordant Harmonies: A New Ecology for the Twenty-first Century,* New York, 1990.

Gopal Singh, *A Geography of India,* Delhi, 2003.

R.L. Singh (ed.), *Regional Geography of India,* Delhi,2003.

Romila Thapar, *History of India*, Vol I, Penguin, 1966.

D.K. Bhattacharya, *Ecology and Social Formation in Ancient History,* Calcutta, 1990.

(We gratefully acknowledge that the source of the maps given in this Unit is O.H.K. Spate and A.T.A. Learmonth, *India and Pakistan: A General and Regional Geography,* Indian Edition, 1984, New Delhi.)

UNIT 3 SOURCES OF STUDY

Structure

3.0 INTRODUCTION

History of Environment is basically an exploration of society-nature interaction.The focus of this Unit is to do a general survey of the major writings on the environmental history of India. It is an interesting fact that the initial writings in the genre of environmental history focused primarily on the history of the humans without in any significant manner according space to environmental considerations. It was with the growth of 'scientific revolution' and 'enlightenment' in Europe that a shift in history writing became evident and the story of evolution, taking into consideration the environmental factors, began to find a discernible place. However, it was only in the period after the first world-war that historical writings incorporating geographical factors as influencing/shaping historical developments appeared. A systematic exploration in this direction started with the establishment of *Annales* School in France. It was here that the trend was initiated of investigating history in the wider context of the prevailing environmental conditions. Similarly, movement against the pollution provided space to environmental concerns in history writing in America. 'But despite all this, it is also the case that only in the past twenty-five years or so have historians methodically pursued a systematic exploration of this interchange (interchange of humans with their natural environment), in the process establishing a distinct branch of history: environmental history' (Brian Fay, 'Environmental History: Nature At Work' *History and Theory, Theme Issue, Environment and History,* Vol. 42, No. 4, December 2003 p.1).

In this Unit our focus is on the writings on environmental history of India. We have attempted a broad survey of the available major literature and have tried to discern, as clearly as possible, the trends therein.It should be noted that no single text serves the purpose of encapsulating all or most of the aspects and for this reason a detailed bibliography is attached for the enthusiasts.

3.1 SURVEY OF LITERATURE

"The words 'environment' and 'ecology' have been subjected to extensive

efforts at definition during the past twenty years or so. Already it has been found necessary to allow them space to breathe. So it is also with 'environmental history' or even 'Environment and History'. As with most commitments, it is possible to have 'hard' and 'soft' positions. The 'hard' might suggest that environmental history necessarily involves an examination of environmental dynamics through human agency in which the change is quantifiable in some shape or form. A softer approach would suggest, perhaps, that change could be inferred from even where data are not available. Interactions with environment may also be frozen in narrow time-scale where change is less significant. Relevant sections of legislation are all part of environmental history."

The above attempt to define environmental history by the editor of the *Environment and History* (John M. Mackenzie, Editorial, *Environment and History*, Vol, VII, No. 3, August, 2002) clearly reflects the dilemma of the present day historians working on environmental issues. A closer examination of the writings appearing under the rubric of 'Environmental History' makes it clear that the documentation of the ecological changes/ disturbances caused by the introduction of colonialism have dominated the discourse though there are a few important aberrations too.Most of the works on environmental history have located their study to analysing the disruptions in the traditional way of living as caused by forces and consequences of industrialisation. In the case of India these disruptions were caused by colonialism and some have continued even after independence. In general historians working on modern era have, along with economic exploitation, explored the exploitation of natural resources by the colonial power to cater to the interests of the mother country. The loss of natural flora and fauna and explanations of the causes and effects have been the major concerns of the environmental historians working on modern India.Further concerns of historians can be located in the debate initiated by the revisionist school of history writing and subaltern's attempt to explore the role of and impact on the marginal groups of society, largely ignored in the conventional history writing.

3.1.1 Methodologies

The above stated principles and concerns have been the defining features of the environmental history and these have been most vigorously put into practice in the case of forestry. Deforestation and associated climatic change has proved to be a vibrant zone.The conflict over classification of traditional rights and claims of tribals and their relationship with the state polity, initially with pre-colonial state and later on with colonial state have been useful add-ons. The domination of these issues in the environmental history can be gauged by the following acceptance by the editors of *Nature and the Orient*: "We make no apology for devoting so much of the book to the history of the relationship between forests, people and the state, and to the history of the discourse and ideology of colonial forestry in India, Burma and Malaysia. At the peak of its power the Indian Forest Department, for example, directly controlled over one-fifth of the land area of South Asia. Moreover, the forest history of the subcontinent and South Asia varies enormously from area to area, and

we feel it necessary to highlight these differences and make a start at producing a series of detailed and empirical environmental histories, concentrating quite deliberately on the forest sector".(From 'Introduction' in *Nature and The Orient*, Delhi, 1998).

The systematic beginning of environmental history writing in India that also set the tone for future writings is invariably associated with Ramchandra Guha and Madhav Gadgil's seminal monograph *This Fissured Land* written in 1992. The authors suggested that in pre-colonial India, resource utilisation was in harmony with nature and resource sharing among various strata of the society was very cordial. The caste society with different claims on different resources led to a state of equilibrium in turn providing stability to the resource demand and supply. Caste was seen as consisting of endogamous groupings that were each marked by a particular economic activity and a particular ecological niche. However, perhaps unintentionally, the notion of self-sufficient villages was also justified by such arguments. The analysis of the various environmental movements were explained in terms of disruptions caused by the British as it was argued elsewhere that in pre-British time 'there was little or no interference with the customary use of forest and forest produce' [Ramchandra Guha,'Forestry in British and post-British India: A Historical Analysis', *Economic and Political Weekly*, 20 (1985), p. 1893]. A romanticised image of the human-environment interaction in the Indian context was thus portrayed by Guha & Gadgil.

The transition from the study of events and watershed occurrences to the study of processes and explorations of deeper continuities from an ecological point of view was a gradual process. In this the concern shifted to asking how and why certain kinds of livelihood patterns or production methods survived and how others were transformed. By replacing the study of events thus the processes had begun to occupy the center-stage.

The relative neglect of the colonial impact on the land by professional historians made it an obvious field for early inquiry. Moreover, early writers were more concerned with the protection of environment as they had been actively supporting the cause of conservation of environment. Thus they looked for evidences of popular protests against the exploitation and often neglected the contrary evidence. South Asian works have often focused on certain themes at the expense of others: the forest rather than agriculture, movements of A*divasis* and marginal peasants rather than changing responses of urban dwellers, histories of irrigation as opposed to conflict over water-rights, etc.

There have been a few exceptions though to this general trend. Sumit Guha has tried to bridge the gap between pre-British and British period. His area of study has been the region dominated by Marathas where rich repositories of Maratha documents have been put to excellent use. At the same time he has also avoided the illusionary divide between forest and agriculture and notions of ethnicity in the wider context of environment.He has demonstrated with fresh evidence that tribal polities

did not evolve in isolation (Sumit Guha, *Environment and Ethnicity*, Cambridge, 1999).

Further, Sumit Guha has pointed out that the large areas of Western plateau (Maharashtra) outside the rain drenched Konkan coast were rendered treeless even during the heydays of Marathas. The pattern of living has modified the environment of the region as he demonstrates that the use of fire and the keeping of cattle were practiced here for at least forty centuries, if not more. In the process a thorny forest region was transformed into seasonal grass-land: the ecology was re-shaped in major ways. The fluidity was more than matched in economic terms. Dry spells could lead to a resurgence of herding.

In the attempt to analyse the deeper continuity Sumit Guha has relied upon archaeological as well as anthropological evidences to substantiate historical evidence thereby stressing the significance of processes rather than watersheds or events.

He has argued that it is important to keep in mind that in South Asian past relatively small area was under permanent tillage and the much larger percentage of land was often in the state of transition at least in the pre-modern period. In the analysis of state's perspective of land it has been pointed out that even in pre-British period 'the rulers, like the Marathas, saw the forest as an obstacle: tree cover multiplies the danger from robbers, rebels and tigers'. Jungle clearance has been equated in terms of fresh revenue possibilities though it had been an arduous and difficult task.

In another work, by Nandini Sinha for the region of Mewar (*State Formations in Rajasthan: Mewar during the seventh- fifteenth centuries*, Delhi, 2002) similar themes have been explored.She asserts that forested and hill regions were integrated into wider imperial systems of South Asia. Moreover the panorama of economic activities in any sub-region was far more diverse than is often realised. There were no clear-cut stages or phases like hunter-gatherer, herder, settled cultivators and artisan and city dweller.

3.1.2 Colonial Period

It is important to note that the whole discourse of colonial historiography has been and its later proponents have tried to analyse history in terms of 'evolutionary' time scale where succession from primitive to tribal to chieftaincy to state has been a unidirectional and mutually contradictory process (Ranajit Guha, '*History At The Limit of World-History*, New Delhi, 2003. He has highlighted the limitations of modern historiography in terms of over concern for 'statism'). In this context Ajay Skaria's writings deserve serious consideration as there the notion of wild has been seen in terms of opposition to civilised. The relationship between tribal people and state has also been located in terms of interaction between civilised and primitive.

Ajai Skaria highlights the general negligence of marginal areas and

laments the lack of importance given to traditional issues. He tries to locate the problems of marginal issues in the context of politics of growth and finds that the same is important for the construction of ideas such as jangali/tribal/primitive. He questions the notion whereby tribals were equated with 'wild' and 'primitive' and settled agriculture (under the patronage of state) with civilisation. He also explores the inter-dependence between state and tribal polities where revenue rights and authority were shared in a complex web of relationship.There has now been an attempt to question the notion of a uniform British policy all across India and recent researches have pointed out that there was a serious divergence of views on policies related with the forest/land/ agriculture. (Ajai Skaria, 'Being Jangali: The Politics of Wilderness', *Studies in History*, Vol. 14, No. 2 n.s. 1998, pp. 193-215.Also Ajai Skaria, *Hybrid Histories: Forests Frontiers and Wildness*, Delhi, 1998.)

Sivaramakrishnan's work is a further advance on the issue of forests and the colonial policy. He tries to locate the issue within the context of the debate that ensued with the attempt to formulate Private Forest Bill between 1865 and 1878. Underplay of various social, economic and environmental concerns made the whole debate so complex that ultimately the bill could not be formatted. The major issues involved in this debate were property rights sanctioned by permanent settlement and that now any attempt to withdraw or curtail the same would lead to greater resentment. These forests were often termed as Jungle Mahal, hence accepted as private property. This was the period when forests were sought after due to wood, which was in great demand because of railways. Initially with the formation of permanent settlement it was expected that marginal lands would also be put to better and positive uses but it was not the case in eastern India, so there was a demand for a private forest policy. There were conflicting issues at stake. On the one hand attempt was made through permanent settlement to maximise land revenue but soil conservation and forest produce were also important. The other conflict visible was the claims of the raiyat over the forest produce, which were recognised by tradition. The landlords on the other hand argued that it lead to degradation of forests and soil erosion. Conversion of private forests to protected forests would lead to the denial of claims to raiyat but would meet the simultaneous demand generated by expanding railways further complicating the issue of traditional claims *versus* commercial exploitation. The importance of his approach lies in a thorough exploration of conflicting interests vis-a-vis natural resources. There were several claimants and the state had to consider several probabilities before arriving at any formal policy. He also examines the debate over environmental considerations.It was not only scientific knowledge (about forests) which participated in the debate but various self interests also tried to appropriate the issue and mend the policy in their favour. (K. Sivaramakrishnan, 'Conservation and Production in Private Forests: Bengal, 1864-1914', *Studies in History*, Vol. 14, No. 2 n.s. 1998, pp. 237-264. Also see K. Sivaramakrishnan, *Modern Forest*).

Similarly, Ravi Rajan points out the internal divisions in the colonial

perspective. The so-called colonial policy has not been a monolithic structure and there were quite evident heterogeneous views. The author has very clearly pointed out internal divisions in colonial policy by examining the deliberations at the Empire Forestry Conference on two crucial colonial agro-ecological policy concerns, shifting cultivation and soil erosion, during 1920 to 1950. The problem of conservation of forest- wild had been of immense significance especially in the 1930s due to the experience of 'Dust Bowl'. Examples from West Africa were cited to point out the benefits of shifting cultivation but it was put aside by citing the nature of forests in India. 'The political damage caused by shifting cultivation was its inducing nomadic habits on parts of the local population, discouraging agricultural progress and facilitating the evasion of taxes'. The problems caused by shifting cultivation were not only of tax evasion but the larger issue of timber trade/supply to cater to the needs of British was also at the centre-stage . The problem of soil erosion was caused by the cutting of forests for commercial use and the clearing of land for agricultural purposes. It was further fuelled by the ever-increasing population pressure and overgrazing. To tackle the problem, scientific studies were encouraged, but, 'given the social roots of the technological experts, it was asserted that the nature of their technical intervention was by no means value neutral'. (Rajan S. Ravi, 'Foresters and the politics of colonial agro ecology: The case of shifting cultivation and soil erosion, 1920-1950', *Studies in History*, Vol. 14, No. 2 n.s. 1998, pp. 217-236).

The reconstructions of forest histories also need to pay close attention to local and regional peculiarities. Ajit Menon has pointed out that 'the forest-dependent communities view land in terms not so much of ownership but of use.' He suggests that the process of colonisation depends both on the state's ability to take over large areas of land and the ability of local communities to shape the state's initiatives to at least some extent. It is significant that the manner in which state policies reach local communities in the Kolli hills continues to be determined by the latter's reception and response. [Ajit Menon, 'Colonial Constructions of 'agrarian fields' and 'forests' in the Kolli Hills', *The Indian Economic and Social History Review,* 41, 3 (2004), pp 315-337].

The attempts to challenge the portrayal of adverse role played by British by arguing that it was the British who initiated systematic forest conservation policy in India is another significant area of Indian environmental history. It has been argued that, "the original 'greens' in India were in fact colonial officials.Colonial forest policy … was rooted in an enlightened understanding of environmental issues developed in particular by a group of remarkable Scottish medicos serving in the colonies, who sought initially to understand the connection between climate and health, but very quickly became experts in botany and ecology. They argued that there was a close connection between deforestation and environmental desiccation and pressed strongly for state-led conservation of forests. Through their pressure, the earlier *laissez-faire* attitude towards forests was replaced from the mid-19th century onwards

by active management and control". (From David Hardiman's review of *Nature & The Orient in Economic and Political Weekly*, issue dated July 3-9, 1999).

The state-led conservation of forests was legitimised under the guise of imparting modern knowledge or banishing the forest-dwellers from their habitat for harming the forests. A balance between agriculture and forests could be achieved by identifying lands suited to the agriculture and marginal land could be developed as forests. The primacy of agriculture was thus quite evident. The availability of ground water was also a related issue often combined with the soil erosion. At times forest growth was considered harmful for ground-water as it sustained itself on the ground water only. (Rajan S Ravi, 'Foresters and the politics of colonial agro ecology: The case of shifting cultivation and soil erosion, 1920-1950', *Studies in History*, Vol. 14, No. 2 n.s. 1998, pp. 217-236.)

It clearly brings out the fact that colonial concerns with respect to forests were principally guided by covert economic considerations though overtly predominated by the objective of conservation. The debate over conservation of environment was traced to the literary traditions of romanticism where nature in its pristine form was aspired. The environment was to conserve to protect the environment in its natural conditions. Similarly, the aboriginals of the forests were to be protected so as to conserve the primitive form of environment. (Archana Prasad, *Against Ecological Romanticism: Verrier Elwin and the Making of Anti-modern Tribal Identity*, New Delhi, 2003.)

Another area of exploration has been the analysis of the various policies having a bearing on the environmental issues. Vasant Saberwal has made a major contribution in this field. He argues that 'there is growing recognition within the academic ecological community of the complexities of ecosystem functioning and the limits to our predictive and explanatory capabilities with regard to large-scale ecological phenomenon'. His explanation brings it out that the concerns for conservation evolved over a long period of time along with the growth in the scientific knowledge about environment. The role of the state in the appropriation of scientific knowledge in support of its claims by the state has also been pointed out by him. He writes: "This essay examines the chronological progression of the desiccation debate, and I have located my analysis in the broader scientific context within which these ideas were articulated during the late 19th and early 20th century. I explore the connection between a scientific paradigm of a given era, and bureaucratic use of this discourse on Himalayan degradation, the institutional context within which the discourse has taken place, has in a sense, shaped or directed the discourse. Over-time, one observes a two-way process whereby bureaucracies may use science to inform a particular rhetoric; at the same time bureaucratic rhetoric comes to influence the scientific discourse itself, and thereby the very nature of science". ['Science and the Desiccationist Discourse of the 20th Century', in *Environment and History* 4, 3 (1997), pp. 309-43].

The changing history of the encounters of humans and animals has become another field of growing interest, both in terms of changing elite taste and of ground level conflicts and co-existence. In this context, *The End of Trail: The Cheetah in India* (Divyabhanusinh, New Delhi, 1999) stands out. The author has attempted to trace the history of Cheetah in India, its origin, spatial distribution, attitude towards the animal, gradual erosion of space for the big animal and finally the extinction of the specie. It is an important contribution that helps in a comprehension of complex relationships between fauna and the society, especially the explanation that the extinction of the animal was caused by the side-effect of the larger historical process and not as a direct process of elimination of the species as it was for other 'big games'.

The picture will be sharper if we simultaneously examine the work of Mahesh Rangarajan. ('The Raj and the natural world: The war against 'dangerous beasts' in colonial India', *Studies in History*, Vol. 14, No. 2 n.s. 1998, pp. 265-299.) Rangarajan has analysed how and why certain types of animals were directly targeted and consequently became extinct. Apparently, the very simple process of agricultural expansion has resulted in the gradual erosion of space for big animals. The shrinkage of the hunting area forced the animals to move in the closer proximity of the humans resulting in violent encounters. The availability of technology placed society of the early colonial period in a better position to combat the 'dangerous beast'. How these dangerous beasts became dangerous and how human action liberally contributed in this was not the concern of the contemporary society. At another level the article also traces the possible political uses of this controversy as it became a tool to secure the right to carry arms even if it was prohibited by the civil authority.

Understanding of environmental issues through in depth regional histories has become the other area of exploration. The interplay of regional identity and ecological niche has come into sharper focus than in the past. It is interesting that there have been a few detailed micro-histories of a particular range of hills, a watershed or a valley system, a reserved forest or a princely reserve.

There have been several useful works on pastures, fields and forests of colonial and contemporary Rajasthan. But except for passing references in studies of agrarian production few have examined the dynamics of water management in Rajasthan prior to 1800. (Ann Grodzins Gold & B.R. Gujjar, *In The Times of Trees and Sorrows: Natural, Power and Memory in Rajasthan*, Durham, Duke University Press, 2002; N.S. Jodha, *Life on the Edge: Sustaining Agriculture and Community Resources in Fragile Environments*, New Delhi, Oxford University Press, 2001). Primary concern of Jodha has been to examine 'the changing status and usage pattern of natural resources… and the possibilities of arresting their negative trends characterising these changes'. P.S. Kavoori, (*Pastoralism in Expansion: The Transhuming Herders of Western Rajasthan*, Delhi, Oxford University Press, 1999) has explored the issue of 'common property resources' by examining the conditions of the

pastoralists in the contemporary Period. Similarly, R. Thomas Rosin has found a relative shortage of the 'common grazing land' and the stress over the sedentary lifestyle has reduced the opportunities for the pastoralists. By the same token, it also reduce the opportunities available with the peasantry in times of drought and famine. (R. Thomas Rosin, *Land Reforms and Agrarian Change: Study of a Marwar Village from Raj to Swaraj*, Jaipur, Rawat Publications, 1987). Similarly, for the later period, conflicts over natural resource use have been extensively investigated, i.e., forest protection and conservation *versus* extension of settled cultivation. (Rajan S. Ravi, 'Foresters and the politics of colonial agro-ecology: The case of shifting cultivation and soil erosion, 1920-1950', *Studies in History*, Vol. 14, No. 2 n.s. 1998, pp. 217-236. K. Sivaramakrishnan, 'Conservation and production in private forests: Bengal, 1864-1914', *Studies in History*, Vol. 14, No. 2 n.s. 1998, pp. 237-264).

There are several studies highlighting the problems with the British policies with regard to the forest management where monoculture has been a major issue and the exploitation of natural resources for a distant elite who was least concerned with the social impact of such policies, a matter of great concern.

The other strand in these studies for the forested region has been the analysis of impacts on the tribes living on the periphery of the settled agriculture. It is significant in the sense that since the tribes were not adhering to the practice of settled agriculture the British were not able to tackle the tribes. (Sumit Guha, *Environment and Ethnicity in India, 1200-1991*, Cambridge University Press, Cambridge, 1999.) The resistance offered by these tribes to the British policies have been extensively examined and it has been argued that British were unable to comprehend the complex functioning of their social relationships.In most of the cases, the problem can be located in a difference of vision of landscape shared by the British and the reality of Indian landscape. In other words, the nature of political intervention influences the nature of colonial discourse on ethnicity, environment and resource exploitation.

3.1.3 Pre-Colonial Period

The broad survey of the writings on the environmental concerns in India cannot ignore the contributions made by historians working on pre-colonial period. The issue of marginal has been addressed with special reference to pastoral, tribal, hunter, etc. Francis Zimmermann has examined ancient texts to construct the ecology of the period. He has questioned the practice of equating the term *Jungle* with the forest. Zimmerman has explored the suggestive ecological references from the ancient texts where animals are classified in two groups: *jungla* "those of the dry lands," and *anupa*, "those of the marshy lands" and pointed out that by closely examining such texts we can infer a great deal about the ancient ecology. (Francis Zimmermann, *The Jungle & the Aroma of Meats: Ecological Themes in Hindu Medicine*, London, 1989. Similar

trends are visible in Roger Jeffery ed., *The Social Construction of Indian Forests*, Manohar, New Delhi, 1998).

Following more conventional path, Aloka Parasher-Sen has tried for the Mauryan period to 'understand how the state perceived the forest dwellers and sought to subordinate and assimilate them. Geography and the perceived existence of the hostile tribes defined the frontiers of the empire and both had to be mastered for the expansion and integration of the state'. [Aloka Parasher-Sen,'Of tribes, hunters and barbarians: Forest dwellers in the Mauryan period', *Studies in History*, 14, 2, n.s. (1998). pp.173-191.Also Shereen Ratnagar, 'Pastoralism as an Issue in Historical Research', *Studies in History*, 7, 2, n.s. (1991). pp.181-193]. The other major concern has been the study of social formations and it has been influenced by the methodologies and tools deployed by anthropology and archaeology. (R. Ray, *Ancient Settlement patterns in Eastern India*, Delhi, 1987, M.L.K. Murthy, 'Environment, Royal Policy and social formations in the Eastern Ghats, South India', *Indian History Congress*, Delhi, 1993, pp. 615-631, D.K. Bhattarchaya, *Ecology and Social Formation in Ancient History*, Delhi, 1990). Ranabir Chakravarti has highlighted the role of hydraulic management in the process of settlement in ancient period, ('The Creation and Expansion of Settlements and Management of Hydraulic Resources in Ancient India', in Richard Grove, Vinita Damodaran and Satpal Sangwan, (eds.), *Nature and the Environment*, Delhi, 1998, pp.87-105).

Few writers have probed the significance of pre-colonial water systems (David Ludden,'Ecological zones and the cultural Economy of irrigation in Southern Tamilnadu', *South Asia*, Vol.-I, No. I, 1978, p. 1-13. and Burton Stein, *The New Cambridge History of India, Vol. 2, Vijayanagara*, Cambridge, Cambridge University Press, 1994; *Peasant State and Society in the Medieval South* India, Delhi, Oxford University Press, 1980); this is especially true of north and northwest India. In most of these studies scholars have stressed the role of traditional village community in construction and maintenance of irrigation mechanisms. David Hardiman suggests, that 'small-dam systems of irrigation existed in the past which were sustained over long periods of time… by community based control.' (David Hardiman, 'Small Dam Systems of the Sahyadris' in David Arnold and Ramchandra Guha eds, *Nature, Culture, Imperialism: Essays on the Environmental History of South Asia*, Delhi, Oxford University Press, 1995. pp. 185-209). In the same vein Elizabeth Whitecombe has argued that irrigation ''works were financed by loan capital. Hence, in the sanctioning of constructions the emphasis was necessarily placed on the prospect of their remunerativeness." ('The Environmental Costs of Irrigation in British India: Waterlogging, salinity, malaria', in David Arnold, and Ramchandra Guha eds. *Nature, Culture, Imperialism: Essays on the Environmental History of South Asia*, Delhi, Oxford University Press, 1995. p. 237-259). David Mosse has examined the interplay of 'developmental politics' to explain the level and process of state intervention. The role of community based programmes to tackle contentious issues like management and allocation of 'common property resources' like water bodies, etc. have also been

examined. (David Mosse, *The Rule of Water: Statecraft, Ecology and Collective Action in South India*, New Delhi, Oxford University Press, 2003.pp.1-27). Water systems have been examined by R.J. Fisher, (*If Rain Doesn't Come: An Anthropological Study of Drought and Human Ecology in Western Rajasthan*, Delhi, Manohar, 1997) and Tripta Wahi, ('Water Resources and Agricultural Landscape: Pre-colonial Punjab', in Indu Banga ed., *Five Punjabi Centuries: Polity, Economy, Society and Culture, c.1500-1990*. Delhi, Manohar, 1997).

As we move further back in medieval India we discover a general dearth of scholars focusing on environment and on man-environment interaction.We may refer to the two initial chapters in *the Cambridge Economic History of India*, Volume I (ed. Tapan Ray Chaudhuri and Irfan Habib, CUP, 1982) by Irfan Habib and Burton Stein on 'The Geographical Background' (especially of North India) and 'South India: Some General consideration of the Region and its Early History' respectively as studies located on the fringe of environmental history. Another study, by Harbans Mukhia, entitled 'Was There Feudalism in Indian History?' also explores influences of environmental factors on human settlement and social formations as a sub-theme and not as the central subject. (Presidential Address, Medieval India Section, *Indian History Congress*, 1982). In fact closest to the field of environmental history is Shireen Moosvi's useful study 'Ecology, Population Distribution and Settlement Pattern in Mughal India in 1989 [Man and Environment, XIV (I), 1989, pp 109-116].One can also refer to an article by Mohd. Afzal Khan published in 2002 ['Environment and Pollution in Mughal India *Islamic Culture*, LXXVI (Vol.76), No.1, January 2002, pp 101-116].

A serious influence on the man-environment studies in medieval India has been that of the *Annales*. Influences of environment on the social formations have been a major area of exploration for the *Annales*. Since the very beginning of the movement, we can trace the attempts made by contributors to explore the newer kinds of sources to analyse the role played by environment in historical developments. They have tried to place the role of environment in the wider settings of social formations and have not remained confined to the colonial impact only. They also attempt to transcend the barrier of medieval and modern history and have been more comfortable with the whole range of human activities in place of mainly the political history.

Harbans Mukhia is credited with making *Annales* popular in India by translating the writings of French historians along with Maurice Aymard (*French Studies in History,* Vol. I- *The Inheritance* New Delhi 1988 and Vol. II- *The Departure*, Sage, New Delhi 1990). The influence of the *Annales* tradition is visible in an important contribution made by Chetan Singh. He has explored the relationship between environment and society in Western Himalaya: "…But my project rested on the belief that there were some long established and well understood relationships between society and its physical surroundings. … Such fundamental relationships did, indeed exist: a society could hardly have survived for any length of time without them. It was, however the clear-cut enunciation

of these relationships that was missing. This required the deliberate elaboration both of socio-economic processes and specific ecological environment within which they operated". (Chetan Singh, *Natural Premises: Ecology and Peasant Life in the Western Himalaya 1800-1959*, Delhi, 1998).

Similarly, Mayank Kumar has also attempted to examine the interaction between environment and society in medieval Rajasthan. He has questioned the notion that the traditional societies always practiced the methods aimed at a prudent use of natural resources and has cited several cases of exploitation of nature by traditional societies in Rajasthan. He also cautions that the magnitude of exploitation of natural resources did multiply manifold under the impact of Industrial Revolution, (*Environment and Society in Medieval Rajasthan*, unpublished Ph.D. thesis, Jawaharlal Nehru University, New Delhi, 2001).

In any attempt to track the interaction between humans and environment one should be careful to avoid the notions of geographical determinism. It is a major cause of concern for the historians dealing with middle ages. Febvre suggested that 'there were no necessities, only possibilities. A river might be treated by one society as a barrier, yet as a route by another.' (Peter Burke, *The French Historical Revolution: The Annales School, 1929-89*, Cambridge, 1990). Similarly, one should not over stress the role of human agency in influencing the environment. Ramchandra Guha and David Arnold have suggested: "Moving more firmly within the parameters of environmental history *per se*, there is the study of human engagement over time with the physical environment, of the environment as context, agent, and influence in human history. Here, nature figures unabashedly as human habitat, but in a dual capacity. On the one hand are ranged those elements of nature-climate, topography, animal and insect life, vegetation and soils-which directly or indirectly shape human activity and productivity. In affecting land-use and subsistence, they help to promote or prohibit specific forms of social structure, economic organisation and belief systems. They also extend the margins of historical analysis and bring centre-stage a 'cast of non-human characters' normally ignored, at least until recently. …But the relationship is a reciprocal one, for man more than any other any other living organism also alters the landscape, fells tree, erodes soils, dams streams, kills off unwelcome plants and predatory animals, installing favoured species in their stead". (David Arnold & Ramchandra Guha, 'Introduction: Themes and Issues in the Environmental History of South Asia', in David Arnold & Ramchandra Guha (eds.), *Nature, Culture, Imperialism: Essays on the Environmental History of South Asia*, Delhi, 1995, p.2.). Such works would have to delve into a wider set of sources: folksongs and legends, music and lore, locating these against the changing backdrop of human-nature encounters. This would mean looking at both culture and nature, howsoever defined, in new ways.

3.2 SUMMARY

The above survey of the literature can at best be treated as cursory as it

is not possible to examine all or even most of the writings on environment within the frame of a Unit. Recently, we have witnessed the growth of anthropological works to examine the contemporary social understanding of past environments. At the same time there has been an ever-growing trend of field-study based works conducted to examine the feasibility of development policies with respect to environment. Here a survey has been conducted to map out the beginning of writings on the environment of the past. It also examines the change in the methodology adopted to explore the hidden past and ecological context suggested by the sources. It is also for you to realise that the writings on environmental history simply demand closer examination of evidences and search for the non-human components of our past.

3.3 EXERCISES

1) Discuss briefly the nature of writings on environmental history in the colonial period.

2) Examine the characteristic features of the literature on environment focusing on the pre-colonial period.

3.4 SUGGESTED READING

Agarwal, A. and Sivaramakrishnan, K. eds., *Social Nature: Resources, Representations and Rule in India,* Delhi, 2000.

Bhattacharya, D.K., *Ecology and Social Formation in Ancient History*, K.P Bagchi & Company, Calcutta, 1990.

Bloch, Marc., *Feudal Society,* tr., L.A. Manyon, London, 1961.

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Botkin B. Daniel, *Discordant Harmonies: A New Ecology for the Twenty-First Century*, New York, 1990.

Braudel, Fernand, *Civilization and Capitalism, 15th-18th Century,* Vol. I The *Structure of Everyday Life;* Vol. II *The Perspective of the World*, tr., Sian Reynolds, London, 1985.

Braudel, F. *Mediterranean and the Mediterranean World in the Age of Philip-II*, Vol-I, tr., Sian Reynolds, Britain, 1981.

Buchy, M, *Teak and Arecanut: Colonial State, Forests and People in the Western Ghats, 1800-1947*, Delhi and Pondichery, 1996.

Divyabhusinh, *The End of Trail: The Cheetah in India,* revised second edition, Delhi, 2001.

Environment and History, *History and Theory, Studies in the Philosophy of History*, Vol. 42, Number 4, December 2003.

Grove H. Richard, Damodaran Vinita and Sangwan Satpal, eds., *Nature and The Orient*, Oxford University Press, Delhi, 1998.

Jeffery R.N., Thin and N Sunder, eds., *Branching Out: Joint Forest Management in India*,Delhi, 2001.

Jeffery R. and N Sunder, eds., *A New Moral Economy for India's Forests? Discourses on Community and Participation*, Delhi, 1999.

Jeffery Roger (Ed.), *The Social Construction of Indian Forests*, Manohar, New Delhi, 1998.

Ladurie, Emmanuel Le Roy, *The French Peasantry- 1450-1660*, tr., Alan Sheridan, Aldershot, 1987.

Ladurie, Emmanuel le Roy, *The Mind and Method of the Historian*, tr., Sian Reynolds and Ben Reynolds, Chicago, 1981

Le Goff, J. ed. *Medieval Callings*, translated by Lydia G. Cochrane, University of Chicago Press, Chicago, 1990.

Madsen S.T. ed., *State, Society and Environment in South Asia*, London, 1999.

Poffenberger, M. and B. McGlean, eds., *Village Voices, Forests Choices: Joint Forest Management in India*, Delhi, 1996.

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