ENVIRONMENTAL HISTORY OF INDIA

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Unit-1

Introduction to Environmental History – Habitats in Human History: Modes of Production and Modes of Resource Use – Schools of Thought in Ecology: Marxist, Gandhian, Eco-Feminism, Anthropocene.

Objectives

- **To interplay between Habitats and Human History.**
- **To Modes of Resource use in Historical Contexts Investigates.**
- **To Understand Ecological perspectives through Various Schools of Thought.**

Like every other subset of history, environmental history is different things to different people. The author's preferred definition is: the history of the relationship between human societies and the rest of nature on which they depended. This includes three chief areas of inquiry, which of course overlap and have no firm boundaries. First is the study of material environmental history, the human involvement with forests and frogs, with coal and cholera. This entails study of the evolution of both human impact on the rest of nature and nature's influence upon human affairs, each of which is always in flux and always affecting the other. This form of environmental history puts human history in a fuller context, that of earth and life on earth, and recognizes that human events are part of a larger story in which humans are not the only actors. In practice, most of the historical work in this vein concerns the last 200 years, when industrialization among other forces greatly enhanced the human power to alter environments.

Second is political and policy-related environmental history. This concerns the history of self-conscious human efforts to regulate the relationship between society and nature, and between social groups in matters concerning nature. Thus efforts at soil conservation or pollution control qualify, as perhaps do social struggles over land and resource use. Political struggle over resources is as old as human societies and close to ubiquitous. The author would not use the term environmental history to refer to contests between one group of herders and another over pastures; but he would use the term to refer to struggles over whether a certain patch of land should be used as pasture or farmland.

The difference lies in the fact that the outcome of the struggle carries major implications for the land itself, as well as for the people involved. (Mind you, others see this differently than

the author). In practice, policy-related environmental history extends back only to the late nineteenth century, with a few exceptions for early examples of soil conservation, air pollution restrictions, or monarchical efforts to protect charismatic species for their own hunting pleasure. This is because only in the late nineteenth century did states and societies mount systematic efforts to regulate their interaction with the environment generally. Because these efforts were spasmodic and often modest in their effects, most of this sort of environmental history deals with the decades since 1965, when both states and explicitly environmental organizations grew more active in their efforts.

The third main form of environmental history is a subset of cultural and intellectual history. It concerns what humans have thought, believed, written, and more rarely, painted, sculpted, sung, or danced dealing with the relationship between society and nature. Evidence of a sort exists from tens of thousands of years ago in Australian aboriginal rock shelter paintings, or in the cave art of southwestern Europe. But the great majority of this sort of work is drawn from published texts, as with intellectual history, and treats the environmental thought contained either in major religious traditions or, more commonly, in the works of influential (and sometimes not-so influential) writers from Mohandas K. Gandhi to Arne Naess. This sort of environmental history tends to focus on individual thinkers, but it extends to the study of popular environmentalism as a cultural movement.

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past land use practices). The subject matter of environmental history is often just the same as the subject matter in historical geography or historical ecology, although the sort of sources emphasized normally differs. An illustration is the field of climate history, which is pursued by scholars from at least half a dozen disciplines, including text-based historians. Unlike natural science, most environmental history has to date been done by individual scholars, rather than by teams.

The Origins and Institutionalization of Environmental History

Like every twist and turn within intellectual life, environmental history has countless and tangled roots. Some of the earliest extant texts, such as the Epic of Gilgamesh, deal with environmental change generated by human action (cutting cedar forests in this case). Many scholars of long ago, notably Bin Chaldean and Montesquieu, found in the variations in the natural world, climate especially, a key to human behavior. Historical geographers since the 1870s charted landscape change, especially in Europe. For professional historians, awareness of geographical constraints and influences has long been a hallmark, although not a universal. Fern and Braudel, in what was probably the twentieth century's most influential book among professional historians, devoted a large chunk of La Mediterranean to geography and environment.

But environmental history as a self-conscious undertaking dates only to about 1970 and, like so much in intellectual life, drew its energy from society at large. Around the world, of course, the 1960s and 1970s witnessed the coalescence of popular environmentalism as a cultural and political force. It was stronger in some place than in others, and took different shapes in different contexts. In the United States it helped a few historians, initially almost all of whom were scholars of U.S. history, to come together both intellectually and institutionally to launch environmental history as a self-conscious undertaking. Among them were Roderick Nash, John Opie, Donald Worsted, Susan Flader and a historian of the ancient Mediterranean, Donald Hughes. By some accounts Nash, author of Wilderness and the American Mind, an intellectual history of an environmental subject, was the first to employ the term "environmental history".

Between Nash's book and 1985 a small handful of books acquired status as foundational texts in U.S. environmental history. The first was Alfred Crosby's Columbian Exchange, one of the few books whose title became part of nearly every Anglophone historian's vocabulary. Revealingly, Crosby had great difficulty finding a publisher for a book that revealed the

extraordinary ecological consequences of the regular crossing of the Atlantic after 1492. At that time, a history book that paid close attention to viruses, grasses, and pigs seemed (at least to acquisition editors) too unorthodox to take seriously. But Crosby's book found an audience and remains in print after nearly four decades.

Worsted's Dust Bowl took an iconic subject in US history and gave it a new twist, mixing careful consideration of climate patterns, soil characteristics and other ecological factors into the story. William Cronon's Changes in the Land, which explored the transformations of the southern New England landscape between 1600 and 1800, enjoyed great success and inspired several imitators. Worsted and Cronon soon became the most influential figures in U.S. environmental history, joined by Richard White, who like Cronon featured Amerindians prominently in much of his work, and Carolyn Merchant, who put women front and center. Martin Melosi and Joel Tarr pioneered urban environmental history in the U.S. context.

Primarily through the work of these leading scholars, environmental history won a place on the crowded stage of U.S. history. Of new sub-fields in U.S. history, only women's history has enjoyed fuller acceptance. Only in India, the author believes, have environmental historians attracted the attention of their fellow historians as successfully as in the U.S.

These U.S. scholars, who continued to produce influential work, attracted international attention too. Historians around the world contemplating taking an environmental turn often read them, especially Worsted and Cronon, while formulating their own projects. Worster's work on droughts and irrigation, for example, seemed relevant in many settings outside the United States. The themes of cultural clash and colonization, developed in Cronon's, Crosby's, and White's work, found interested readers among those writing about colonial encounters in Asia and Africa. White's concept of a 'middle ground' seemed helpful to scholars of medieval Central Europe and to Tokugawa Japan.

Part of the influence of the U.S. authors must be attributed to institutional factors. The first generation formed the American Society for Environmental History in 1976-77 and by the early 1980s held regular conferences. Most importantly, the ASEH began publishing a journal, now called Environmental History, in 1976. Moreover, as in all fields of history, the Americans enjoyed advantages in the form of the general vigor and (comparatively) generous funding of US academia, and in the fact that so many historians around the world could read English (this, obviously, boosted the fortunes of all Anglophones, not merely those in the U.S.)

In contrast, the institutionalization of environmental history came later elsewhere. For example, the European Society for Environmental History began regular meetings in 2001. SOLCHA, the Society for Latin American and Caribbean Environmental History, began operations in 2003. A Canadian network of environmental historians (NiCHE) took shape in 2006-7, as did the Association of South Asian Environmental Historians (ASAEH). An umbrella organization for environmental history around the world formed in 2006-2008 and oversaw the first world congress of environmental history, held in Denmark in 2009.

The Environment and History

Which published chiefly British, European, and imperial environmental history, started up in 1995. A Dutch and Flemish journal Tijdschrift voor Ecologist Geschiedenis, became a regular annual in 1999. A Czech internet journal, Klaudyán, began publication in 2000. In 2004 the Croatian journal Ekonomska i ekohistorija was launched, as was an Italian one, I Frutti de Demetra. An Italian-based but internationally focused journal, Global Environment, began publication in 2008.

In every respect, the Americans enjoyed a firmer institutional footing sooner than environmental historians elsewhere. Numerically, Americanists still loom large in the early 21st century, and at a guess accounted for roughly half of the environmental historians around the world as of 2010.

'Habitat and Learning' is the theme of a focus group set up as part of the National Curriculum Review process. Habitat is where any specie finds conditions that permit it to thrive. Learning is a vital faculty of all animal species. First and foremost, animals learn about the features of their own habitat, picking up clues as to where they may expect to find food, where they may expect to encounter enemies, and where they may expect to meet social companions. For our ancestors, knowledge thus began with the exploration of their habitat. In that sense, this focus group may be said to be at the centre stage of education, an enterprise dealing with knowledge. Humankind's knowledge thus began with the exploration of its habitat and its features. This knowledge has great survival value, as was recently brought home to us by the ability of people living close to nature to more effectively escape the fury of the 26 December 2004 tsunami. But as human beings' controls over the environment has increased, and as people have begun to mould the world more and more to suit their needs, this component of knowledge has diminished. So much so that today formal education has become largely alienated from the

habitat of the students. But as environmental degradation proceeds at an unprecedented pace, we are beginning to realise the importance of taking good care of our habitat. Humankind must, therefore, make an attempt to comprehend its roots, to re-establish links with its habitat, and to understand and take good care of it. In substance and spirit, then, the theme 'Habitat and Learning' is equivalent to EE. The formal curriculum of 'Habitat and Learning' needs, therefore, to be developed within the framework of EE. Environmental contexts abound in diversity. EE cannot, therefore, be straitjacketed, but rather must emphasise continual inquiry. An important challenge before us is to inject into the learning process a spirit of questioning, to rid it of rote learning and of unquestioning acceptance of authority. Rather, the process of EE must become a vehicle for engaging young minds in the excitement of first-hand observation of nature, of understanding patterns and processes in the natural and social worlds, indeed, of participating in the enterprise of generating knowledge about this world.

Mode of Production and Modes of Resource Use

This concept was first introduced by Karl Marx in his efforts to theorize the overall structure and dynamic of capitalism. It has since been widely used, mainly in Marxist political economy and historical studies, to analyse various economic systems. Although there is broad agreement on its general field of application, different approaches exist towards defining and distinguishing particular modes of production. Some of the resulting problems are considered below.

Marx used the concept of mode of production in two main ways; to analyse the economic base and to describe the overall structure of societies. Thus he employed it to specify the particular combination of forces and relations of production which distinguished one form of labour process and its corresponding form of economic exploitation from another. He also employed it to characterize the overall pattern of social reproduction arising from the relations between the economic base (comprising production, exchange, distribution and consumption) and the legal, political, social and ideological institutions of the so-called superstructure. The latter usage is particularly problematic. Its conceptual basis is fuzzy and it encourages monocausal economic analyses of whole societies. But even the more rigorously defined and carefully theorized analysis of production proper involves problems. For Marx concentrated on the capitalist mode of production, discussed it in relatively abstract terms, and considered pre-

capitalist modes largely in terms of their differences from capitalism. Many of these ambiguities and lacunae survive today so that the meaning and scope of the concept are still contested.

Mode of Production Defined

Marx analysed modes of production in terms of the specific economic form in which the owners of the means of production extracted unpaid surplus labour from the direct producers. For him this form always corresponded to a definite stage of development of the methods of labour and their social productivity. He also described this economic form as 'the innermost secret, the hidden basis of the entire social structure' (Capital, III, ch. 47, sect. II). For it provides the real foundation on which rise legal and political superstructures and to which correspond definite forms of social consciousness' (1859, Preface). Orthodox Marxists have generally focused on three modes of production: ancient society based on the direct exploitation of slave labour, feudalism with its serf labour and appropriation through ground rent, and capitalism with its free wage-labour and appropriation through surplus-value (see below).

In general terms a mode of production can be defined as a specific combination of forces and relations of production so organized that it can sustain a distinctive mode of appropriating surplus labour. Forces of production include not only the means and objects of labour but also labour-power itself. They are never purely technical in character but are always shaped by the prevailing social relations of production. The latter can be divided analytically into relations in production and relations of production (cf. Burawoy, 1985). Relations in production comprise the working relations between classes within a productive entity, for example, between capital and labour in the factory; relations of production are grounded in the capacities to allocate resources to diverse productive activities and to appropriate surplus-labour in determinate forms. It is the combination of these forces and relations which defines the basic pattern of class relations and determines the overall pattern of production, distribution and consumption in its articulation with the appropriation of surplus. For a distinct mode of production to exist, the forces and relations of production must complement each other so that together they sustain the economic basis of the relevant mode of appropriation. This does not mean that modes of production can somehow reproduce themselves autonomously. There are always extra-economic preconditions (such as law, the state, or specific systems of ideas) which must be secured for economic reproduction to exist. In turn, economic activity is an essential precondition of other activities and its form has its own effects thereon. This mutual presupposition and reciprocal

causality have encouraged the extension of the 'mode of production' concept to societies as a whole. Where the forces and relations of production are not usually supportive and/or their essential extra-economic conditions are not secured, various situations can exist short of an economic collapse. Most studies have examined transitions from one mode of production to another. But is also possible that an ad hoc, contingent and temporary economic system could emerge combining elements from different modes of production

An Asiatic Model of Production

Marx provided several different accounts of the Asiatic mode but always emphasized the absence of private property in land. In general he noted that Asiatic societies had autarchic village communities which combined crafts with cultivation; but they were also dominated by an overarching state which claimed absolute title to the soil and appropriated the bulk of economic surplus in the form of tax or labor levies.

The scope of this concept seems to vary inversely with that of 'feudalism'. For, given the limited number of modes of production traditionally considered, one or other concept must subsume the most widely divergent economic systems. However, whereas feudalism is generally agreed to be a valid concept and to have been instantiated in the West, neither the concept nor the existence of an Asiatic mode are universally accepted. This partly reflects political disputes concerning the 'semi-Asiatic' character of pre-revolutionary Russia and polemical suggestions that the Soviet system (especially under Stalin) is an Asiatic despotism.. More generally the concept is theoretically contradictory in Marxist terms (states are not supposed to develop in otherwise classless societies) and also historically inadequate (Asiatic systems were diverse and dynamic rather than homogeneous and stagnant). The history of the concept suggests that there is still much work to be done in analysing pre-capitalist modes of production.

Modes of Resource

Growth of human societies has been linked inextricably with various resource-use practices. Each important stage in the growth of human societies has discovered and used new resources and adopted practices to facilitate the extraction of resources from the nature. Unlike other species of animals, the man has been especially endowed with a prowess for using nature's resources in innovative ways. This has given rise to relationships between human societies and environmental resources that sustain on a delicate balance and have the propensity of yielding disastrous results in the eventuality of excesses being committed on either side. The special place

acquired by man in nature and the emergence of social forms that have adopted resource-use practices making an impact on eco-environmental systems has been a major historical development. The present Unit focuses on this historical development. The main areas examined here relate to the:

Understanding of the nature of environmental resources that have been brought into social use; analysis of resource-use practices with reference to their impacts on human societies; crises resulting from reckless use of environmental resources; and l growth of the concept of resource conservation.

The unit prepares the ground work for a more detailed analysis of the distinct stages of social evolution and the emergence of related resources use practices.

Nature of Resources & Social Use

Earth is a unique planet as it contains natural resources that have given rise to numerous life forms and have created an environmental system that has sustained and is compatible with this diversity of life forms. The reserves of these natural resources on the earth are enormous and along the route of the progress of human societies different kinds of resources have been harnessed by the man. There has, in fact, been a complex interactive relationship between human requirements in accordance with specific stages of culture and the development and use of natural resources. During the course of this interaction the ambit of 'natural resources' has been constantly changing and with that the relationship between man and his environment (use of gender being in the generic sense) has also been changing. The general understanding of the term 'natural resources' until close to the beginning of the modern age was that they consisted of useful, and therefore valuable, commodities. Practically they comprised the raw materials which could be purposefully used by human societies. This meant, essentially, that things like water, air and the light and heat emitted by the sun, and forests, land, wild life, fishes, and minerals were natural resources commonly brought in use by the humans. The modern age broadened this concept to include, as natural resources, the entire natural environment including all living and non-living things. For our purpose, however, a simple classification of natural resources has been adopted that divides them into the categories of renewable and non-renewable resources. In this division the resources which regularly multiply or get renovated are considered as renewable; the resources which are available in a fixed quantity, howsoever large, are considered

as non-renewable. Non-renewable resources do not possess the inherent property of multiplication or periodic renovation.

Renewable Resources

The natural resources which have the ability to regenerate are generally considered as renewable resources. An outcome of this ability is that the use or consumption of such resources is replenished and after a certain time the reserve is again available for use. The renewable resources are mostly the living resources such as plants, forests, wildlife etc. They also include such natural resources as the solar energy, air, and water because of their almost inexhaustible supply.

In addition to the above there are also natural resources that are bestowed with the property of renewal but with a relatively long time taken for accomplishing replenishment. In the context of social use of natural resources they are considered as least renewable resources or may even be considered as non-renewable. The length of time needed for replenishment is known as the cycling time. The resources having a short cycling time are renewable and those resources that have very long cycling time are non-renewable.

The sustenance of human life and its further growth has been largely dependent on renewable natural resources. The most clearly identifiable natural resources that have enormous regenerative capacity are solar energy, water and air. Life has been dependent on them so much that we generally do not count them in the category of renewable resources. In addition, we have two more renewable resources that have played an extremely significant role in the development of human societies – the plants and animals, and the landscape. We shall discuss them in the context of their use by human societies and shall also examine the resultant interrelationship.

Solar energy, water and air form a triumvirate that has helped the germination of human life as also all other life forms and has been responsible for its further progress in an immeasurable manner. If we take human time scales as our point of reference, we find that solar energy has remained an inexhaustible resource as it has met all human needs since the evolution of human life. It has provided energy in the form of light and heat and has helped regulate a climatic cycle that is the source of all vegetational growth and other support systems found vital for life. Solar energy is capable of being captured directly or through conversion in other forms. It was only after the beginning of science in organized manner that conversion of solar energy in other forms became possible. The solar energy has been available to man so naturally and in

such uninterrupted form that any documentation of its social use is almost totally absent. We can only assume that the light and heat emitted by sun have been in perennial use by human societies for daily chores, for drying the ripened crops and for regulating their routine works. In fact human societies have, from immemorial times, recognized sun as the single most important resource for light and for heat. A diversification of the use of this resource, however, could only be made viable in the modern age.

Water is generally considered a perennial natural resource as it meets some of the vital requirements of life on earth. The humans are no exceptions in the matter and use water for sustaining life as also for a variety of other purposes. Considering the critical importance of this resource the nature has been very generous in providing water in ample forms and ways. The growth of human societies had been, for a very long time, contingent upon the natural availability of water. In fact water has been one of those key resources that have been managed by human societies from a very early time in its history. Drinking water and irrigation requirements have more often than not determined the contours and pace of development. In this process man learnt, quite early, the methods of converting non-usable water into usable water. As a natural resource water has also enabled man to generate energy and use this energy to power mechanical devices. As a matter of fact the availability of water has been in such abundance in nature that a kind of recklessness in its use crept in human habits. Over several millennia of the abuse of water resources a situation of supply-crunch has emerged now. Several regions of the world as also of India have been suffering from severe shortages of water.

Environment and Early Societies

One of the most important renewable resources has been the plants and the animals. Right from the beginning man has lived on a food consisting of animal meat and the plant fruits. The availability of food in different measures in different regions of the country has determined the pattern of settlement and growth of human societies in those regions. Later, in this process, human societies learnt and developed the art of agriculture and adopted semi-permanent and permanent settlements as habitats. The environmental conditions favouring agriculture determined the emergence of community settlements. These settlements were organized in accordance with specific agricultural conditions. The human endeavour was to grow crops to maintain a regular and adequate supply of seeds and to breed animals with the purpose of not allowing their stock to diminish. Agriculture soon became a basic form of human activity and

the land for agriculture became one of the basic resources. It provided food to man and fodder to animals; it provided raw materials for ancillary activities such as clothing and shelter and other agro-activities. The agricultural resources were dependent on environmental conditions such as topography, soils, and water-supply and were regularly replenished through cropping activity. In this process sometimes the environment was allowed to deteriorate and the resources to diminish. This obviously had a major impact on contemporary societies as some even became extinct unable to cope with the changes.

The practice of agriculture reshaped the man-nature relationship. The supply of food resources was now assured and societies could take up other developmental activities. The landscapes occupied by agricultural societies underwent a major change and in innumerable cases the original vegetation was completely replaced by crops grown by the human societies. All this had a profound impact on the environment and various natural combinations of plant and animal life that had contributed to the original environmental conditions were altered permanently.

Non-Renewable Resources

There are some resources that are replenished through extremely slow natural cycles (several thousands of years). Such resources can therefore be considered as non-renewable for all practical purposes. Since the rate of formation of these resources is very slow, each time they are used some depletion in their reserve does occur. The rate at which they are used, therefore, determines whether they are likely to last long or diminish sooner. The main non-renewable resources which human societies have been using since the most remote past are metals and mineral resources and soil. The metals and minerals are sometimes available on or near the surface or otherwise have to be mined. The soil is formed over hundreds of years as a result of a complex inter-action between organisms and the physical surface of the earth. Climate also plays a significant role in soil formation.

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The metals and minerals are seldom available in pure form in nature and are mostly extracted from below the ground or from the hills in the form of ores. This implies the availability of knowledge and a certain level of the development of technology of extraction. The earliest use by man of these resources has been documented with the help of archaeology and shall be subjected to a more detailed discussion in the next section. Here we would like to note that rock was perhaps the earliest material harnessed by man for use in daily chores. This period was the longest in the development of human societies and is called as Palaeolithic period. Most of the minerals known to us today have been discovered very recently in comparison to the time period occupied by the stone using human societies. The metals as a resource first became known to man in the period often characterized as the Chalcolithic period. The earliest evidence of the use of a metal by human societies relates to copper and bronze. The use of iron as a resource followed the copper-bronze period. The use of metals was a significant stage in the development of human societies as it became the harbinger to a host of critical developments in the subsequent periods that altered the relationship between man and environment. An important property of the metals is that the use of most of them does not result in any considerable destruction of their resources. The metals constantly change form and their malleability allows their use in a variety of applications.

Soils provide a basic support to most of the terrestrial life forms. They are also an important source of nutrients for aquatic life. The process of soil formation involves the breaking of rocks by natural actions such as that of wind, rain, sunlight etc. The rock particles so obtained then combine with vegetation and animal life to form soils. It is clear that soils at different places are different and they also have varying properties. This variation shows its impact on the fertile properties of soils. The vegetation supported by soils accordingly show a great diversity. The growth of human societies has thus been linked with the nature of soils; in

some places the soils have supported crops and have helped the transformation of wandering human groups into settled societies, and at other places the less responsive nature of soils for vegetation and crop support has given rise to nomadic and non-sedentary societies.

Soils have the tendency to suffer from the acts of erosion by wind action or by the rains. Whereas agriculture has been seen as the outcome of a major use of soil resource by human societies, it has also resulted in the destruction of the natural plant cover thereby exposing the soil to erosion. In such cases the desert like conditions spread and agricultural area begins to dwindle at varying pace. Soils have also been degenerated from incessant human activities without any consideration for permitting regenerative lean periods so vital for recuperating the fertile properties. The grimness of the situation resulting from this degeneration can be ganged from the fact that human settlements have been forced to abandon the place and resort to migration. The problem of the loss of soil fertility has been faced by humans from a very early time and various solutions have been practiced to combat the situation. Coterminous with these solutions have been the different stages of the growth of human societies as will be discussed in Block 3. As a natural resource, therefore, soils have been of critical significance to the humans and have been subjected to a widespread and diverse use by human societies from very early in human history.

Resource-Use Practices and Their Impact

We have seen above how natural resources are distinguished between renewable and non-renewable categories. We have also noted the fact that human existence and the growth of human societies has been contingent upon the use of these natural resources. Over a long period of time human societies had developed different practices for use of natural resources. These practices varied from place to place and invoked, from long experience of resource-use, several sub-processes that helped human societies in their further development. We discuss these sub processes briefly before taking up a historical sketch of resource-use practices by human societies and their impact**.**

Perhaps it had become evident to human societies, through repeated acts of resource extraction and observation, that a purposeful resource-use involved the application of one or more sub-processes for better reclamation of natural resources. Broadly there were five sub-processes that could be applied singly or in combination with others depending upon the specific requirements of the local conditions. These are described below**:**

I. Adoption of techniques that allowed reclamation of a resource that had not been rendered useful until then;

II. Organising systems that ensured the most appropriate uses for specific resources thereby optimizing their utility;

III. Discovering more viable replacements/alternatives in place of rare and scarce resources; and

IV. Inventing methods and techniques that helped the reprocessing and reutilization of by-products or once wasted resource materials. The resource-use practices adopted by human societies were in different measures mediated by these sub-processes at different times. We shall study them in a historical sequence in the ensuing sub-sections.

School of thought in Ecology

An ecological conception of geography had appeared much earlier, of course, but it failed to attract many enthusiasts at any point in the development of geography as a discipline. There are some geographers who consider human geography as human ecology and stress on the ecological school which is concerned with the vast man – earth interacting system. Ratzel, taking his cue from the biological use of the term 'ecology,' once suggested that anthropogeography is human ecology and should be studied under the school of ecology. From his point of view, as from that of biology, human ecology would be defined as the study of the interaction of man and environment. The doctrine was further strengthened by Barrows in 1922 when in his presidential address before the American Association of Geographers he emphasized that in geography human ecology is the guiding concept. In the words of Barrows (1923) – "Thus defined, geography is the science of human ecology". Human ecology is a relatively current development; the first use of the term in the literature was in 1921. The first book with title as ecology appeared in 1935 and interestingly was the work of a botanist. In this brief span of time, the discipline of ecology has evolved quite rapidly. When concerned with human ecology one can relate to Mackenzie's (1931) definition which states that Human ecology deals with the spatial aspects of the symbiotic relations of human beings and human institutions.

Ecological school is receiving increased attention as a research focus for geography and other academic disciplines. Geographers are concerned with the identification and explanation of the spatial patterning of earth phenomena. The ecosystem concept, with an emphasis on structure, networks of interaction, and function, is quite useful for conducting such geographical

investigations. Ecological school is thus viewed as a methodological approach with significant applications for geographic research.

The interactions between man and nature in different cultures are studied in the school of ecology. School of Ecology combines the ideas and methods from several disciplines, including anthropology, sociology, biology, economic history and archaeology. Ecological school of study is a multidisciplinary approach enables geographers to comprehensively address issues of environmental justice, sustainability and political ecology.

Ecological school studies human life and human activity in different ecosystems and different cultures in the present and in the past in order to gain a better understanding of the factors which influence the interaction between humans and their environment. The aim of ecological school to achieve a more complete view requires an integrated perspective that transcends traditional boundaries between the humanities, social sciences, natural sciences, and technology.

Fundamental issues in ecological school are how people's cultural beliefs about the nature affect and are affected by their livelihoods and the social order. While cultural beliefs come into focus in the influential modern sciences like economics, human ecologists examine the modern concepts of economic growth and technological development from an anthropological perspective. By comparing those concepts with other scientifically insights about environmental degradation, climate change and global inequality, human ecology challenges the ideas that perpetuates an unsustainable and unequal global society. Studies in Ecological school give a broad and theoretically deep understanding of the interactions between man and nature in different times and in different parts of the world. Of central importance is to understand how the human relationships with the environment are influenced by their history and their place in the world system.

Ecological school is an interdisciplinary and trans-disciplinary study of the relationship between humans and their natural, social, and built environments. The philosophy and study of school of ecology has a diffuse history with advancements in ecology, geography, sociology, psychology, anthropology, zoology, epidemiology, public health, and home economics, among others. School of ecology, which is also interested in the relations of man to his geographic environment, fastens its attention upon the human interdependences that develop in the action and reaction of a population to its habitat. In other words, while geography views the adjustment of man from the standpoint of modifications of the earth's surface, ecological school makes a

detailed analysis of the process and organization of relations involved in adjustment to environment. This brings us to a second point of distinction between the two disciplines. Geography involves a description of things as they are at a point in time; its interest is in distribution rather than development. Ecology, on the other hand, is evolutionary. It undertakes to describe the developmental process as well as the form of man's adjustment to his habitat.

Marxist

In 1986, Professor Wang Jin was the first to introduce ecological Marxism into China, and its systematic research on ecological Marxism began in the 1990s. All western Marxist textbooks published in the 1990, such as Foreign Marxist Philosophy

Schools by Yu Wujin and Chen Xueming, have discussions on Ecological Marxism. In 2007, Liu Rensheng published an Introduction to Ecological Marxism in Central Compilation & Translation Press, which is China's first book to study systematically of ecological Marxism. After him, a number of doctoral theses on ecological Marxist research published. The representatives' works of ecological Marxism have been translated into Chinese successively, gradually forming a climax of domestic research on ecological Marxism. They all had a fierce debate on the definition domain of ecological Marxism. The domestic scholars think that ecological Marxism is the result of Western Marxism paying attention to ecology (Liu, 2007); or that ecological Marxism is a kind of postmodern Marxism that fundamentally rejects the mode of productivity growth of historical materialism; Or think that ecological Marxism is a representative that has strong Marxist tendency in the ecological socialism camp. It consciously uses Marxist viewpoints and methods to analyze the environmental degradation and ecological crisis of contemporary capitalism, to explore the solutions for environmental problems (Yu & Chen, 2002). Wang Yuchen believes "Ecological Marxism is a new school of Marxism, which applies Marxist historical analysis method and class analysis method to criticize contemporary western capitalist system and mode of production from the perspective of ecology, based on Marxist theory of the relationship between man and nature.

Background of Ecological Marxism The background of Ecological Marxism can be summarized as follows:

- At the age of machines, social productive forces improved at a high speed, at the same time, capitalism use science and technology to accelerate the developing of natural

resources, as a result, excessive discharge of waste caused serious pollution and damage to the ecological environment (Zhang & Jiang, 2020);

- Global capitalism spread, humans have been facing serious survival challenges, successive ecological movement and the emergence of the Green Party have provided an organizational foundation for ecological Marxism; 3) In capitalist society,
- The Nature of Ecological Marxism On the nature of ecological Marxism, the main views are as follows:
- Ecological Marxism is a supplement to Marxism, trying to help developed capitalist countries eliminate the ecological crisis and move towards ecological socialism (Zhu & Wu, 2021);
- Ecological Marxism is one of the trends of western Marxism, and the modernization results of western Marxism solving new social problem
- Ecological Marxism is the premise of realizing ecological socialism, without ecological Marxism, ecological socialism is fully theoretic;
- Ecological Marxism advocates eliminating alienation labor and establishing steady-state economic model, and insists on human-centered values (Bao, 2020);
- Ecological Marxism advocates replacing mass production by small one, and hopes to eliminate social problems through social ideological revolution, so Ecological Marxism is also partly considered as combination of Utopian socialist and revivalism.

Thoughts on Ecological Marxism

Based on the illustration and analysis before, the author thinks that ecological Marxism has its positive sides and negative sides.

Positive Side

Firstly, taking the increasingly prominent ecological crisis as its starting point and research content, ecological Marxism reflects the current situation of human beings destroying the ecology for economic growth, and strongly expresses its opposition, emphasizing the importance of uniformity between economic growth and ecological balance. This is not harmful but conducive to sustainable economic development, to the perpetuation of human society, and to the long-term peace of the world. Secondly, capitalist system and mode of production are regarded as the root of ecological crisis by ecological Marxists. Ecological Marxism profoundly reveals the essence of ecological crisis and provides a new perspective for us to scientifically

understand capitalism. Ecological Marxists also pointed out that the ecological crisis cannot be solved in capitalism, and the only way to solve the ecological crisis is to overthrow the capitalist system and its mode of production, then to carry out socialist revolution in order to establish ecological socialism. This provides us a powerful theoretical support for firming socialist ideal and belief. Thirdly, the concept of consumption alienation in ecological Marxism is an extension of Marx's concept of labor alienation and production alienation. It points out that capitalist society is a morbid society in which the bourgeoisie exploits the proletariat, man exploits nature. The production mode in ecological socialism will overcome capitalism alienation, overproduction and over-consumption. People working in this mode will gain the essence of a community, which is a community of cognition rather than a community of interests. Such a society full of love for the ecology, and its system reflects social justice and fairness while avoiding ecological crisis. Ecological Marxists also point out that in ecological socialism, technology will be rationally utilized to protect nature instead of destroying it, and to make people at work will feel the happiness and satisfaction of production. Ecological socialism will not cause ecological crisis, will eliminate labor and production alienation in capitalism, and realize the liberation of man and nature.

Negative Side

Although ecological Marxism attaches importance to the issue of ecological crisis and provides us with a new theoretical perspective, it also has its obvious limitations, which are mainly manifested in three aspects. Firstly, ecological Marxists replaces the economic crisis theory by ecological crisis, which means the conflict between man and nature replaces the basic conflict of capitalist society, and ecological Marxists denied the practical significance of Marx's economic crisis theory. Secondly, in order to maintain ecological balance, ecological Marxism advocates the creation of a steady-state economic model. This kind of "zero growth" economic model is unrealistic and cannot meet the growing material and cultural needs of the people. It is unfair to developing countries. In this mode, replacing large-scale and concentrated production with small-scale and decentralized production is a historical retrogression at a time when productivity is highly developed. Thirdly, ecological Marxists advocate the establishment of ecological socialism by the establishment of a "cognitive community" rather than "violent revolution". In fact, it is impossible to fundamentally reform the bourgeoisie. It's just the vain "reformed capitalism", which is still capitalism in essence. In this paper, by means of literature

research, the author attempts to conclude the background and nature of ecological Marxism, illustrates and analyses ecological crisis, alienation consumption, steady-state economic model and ecological socialism, which are included in ecological Marxism. By illustrating and analyzing these theories, the author finds that ecological Marxism has its positive and negative sides, and its study has great significance. 5. Conclusion The tion". In fact, it is impossible to fundamentally reform the bourgeoisie. It's just the vain "reformed capitalism", which is still capitalism in essence. In this paper, by means of literature research, the author attempts to conclude the background and nature of ecological Marxism, illustrates and analyses ecological crisis, alienation consumption, steady-state economic model and ecological socialism, which are included in ecological Marxism. By illustrating and analyzing these theories, the author finds that ecological Marxism has its positive and negative sides, and its study has great significance.

Gandhian

In a lecture given in 1993, the Indian historian Ramachandra Guha proposed to inquire whether Gandhi could be considered an "early environmentalist."1 Gandhi's voluminous writings are littered with remarks on humankind's exploitation of nature, and his views about the excesses of materialism and industrial civilization, of which he was a vociferous critic, can reasonably be inferred from his famous pronouncement that the earth has enough to satisfy everyone's needs but not everyone's greed. Still, when "nature" is viewed in the conventional sense, Gandhi was rather remarkably reticent on the relationship of humans to their external environment. His name is associated with innumerable political movements of defiance against British rule as well as social reform campaigns, but it is striking that he never explicitly initiated an environmental movement; nor does the word ecology appear in his writings. Again, though commercial forestry had commenced well before Gandhi's time, and the depletion of Indian forests would persistently provoke peasant resistance, Gandhi himself was never associated with forest satyagrahas, however much his name was invoked by peasants and rebels.

Guha observes also that "the wilderness had no attraction for Gandhi." His writings are singularly devoid of any celebration of untamed nature or rejoicing at the chance sighting of a wondrous waterfall or an imposing Himalayan peak; and indeed his autobiography remains utterly silent on his experience of the ocean, over which he took an unusually long number of journeys for an Indian of his time. In Gandhi's innumerable trips to Indian villages and the countryside and seldom had any Indian acquired so intimate a familiarity with the smell of the

earth and the feel of the soil across a vast land—he almost never had occasion to take note of the trees, vegetation, landscape, or animals. He was by no means indifferent to animals, but he could only comprehend them in a domestic capacity. Students of Gandhi certainly are aware not only of the goat that he kept by his side and of his passionate commitment to cow protection, but of his profound attachment to what he often described as "dumb creation," indeed to all living forms. The modern environmental movement was, of course, still several decades distant from being inaugurated in Gandhi's time, but it is indubitably certain that Gandhi at least cannot be constrained or exculpated by that conventional and tedious yardstick with which so much scholarship sadly contents itself: namely, that he was a man of his times, and that an environmental sensibility was not yet positioned to intervene significantly in the shaping of society.

Gandhi was an ardent exponent of vegetarianism, nature cure, and what are today called "alternative" systems of medicine well before these acquired the semblance of acceptability in the West; he was a dedicated practitioner of recycling before the idea had crept into the lexicon of the liberal consciousness; he was a trenchant critic of modernity before the Frankfurt school, not to mention the post-modernism of Lyotard, had provided some of the contours of modern thought; and he was, needless to say, an advocate of nonviolent resistance long before uses for such forms of resistance were found in the United States, South Africa, and elsewhere. No one suspects that Gandhi was merely a man of his times: so it is not unlikely that Gandhi could have been an environmentalist and more, anticipating in this respect as in many others modern social and political movements. Indeed, the general consensus of Indian environmentalists appears to be that Gandhi inspired and even perhaps, in a manner of speaking, fathered the Indian environmental movement. He cannot, however, be likened to John Muir or Aldo Leopold, and much less to Thoreau: Gandhi was no naturalist, and it is doubtful that he would have contemplated with equanimity the setting aside of tracts of land, forests, and woods as "wilderness areas," though scarcely for the same reasons for which developers, industrialists, loggers, and financiers object to such altruism. The problems posed by the man-eating tigers of Kumaon, made famous by Jim Corbett, would have left less of a moral impression upon him than those problems which are the handiwork of men who let the brute within them triumph. It is reported that when the English historian Edward Thompson once remarked to Gandhi that wildlife was rapidly disappearing in India, Gandhi replied: "Wildlife is decreasing in the jungles,

but it is increasing in the towns." Although Guha has noted some limitations in viewing Gandhi as an "early environmentalist," such as his purportedly poor recognition of the "distinctive social and environmental problems" of urban areas, Guha readily acknowledges, as do most others, that the impress of Gandhian thinking is to be felt in the life and works of many of India's most well-known environmental activists.4 It was Gandhi's own disciples, Mirabehn and Saralabehn, who came to exercise an incalculable influence on Chandi Prasad Bhatt, Vimla and Sunderlal Bahuguna, and others who have been at the helm of the Chipko agitation, a movement to ensure, in the words of women activists, that Himalayan forests continue to bear "soil, water and pure air" for present and future generations.

Similarly, Baba Amte and Medha Patkar, the most well-known figures associated with the more recent Narmada Bachao Andolan, a movement aimed at preventing the construction of one of the world's largest dam projects and the consequent dislocation and uprooting of the lives of upwards of 100,000 rural and tribal people,6 have been equally generous in acknowledging that their inspiration has come in great part from Gandhi. It may be mistaken to speak of these movements as "Gandhian," since any such reading perforce ignores the traditions of peasant resistance, the force of customary practices, and the appeal of localized systems of knowledge, but the spirit of Gandhi has undoubtedly moved Indian environmentalists.

Thus far, then, it appears that Gandhi presents something of a difficulty to those who would propose to describe him as the author or father of Indian environmentalism. It is undoubtedly possible to see the environmentalist in him, but one hesitates in describing him as an environmentalist. Similarly, if I may multiply the layers of this anomaly, Gandhi was a lover of animals without being a pet lover, a warrior who absolutely forsook arms, an autocrat deeply wedded to democratic sentiments, an admirer of the Ramayana who rejected the dogmatism of many of its verses, a follower of the sanatan dharma or eternal faith who in his later years would only bless inter-caste weddings, and a traditionalist whose apparent allegiance to hideous traditions led him to counsel the rejection of all authorities except one's own conscience. Although his pronouncements spoke of the conventional division of labor between men and women as "natural," in his own ashrams he insisted that all its members were to partake equally of all the tasks, and no differentiation was permitted, in matters of either labor or morality, between men and women; moreover, the kitchen, the toilet, the Viceroy's palatial residence, and the prison were all equally fertile arenas for testing the truth of one's convictions. These

circumstances constitute the grounds, as I endeavor here to argue, for viewing Gandhi as a man with a profoundly ecological view of life.

Eco- feminism

A large and growing body of literature on eco feminism in the West relates gender and environment mainly in ideological terms. In India however, growing protests against environmental destruction and struggles for survival and subsistence point to the fact that caste, class and gender issues are deeply interlinked. In this paper, I will look at the main tenets of "eco feminism", and the critiques that have been leveled against them. Then I will try and contextualize this debate within the Indian environmental movement and highlight the interconnections of caste, class and gender issues in it. Further, I will attempt to see whether the issue of environment has been taken up by the Indian women's movement. If not, how the Indian women's movement would benefit and become more broad based by taking up issues that concern women of different caste and class, and simultaneously to gauge how the environment movement would benefit by taking up a feminist perspective.

Emergence of Eco feminism Movements all over the world that are dedicated to the continuation of life on earth, like the Chipko movement in India, Anti-Militarist movement in Europe and the US, movement against dumping of hazardous wastes in the US, and Green Belt movement in Kenya, are all labeled as "eco feminist" movements. These movements attempt to demonstrate the "resistance politics" (Quinby 1990) working at the micro-levels of power and point to the connections between women and nature. They also claim to contribute to an understanding of the interconnections between the domination of persons and nature by sex, race and class. Eco feminism emerged in the West as a product of the peace, feminist and ecology movements of the late 1970s and the early 1980s. The term "Eco feminism" was coined by the French writer Francoise Eaubonne in 1974. It was further developed by Ynestra King in about 1976 and became a movement in 1980, with the organization, in the same year, of the first eco feminist conference – "Women and Life on Earth: Eco feminism in the 80s", at Amherst, Massachusetts, US (Spretnak 1990). The conference explored the connections between feminism, militarism, health and ecology. It was followed by the formation of the Women's Pentagon Action, a feminist, anti-militarist, anti-nuclear war weapons group. According to eco feminist Ynestra King: "Eco feminism is about connectedness and wholeness of theory and practice (it sees) the devastation of the earth and her beings by the corporate warriors, and the

threat of nuclear annihilation by the military warriors as feminist concerns. It is the same masculinity mentality which would deny us our right to our own bodies and our own sexuality and which depends on multiple systems of dominance and state power to have its way"(King 1983). Whenever women protested against ecological destruction, threat of atomic destruction of life on earth, new developments in biotechnology, genetic engineering and reproductive technology, they discovered the connections between patriarchal domination and violence against women, the colonized non-western, non-White peoples and nature. It led to the realization that the liberation of women cannot be achieved in isolation from the larger struggle for preserving nature and life on this earth.

As philosopher Karen Warren (1987) puts it: "Eco feminism builds on the multiple perspectives of those whose perspectives are typically omitted or undervalued in dominant discourses, for example – Chipko women – in developing a global perspective on the role of male domination in the exploitation of women and nature (Data 2011). An eco feminist perspective is thereby…structurally pluralistic, inclusivity and contextualist, emphasizing through concrete example the crucial role context plays in understanding sexist and naturist practice".

Nature of Eco feminism Recent works by feminists Susan Griffin (1978) and Mary Daly (1978), Carolyn Merchant (1980), Ynestra King (1981), Ariel Kay Salleh (1984), Karen Warren (1987, 1990), Val Plumwood (1993) and others, highlight the fact that ecology is a feminist issue. The connections between the oppression of women and the oppression of nature are highlighted in order to understand "why the environment is a feminist issue", as well as "why feminist issues can be addressed in terms of environmental concerns However, there are disagreements about the nature of these connections and whether they are "potentially liberating or simply a rationale for the continued subordination of women" . Thus, while many feminists agree that ecology is a feminist issue, they differ over the nature and desirability of "eco feminism". Hence, just as there are a variety of feminisms, so there are a variety of eco feminisms, too. Eco feminism is based on certain fundamental claims that point to the existence of important connections between the oppression of women and oppression of nature. It is essential to understand the nature of these connections in order to understand the oppression of women and nature, and finally, every feminist theory must include an ecological perspective and vice versa (Warren 1987). Eco feminism can be defined as a "value system, a social movement,

and a practice also offers a political analysis that explores the links between and rocentrism and environmental destruction. It is an "awareness" that begins with the realization that the exploitation of nature is intimately linked to Western Man's attitude toward women and tribal cultures. Within the patriarchal conceptual framework, all those attributes associated with masculinity are given higher status or prestige than those associated with femininity, resulting in 'hierarchical dualisms'**.**

All eco feminists are of the view that it is the "logic of domination", in association with value-hierarchical thinking and value-dualisms that sustains and justifies the twin domination of women and nature (Warren 1990). For eco feminists, therefore, the domination of women and nature is basically rooted in ideology. In order to overcome this, one needs to reconstruct and reconceptualize the underlying patriarchal values and structural relations of one's culture and promote equality, non-violence, non-hierarchical forms of organization to bring about new social forms. According to the eco feminists, one also needs to realize the inter-connectedness of all life processes and hence revere nature and all life forms. Humans should not try to control nature, but work along with it and must try to move beyond power-based relationships. This would mean integrating the dualisms on the polarization of the male and the female in one's conception of reality. Importance should also be given, the eco feminists argue, to the process rather than only to the goal. The personal is political, and hence the female private sphere is just as important and applicable to the male public sphere. One need to change the patriarchal nature of the system by withdrawing power and energy from patriarchy Eco feminist theory has brought into sharp focus the links between development and gender. It has highlighted the fact that the violence against nature and against women is built into the dominant development model**.**

Perspectives on Eco feminism The different configurations of eco feminism reflect the different ways of analyzing the connections between women and nature, as well as the differences in the nature of women's oppression and solutions to them, the theory of human nature, and the notions of freedom, equality and epistemology on which depend various feminist theories. Some feminist scholars like Carolyn Merchant (1992) have categorized eco feminist theory into liberal, radical or socialist frameworks. However, leading versions of feminism have not, in fact, articulated their position on ecology or on the nature of the connection between the twin oppressions of women and nature. In the 1960s, the feminist movement demanded equity for women in the workplace and in education as a method to achieve a fulfilling life. At around

the same time, Rachel Carson's book, Silent Spring (1962) focused attention on the effects of pollution on the human and non-human world, making the question of life on earth a public issue. For the eco feminists of the liberal mode (as for liberal feminists in general), environmental problems are a result of the rapid exploitation of natural resources accompanied by the lack of regulation of pesticides and other environmental pollutants. This can be overcome by a social production that is environmentally sound. For this, one requires better science, conservation and laws. With equal educational opportunities, women can become scientists, natural resource conservators, lawyers, and so on, like men. Thus, these eco feminists attempt to change human relations with nature through the passage of new laws and regulations. However, just training women to be lawyers and environmental scientists will not solve the increasing problem of environmental degradation. Those eco feminists fail to question the whole development process, which is the primary cause of environmental destruction. As a rejoinder to the view that associated women with nature, both of which were devalued in western culture, eco feminists with a radical bent analyzed environmental problems from within their critique of patriarchy and offered alternatives that could liberate both women and nature.

This perspective draws from the now famous article by Sherry Ortner, Is Female to Male as Nature is to Culture? (1974). The eco feminists celebrate the relationship between women and nature through the popularization of ancient rituals centered on the Mother Goddess, the moon, animals and the female reproductive system. This prehistoric era, centered on goddess worship, was dethroned by an emerging patriarchal culture with male gods to whom the female deities were subservient. Nature was further degraded by the Scientific Revolution of the 17th century, that replaced the nurturing earth with the "metaphor of a machine to be controlled and repaired from outside...The earth is to be dominated by male developed and controlled technology, science and industry". So these eco feminists argue against the dominant view that women are restricted by being closer to nature, because of their ability to bear children. In fact, women's biology and nature are seen as sources of female power to be celebrated

Eco feminism & Its Critics in India In India, the most visible advocate of eco feminism is Vandana Shiva. One would tend to categorize her work with the eco feminists of the radical mode, but her critique of the entire development model and its effects on the environment, places her more among the eco feminists of the socialist framework. Vandana Shiva (1988) critiques modern science and technology as a western, patriarchal and colonial project, which is inherently

violent and perpetuates this violence against women and nature. Pursuing this model of development has meant a shift away from traditional Indian philosophy, which sees prakriti as a living and creative process, the "feminine principle", from which all life arises. Under the garb of development, nature has been exploited mercilessly and the feminine principle was no longer associated with activity, creativity and sanctity of life, but was considered passive and as a **"**resource". This has led to marginalization, devaluation, displacement and ultimately the dispensability of women. Women's special knowledge of nature and their dependence on it for "staying alive", were systematically marginalized under the onslaught of modern science. Shiva, however, notes that Third World women are not simply victims of the development process, but also possess the power for change. She points to the experiences of women in the Chipko movement of the 1070s in the Garhwal Himalayas – where women struggled for the protection and regeneration of the forests. Through her analysis, Shiva points out the critical links between the different development perspectives, the process of change brought about by the development and its impact on the environment and the people dependent on it for their subsistence. Further, she argues with Maria Mies that whenever women have protested against ecological destruction or nuclear annihilation, they were "aware of the connections between patriarchal violence against women, other people and nature.

These movements were informed by the ecofeminist principles of connectedness, wholeness, inter-dependence and spirituality, in opposition to capitalist patriarchal science that is engaged in disconnecting and dissecting. It is argued that the eco feminist position, i.e., a subsistence perspective, is rooted in the material base of everyday subsistence production of women the world over. This struggle of women and men to conserve their subsistence base can become the common ground for women's liberation and preservation of life on earth. However, some of the problems with Vandana Shiva's argument are as follows: Shiva's analysis (in Staying Alive 1988) relates to the study of rural women in Northwest India, but she tends to generalize her analysis to cover all Third World women. Gabriel Dietrich (1990, 1992) points out that Shiva seems to presuppose a society that is democratically organized, where people own sufficient land to survive on its produce. She seems to treat caste factors and political options as nonexistent and neglects the realities of hierarchies, subordination, patriarchy and violence within traditional tribal and peasant communities.

Like the western eco feminists, she implicitly essentialisms Third World women and sees them as being closer to nature. Besides, the notions of "Shakti" and "Prakriti" are posed as representative of Indian philosophy as a whole. However, the "feminine principle" is largely expressed in Hindu terms which are close to Sankhya philosophy, which is mainly popular in the North. Dietrich wonders what the "feminine principle" would imply for Dalits, tribals, Muslims, Chrisians, Sikhs and other minority communities. Furthermore, Shiva does not analyse religious controls over women, when she discusses the "shakti" aspects of religion. Meera Nanda (1991) in a scathing attack on Vandana Shiva, brands her a typical neo-populist scholar, who has tried to portray the "West" as inherently vicious and the "Third World" as fundamentally virtuous. She rebukes Shiva for branding modern science as western, inherently masculine (therefore destructive) and just another social construct. Shiva attributes the degradation of nature and the subordination of women mainly to the country's colonial history and the imposition of a western model of development. She, however, ignores the preexisting inequalities of caste, class, power, privilege and property relations that predate colonialism.

In advocating the eco feminist principles of women's special relationship with nature, connectedness, wholeness and so on, Shiva and Mies ignore the question of who acquires what knowledge and how or whether at all, it is articulated. Property relations play a major role in the way in which women and men relate to their environments. In matrilineal societies, women do not have primary rights to land. Their rights to land are mediated through their male relatives. The gap between legal and actual land ownership rights, patrilocal marriages, the segregation of public space and social interaction by age, class and gender, female illiteracy, high fertility, as well as male control over agricultural technology and dissemination of information put women farmers at a disadvantage Thus women would probably not be inclined to undertake long-term conservation practices. In land cultivated by women as part of family duties and as use of common property resources (CPR), the conservation practices adopted, do not necessarily reflect women's special knowledge of conservation, as they may be dictated by men. It is usually pointed out that women's relation to the environment is influenced by requirements of "sustenance", unlike men who exploit the environment for cash (). However, studies show that this is questionable, since women also use the CPRs for fuel wood, fruits etc., for sale in the market. In fact, men use CPRs in more subsistence oriented ways. Govind Kelkar and Dev Nathan (1991), in their study of the Jharkhand region in Central India, point out that the division

of labour between men and women is determined by culturally influenced gender roles rather than sex roles influenced by biology. Through their study they show that women, besides gathering, also took part in hunting. Men also take part in gathering of food in foraging societies.

Feminist Environmentalism

In discussing the pros and cons of eco feminism, one would like to advocate Bina Agarwal's "feminist environmental" perspective. The perspective is rooted in material reality and sees the relation between women and nature as structured by gender and class (caste/race) organization of production, reproduction and distribution. As Bina Agarwal points out (1992), women's relation to the environment is socially and historically variable. Women, particularly in poor rural households, are both victims of environmental degradation as well as active agents in movements for the protection and regeneration of the environment. They act in both positive and negative ways with the environment. The unquestioning acceptance of woman-nature link and the idea that, since women are most severely affected by environmental degradation, they have "naturally" positive attitudes towards environmental conservation is, therefore, unacceptable. The forests and village commons provide a wide range of essential items such as food, fuel, fodder, manure, building material, medicinal herbs, resin, gum, honey and so on, for rural households in India as well as in much of Asia and Africa. For the poor, village commons (VC) are a vital source of fuel and fodder. Ninety-one percent of their firewood needs and more than 69 percent of their fodder needs are met by VCs (Agarwal 1992). Access to VCs reduces inequalities in income among poor and non-poor households. The forests are an important source of livelihood, particularly for tribal populations. Studies have shown that nearly 30 million people in India depend on forests and forest produce to a large extent (Kulkarni 1983). The dependence on forests is much more during lean agricultural seasons and famines or droughts. Class differences are once again highlighted in the dependency on and accessibility to water resources for irrigation and drinking. While for a large percentage of poorer households, water is used directly from rivers and streams, richer households sink deep wells and tube-wells, and tap groundwater for drinking and irrigation. The growing degradation of natural resources, both qualitatively and quantitatively, the increasing appropriation by the state and by private individuals, as well as the decline in communally-owned property, have been primarily

Responsible for the increased class-gender effect of environmental degradation. Besides, the decline in "community resource management systems, the increase in population and the

mechanization of agriculture, resulting in the erosion of local knowledge systems, have aggravated the class-gender implications of the environmental degradation". With the disappearance of forests, VCs, shortage of drinking water and so on, women have to spend more time and walk longer distances to get fuel, fodder, food and water. Drying up or pollution of wells accessible to lower-caste women have meant an increased dependence on upper-caste women to dole out water to them. This has increased the burden on women and young girls and has ever led to increasing cases of suicide among them. The degradation of forests and the historical and ongoing malpractices and state policies and increasing privatization have restricted the access of villagers to forests and VCs. It has reduced the number of items that women could gather from forests and VCs which has directly resulted in reduced incomes. The extra time spent in gathering has reduced the time available to women for crop production, where they are the main cultivators, as in the hill regions due to high male outmigration (Agarwal 1992). The little women earn through selling firewood is also reduced due to deforestation. This has a direct impact on the diets of poor households. The decline in the availability of fruits, berries and so on, as well as firewood has forced people of poor households to shift to less nutritious food and eat half-cooked meals or even reduce the number of meals eaten per day. The existing gender biases within the family lead to women and female children getting secondary treatment with regard to food and health care. Given the kind of task a poor rural women do, such as working in the rice fields, fetching water, washing clothes, etc., they are more exposed to water-borne diseases and to polluted water bodies (Mencher-Sardamoni 1982). It is also women who are mainly responsible for the care of the sick within the family. The displacement of people due to large dams, or large scale deforestation, etc., has led to the disruption of social support networks within and between villages. Women, particularly of poor, rural households, who depend to a large extent on such networks for economic and social support, are adversely affected (Sharma 1980). It has also eroded a whole way of life and has resulted in alienation and helplessness. Old people and widows or deserted women are most neglected. The dominant forms of development have led to a devaluation and marginalization of women's indigenous knowledge and skills which they have acquired through their everyday interaction with nature. Simultaneously, they are not trained to use the new technologies and are excluded from the planning process. With degradation and privatization of natural resources, the material base of women's knowledge is declining. Krishna (2009) points out that the gender perspective involves more than a "women's

angle" on environmental issues. Highlighting the Bankura project, she argues that if women obtain more control over the material basis and the processes of production as well as their own labour, they would be well prepared for changes under India's new economic policies. She believes that women's participation in environmental movements and activities will lead to their empowerment.

Anthropocene

The Anthropocene is a scientific hypothesis based on the assumption that humanity has become a global Earth system factor in sectors such as water circulation, climate, biological productivity, biodiversity, geo biochemical cycles, sedimentation patterns, and overall use of lands and seas (Crutzen and Stoermer 2000; Crutzen 2002; Williams et al. 2011). If this hypothesis is correct, and all available data corroborate its correctness, it has a great range of implications.

It is necessary to understand that the previous epoch, the Holocene, has definitely come to an end and will not be reestablished ever. Our current social and economic systems, such as agriculture, permanent settlements, transport and trade infrastructures, and the large-scale division of labor, all developed during the relatively stable environmental conditions of the Holocene. Now, however, we have managed, inadvertently and unconsciously, to strain these same environmental conditions to their limits. Ethically, the Anthropocene emphasizes that all of us - from individuals to states to the

United Nations - are collectively responsible for the future of the world. Conceivably, the same force that previously wrought unintended changes could be used in a conscious and reflected manner to create a world that is sustainable on a regional as well as global scale for many generations to come. As a conceptual framework, the Anthropocene could hence provide a solid basis for envisioning a sustainable human presence on Earth in which humans would no longer be "invaders" but rather participants in shaping the natural environment. In the future, technology and culture could be integrated into nature - and thus the "unnatural" environment that surrounds us today would be transformed into a human-designed neo-natural environment that includes culture and technology as an integral part of an interconnected system.

Assuming such responsibility, however, means that transforming nature into even more human-made environments must be based on scientific knowledge and large-scale participation of society to find the possible pathways to a sustainable future. Efforts to shape a sustainable

Anthropocene of tomorrow must also follow the precautionary principle: where there is a suspected risk of harm to humans or the environment, efforts should be made to reduce these risks even if there is not yet definitive scientific proof about the causes.

Given the fact that our scope for action is limited by our knowledge, and that there is no single one-size-fits-all path to a solution, societal and individual responsibility will be of paramount importance. Society will have to legitimize science and technology, focusing in particular on education as one of the most powerful tools for transformation, in order to make the Anthropocene long-lasting, equitable, and worth living. Boundaries between science and the education process will probably vanish, giving way to new transdisciplinary approaches, with science and society interacting in a great variety of new ways. In other words, education for the Anthropocene encompasses a great array of challenges as well as opportunities. This paper attempts to outline some of them and presents a couple of practical examples on the way towards a necessary reorganization of educational systems.

Understanding the State of the Planet-an Educational Challenge

Nearly everybody is aware of the fact that humans exert influence on Earth systems processes. However, almost no one is actually aware of the magnitude of these effects. Recent data illustrate how realistic the Anthropocene hypothesis actually is: about 77 percent of all (ice-free) land surface cannot be considered pristine; it is in use by humans or has been at one time. The world is no longer characterized by biomes, i.e., natural sets of habitats, such as wild forests, savannas, or shrublands, but rather by "anthromes," i.e., cultural landscapes, such as managed forest, cropland, pasturelands, and urban areas. About 90 percent of primary plant productivity happens in these anthromes. Pollen, one of the key elements that helps us characterize natural environments in the fossil record, is dominated by just a few cultivated plant species worldwide. Invasive organisms also alter future sediments, as will plastic particles and other human-processed matter. Fish populations are strongly overfished and partially collapsed. Our present extinction rate is assumed to be at least 100 times higher than during normal episodes of Earth history development. Atmospheric carbon dioxide has never been as high during the entire history of humans as it is now. More than 50 percent of all freshwater is managed by humanity. Nitrogen oxides and sulfur dioxide emissions are now higher than their natural counterparts, and the mean erosion rate is now up to 30 times higher than during the average of the last 500 million years. At the same time, dams filter out sediment load from rivers, causing deltas to retreat and

local sea levels to rise, because the eroded material is no longer being redeposited (e.g. Crutzen 2002; Wilkinson 2005; Rockström et al. 2009; Williams et al. 2011). This list could easily be continued.

Learning from History

A very promising attempt to address the feeling that individuals and groups have of being overwhelmed by the magnitude of changes necessary for an Anthropocenic societal transformation is to highlight examples from the history of humankind that show ways in which long-lasting societal problems may be solved. According to the WBGU (2011), these lessons can be categorized into four types. First, change by vision, in which shifting values and ethical views lead to long-term alterations in society. These shifts may often be motivated by groups or individuals with visions of a better future, and gradually spread to the rest of society. The Enlightenment and abolition of slavery are possibly the best examples of how changing values and views, among other motivations, have resulted in one of the largest transformations of consciousness and society that we have ever had. Also important to state is that it took nearly the entire eighteenth century to implement Enlightenment, and that, astonishingly, abolition had not been a topic for the Enlightenment movement. Abolition took another 80 years, finally coming to a head during the secession war in the United States. The lessons from this are that change by vision is possible, that visions will have to be readjusted during the change process, and that implementation is a long and, in these examples, very violent pathway, with revolutions and wars taking place. Given the fact that it took nearly 180 years for the implementation of the vision of equality, liberty, and justice, the 20 years between the first Rio environmental summit and the relative failure of the Rio +20 summit is quite a short period, given the enormous increase in environmental literacy and activism that has already been achieved in many parts of the world. The vision of an integrated European Union is another example of where visions came first and implementation is still not completed (and is even, at present, faced with considerable challenges).

Crisis may also be a powerful motivation for transformation. Change by crisis is unfortunately one of the most common forms of change. Catastrophes such as drought, floods, or famines create an urgent need to develop new solutions to problems that may have been ignored until that time. In 1815 the gigantic eruption of the Indonesian volcano Tambora resulted in a global temperature drop: 1816, also known as “the year without summer,” was marked by very

poor harvests and a significant increase in livestock mortality, leading to the most severe famines of the nineteenth century in the northern hemisphere. In Germany, King Wilhelm I of Württemberg founded the Experimental and Academic Institute of Agriculture at Hohenheim in 1818 as a reaction to this; his goal was to "radically improve" the food supply using scientific methods. To this day, the institute is still entirely dedicated to agricultural issues. The Green Revolution that started in the 1960s is another example of worldwide change triggered by crisis, as are Structural Adjustment Programs for developing countries.

In rare cases, improvements of scientific knowledge may lead to change before a crisis occurs, such as when new scientific insights allow researchers to identify problems or side-effects of existing practices that had not previously been suspected. Unfortunately, change by scientific knowledge is far more infrequent than it should be, for it requires not only that the scientific knowledge exists, but that policymakers can be convinced to act upon this knowledge. And far too often, we discover the consequences of our actions after it is already too late to easily fix. The best example is probably the ozone hole, which was identified in the 1970s along with the cause, chlorofluorocarbons (CFCs). Chlorofluorocarbons had been developed for a very good purpose: replacing dangerous fluids and gases in items such as refrigerants and fire extinguishers with non-toxic and non-explosive inert material. The reactivity of CFC in the atmospheric ozone layer was initially not known; scientists Paul Crutzen, Mario Molina, and Frank Sherwood Rowland warned in 1974 that the ozone layer would shrink and holes might develop if the use of CFCs continued research for which they later received the Nobel Prize. In consequence, CFCs were banned worldwide by the Montreal Protocol in 1987, in time to prevent the hole from growing to dangerous dimensions. Owing to the long "braking distance," the ozone hole is still not fully closed, but we are on the way to it. It is terrible to imagine what the consequences would have been if Paul Crutzen and his team had not discovered and loudly warned about the effects of CFC.

Many other historical examples of societal or attitude change are a mixture of change by crisis and change by scientific knowledge. An example of this is the banning of DDT: although the scientific knowledge of the long-term effects of DDT was available earlier, it took Rachel Carson's book Silent Spring and her personal vision and action to highlight the dangerous effects of DDT on birds and other organisms and to initiate a movement against DDT.

Finally, technology is a trigger for transformations of all kinds, both positive and negative. Change through technical innovation is widespread and includes the mastery of fire and weapon-making in the Stone Age as well as agricultural methods for seeding, fertilizing, and watering that started in the Neolithic revolution. Another example is the perfection of the steam engine by James Watt in the nineteenth century, which was a key trigger for an avalanche of concurrent technical innovations and societal changes such as traffic and transportation, cloth and food production, and coal and iron mining and steel production. The IT revolution currently underway is another good example, with the spread of new communication systems even enabling revolutionary political changes, such as those presently occurring in Arab and North African countries.

It will probably require a combination of all these elements in order to bring about the changes needed for a long future of humans in a sustainable Anthropocene, with hopefully the crisis type not becoming the most important one. Science warns us that "braking distances" for many phenomena, such as climate change, rising sea levels, biodiversity loss, or contamination from nuclear waste, are of a geological timescale and not something that can be stopped or reversed within a few years.

Self Assessment Questions

- .What role has environmental change played in shaping economic systems?

- Compare and contrast the modes of resource use employed by different civilizations in the past.

- Analyze the concept of the Anthropocene and its significance in understanding the current state of the environment.

Unit – II

Prehistoric Environment in India – Role of Climate in Indus Valley Civilization – Forest in Ancient India –Iron Tools and Deforestation in the Vedic Period – Eco Systems of the Sangam Age in South India – Asoka and Eeology – Mughals and Hunting.

Objectives

- Geological, Climatic, and Ecological factors that characterized the prehistoric environment in India.
- Impact of Climate on the Indus Valley Civilization.
- Ecosystems during the Sangam age.

Prehistoric Environmental History in India

Prehistoric Periods

Prehistory time is defined as the period of human activity between the use of the first stone tools approx. 3.3 million years ago and the invention of writing systems, the earliest of which appeared nearly 5,300 years ago. The prehistoric age is divided into the Stone Age, Metal Age (Copper, Bronze and Iron Age), and Golden Age. The longest period is Stone Age, which is further divided into Old Stone Age (Paleolithic), Middle Stone Age (Mesolithic) and New Stone Age (New lithic) (scheme 1). The copper age is also known as Chalcolithic i.e use of copper and stones both.

Paleoclimatology - Ancient Climates The study of changes in climate accounted on the scale of the entire history of Earth is called as Paleoclimatology. Under this branch, the natural materials such as rocks, sediments, ice sheets, tree rings, corals, shells, and microfossils were used to obtain the prehistoric climatic data as discussed below:

Ice: Ice caps and Mountain glaciers provide abundant information about the ancient climatic conditions. The air remained trapped within fallen snow as tiny bubbles. The trapped air has proven a tremendously valuable source for direct measurement of the composition of air from the time the ice was formed. The changing pattern in the layers thickness can be used to determine changes in precipitation or temperature.

Dendron Climatology: Climatic information can be obtained through an understanding of changes in tree growth. Generally, trees respond to changes in climatic variables by speeding up or slowing down growth, which in turn is generally reflected by thickness of growth rings.

Different species, however, respond to changes in climatic variables in different ways. A tree-ring record is established by compiling information from many living trees in a specific area.

Sediments, sometimes citified to form rock, may contain remnants of preserved vegetation, animals, plankton, or pollen, which may be characteristic of certain climatic zones. Biomarker molecules such as the alkenones may yield information about their temperature of formation.

Chemical signatures, particularly Mg/Ca ratio of calcite in Foraminifera tests, can be used to reconstruct past temperature. Coral "rings" are similar to tree rings except that they respond to different parameters, such as the water temperature, freshwater influx, pH changes, and wave action.

Carbon dating: Carbon dating can be used to date organic artifacts, or things that were once alive. All living things contain a radioactive isotope of Carbon called Carbon 14 since the time they were alive. Carbon 14 has a half-life of 5000 years. That means it takes 5,000 years for half of the Carbon 14 to break down.

Fossils: The remains of ancient plants and animals. By studying fossils, archaeologists and anthropologists can learn about what people ate, what animals they had around, and their way of life.

Development of Early Humans

Anthropologists divide hominids into three different types based on their body shapes and lifestyles. The first type of hominid was referred as Homo habilis, which means person with abilities. It is believed that Homo habilis lived about 1.5 million years ago. The second type of early human that lived on the Earth was Homo erectus, which means person who can walk upright.' Homo erectus lived on the Earth about 150,000 years ago. The last hominid on Earth was Homo sapien. Homo sapien means person who can think. Presently all humans on Earth belongs to Homo sapiens. The pattern of human development is as follow:

I. HOMINIDS: Walked upright like humans, Fossils found from Africa, Existed 4 million years ago for millions of year, Discovered by Louis and Mary Leaky
II. Homo Habilis: Existed 2.5-1.6 million years ago, Known as "Handy Human", Used stone tools, Fossils found near Olduvai George
III. Homo Erectus: "Upright Human", 1.8 to 100,000 years ago Had arms and legs in modern human proportion, First human to leave Africa.

IV. Neanderthals: 100,000 B.C. to 30,000 B.C. Buried their dead; believed in afterlife Wore animal skins

V. Homo sapiens: Rapid brain growth, Mastered fire, 200,000 B.C. to present

Pre Historic Man and Environmental Interactions

The Paleo-climatic evidence and facts suggest that the changes in the climatic conditions always help in the incubation of several species. The development of prehistoric man is also the consequence of controlled climatic conditions. But, with the settlement and stabilization of human community, the dramatic shift was observed in the climatic conditions. The rapid changes in temperature, precipitation and distribution of vegetation are the major outcomes of the Pre Historic man and environmental interactions. The activities adapted by the prehistoric humans for improvement of their life style were totally dependent on their surroundings. The activities like hunting and gathering, use of stone & metals and discovery of fire & wheels were the initial steps of humans that influenced the surroundings. As the humans expended his knowledge of agriculture, animal domestication, the influence and burden on the surrounding environment increased.

Environmental Interactions in Stone Age The Stone Age is one of the longest prehistoric period. This is known for the use of stone in the manufacturing of tools with a sharp edge, a point, or a flat surface. The period of this era is between 250000 years ago to 10000 years ago. The Stone Age is further divided into Palaeolithic, Mesolithic, Neolithic, Chalcolithic ages. The information about the environmental and climatic conditions of this era collected by different places and sources is as follow:

1. In the Stone Age, initially the humans were hunter-gatherers who used to travel for hunting and gathering wild plants and meat.

2. The archeological data provides the proof of wet and dry spells from 80,000 to 40,000 years ago that created a huge impact in shaping modern human intelligence, adaptability, and social behaviors.

3. The aggregation and dispersion of humans were influenced by the climatic conditions e.g. humans left Africa, perhaps motivated by the competition for resources during droughts, they ended up in places, like Europe and Northern Asia that were colder and often covered in snow.

Aurignacian tools, such as tools made of bones, stone bladed tools and tools made of antlers were created during this period and confirmed that the humans had little knowledge of agricultural practices. Neolithic humans domesticated dogs for personal protection, or hunting. The evidence of dog has been found in the burial of early age humans. The evidences also suggested the interaction of humans with other small animals like sheep, goat, cat and large animals like rhino, bison or even mammoths.

The discovery of fire has also been reported in the late Stone Age. They used fire as a source of warmth. It allowed early humans to survive in cold temperatures of nights and to survive in colder environments. The fire also made possible the geographic expansion from tropical and subtropical climates to areas of temperate climates with colder winters.

Environmental Interactions in Metal Age

- The progress of civilization heavily depended on the discovery of metals. Prehistoric man used metals to build tools and weapons and as the knowledge of metallurgy developed, metals played an essential role in the improvement of agriculture, transport, art and craft. Copper was the first metal used for the preparation of tools, implements and weapons. The metal age is divided into three stages: the Copper Age, the Bronze Age and the Iron Age.
- Agricultural evidences of Iron Age have shown that the new crops like wheat were introduced. In addition to the spelt wheat, barley, rye and oats were also in use.
- Harvested crops were stored in either granaries that were raised from the ground on posts, or in bell-shaped pits 2-3m (6-7ft) deep, dug into the chalk landscape
- Domestication evidence indicates that cattle and sheep were the most common farm animals. In addition, pigs were also kept. The animals supported the family with heavy farm labor (in the case of the cattle) such as the ploughing of crop fields, and also as source of a valuable form of manure, wool or hide, and food products.
- Horses and dogs were also observed in the archaeological evidences from both faunal remains and art facts. Horses were used for pulling 2 or 4 wheeled vehicles (carts, chariots), while dogs would have assisted in the herding of the livestock and hunting.
- During the Metal Ages, people made variety of metal objects. They also invented new techniques for making clay pottery. The most characteristic examples are beaker pots.

- Palaeo-ecological surveys and radiocarbon dating of peat cores from ten sites indicated that field cultivation and animal husbandry had taken place constantly throughout the entire Iron Age.
- The Stone Age people follow the Burial custom. Burying of dead in north- south orientation has been revealed by excavations. There are evidences of pit-burial also.
- The people in this era does not knew the art of mixing of tin and copper, that is why, only few sites had the evidences of bronze.
- Generally, Chalcolithic cultures had grown in river valleys. Most importantly, the Harappan culture is considered as a part of Chalcolithic culture.

In South India the river valleys of the Godavari, Krishna, Tungabhadra, Pennar and Kaveri were settled by farming communities during this period.

Prehistoric Development and Environment

Agricultural Development

As agriculture spread humans began to grow different crops that were suitable to the environment. The places where people began to settle down, grow crops, and start villages became the Cradles of Civilization. Most of these areas were in river valleys. This first was Mesopotamia between the Tigris and Euphrates River Valleys. Other river valleys include Nile in Egypt, Indus in India, and the Huang He in China. These villages spread throughout Europe and the rest of the world. The oldest and largest of the villages were found in South West Asia. The major crops cultivated at that time are as follow:

- Southwest Asia- wheat, barley, rice
- Africa and Egypt: wheat, barley, banana
- Meso-Americans: Bean, squash, maize

The Changes in the societies and environment due to Agricultural development were

- Creation of small settlements villages and towns started
- Population, warfare and disease increased
- Shift cultivation and deforestation
- Temperature of earth increased
- New varieties of crops developed
- Storing of foods and preservation techniques developed
- New tools, methods, agricultural land preparation started

- Animals were used for fieldworks

Animal Domestication

In addition to growing crops, Neolithic man also tamed animals for hunting (dogs) and other animals for their food supply such as sheep, cows, etc. The animals were used in the farm activities also. They also explored the animals for other works like travelling, recreation and other religious activities. The use of animal based products also increased. Use of animal skin, wool, horns and teeth for tool making was in progress. The major effects of animal domestication associated with environment are as follows:

The animal domestication followed the artificial selection i.e. the selection of advantageous natural variations, due to this mechanism most of the domestic species evolved.

The herd-living and herbivorous animals were preferably exploited by the Neolithic peoples due to their flexible diet (enough to live on what early farmers might provide), grew fast (and thus did not unduly expend farmers' resources), and would freely breed in the presence of people. As the consequence of this, the species and breeds of these animals improved with time.

Role of Climate in Indus Valley Civilization

Geographical Setting

The Indus Valley was characterized by a diverse landscape, encompassing the fertile plains of the Indus River and its tributaries, as well as the adjacent Thar Desert.

The region's geography significantly influenced the availability of water resources and agricultural potential.

Climate Variability

The climate during the IVC was marked by periods of both stability and change.

Long-term climate patterns, such as monsoons and seasonal variations, influenced agriculture, water availability, and overall sustainability.

Monsoons and Agricultural Practices

Monsoons played a pivotal role in the IVC's agricultural practices. The arrival, duration, and intensity of monsoons directly impacted crop cultivation.

Reliable monsoon patterns contributed to the development of an advanced agricultural system, including the use of sophisticated irrigation techniques.

Hydrological Systems

The Indus River and its tributaries, including the Ghaggar-Hakra, were integral to the civilization's existence. They provided a consistent water supply for irrigation and daily use. Fluctuations in river patterns and water availability could have had profound effects on agricultural productivity and the overall sustainability of settlements.

Urban Planning and Water Management

Cities like Mohenjo-daro and Harappa showcased advanced urban planning with well-designed drainage systems and public baths.

These features suggest a deep understanding of water management, indicating the civilization's ability to cope with the challenges posed by the environment.

Impact of Climate Change

The decline of the Indus Valley Civilization has been linked to various factors, including shifts in climate patterns.

Evidence suggests changes in monsoon patterns, which could have led to decreased agricultural productivity and strained resources, contributing to societal stress.

Adaptation and Resilience

The Indus Valley inhabitants exhibited adaptability and resilience in response to environmental challenges.

Urban planning, water management systems, and agricultural practices reflected a society capable of adjusting to climatic variations.

The study of the Indus Valley Civilization from an environmental perspective underscores the intricate relationship between climate and human civilization. By understanding how the ancient inhabitants navigated climatic challenges, we gain insights into sustainable practices and the potential impact of climate change on human societies throughout history. This knowledge is particularly relevant in the contemporary context, as we face global environmental challenges and work towards sustainable development.

Forest in Ancient India

Forests

In many ancient Indian literary sources the settlement (kshetra) – village (grama) or city (nagara) – reflected an organized and systematized social order. On the one hand, the forest (vana/aranya) was the abode of ascetics and renounces as well as a terrain that included desert

and semi-pastoral tracts of land. These are differentiated from each other and presented as polar opposites. However, they are also viewed as being closely linked in the form of a continuum. Thus, there is both dichotomy and complementarily between the two and the texts often try to understand and comment upon the influence of kshetra on aranya and vice versa. It also needs to be kept in mind that with the rise of urban centres and particularly in the early centuries of Common Era there was also a growing demarcation between grama and nagara. The former was not static and could also be a mobile village of migrating cattle-keepers. Grama also subsequently became an intermediary zone between nagara and vana. Now let us delve into a few historical sources to get an idea of how forests were perceived by ancient Indians.

Arthashastra Kautilya devises a detailed way of demarcating and classifying ecological spaces with the intent to harness their resource potential and forests figure prominently in his scheme. The terms used in the Arthashastra for a forest are:

- Vana,
- Aranya/Aaranya,
- Atavi, and Kantara
- Inhabitants of the forest are referred to as:
- Vanacharas,
- Aranyavasins, and Atavikas.

Kautilya ascribes importance to the management and protection of forests as well as gardens, groves and orchards. They were not only recreational venues but also potential sources of revenue. Aranyas supplied honey, timber, oblation material for sacrifices, herbs of various kinds, flowers, fruits, roots, vegetables, wild grains etc. He classifies the forests into material forests, elephant forests (hastivanas) etc. based on their resource potential and use. Kautilya visualizes forest as a terrain to be controlled, exploited, and protected and expanded, and a terrain into which the state must aggressively extend its administrative and fiscal activity. He instructs the appointment of superintendents of forests and directors of forest-produce (kupyadhyakshas) to promote forest resources. All forests are said to be owned by the government. He recommends rewards to the person who brings a pair of tusks of an elephant which died naturally. He instructs setting up of factories/manufactories (karmantaham) for goods obtained from forests and raise income of the state. But, he cautions that forest-products should be used in a sustainable manner. He lays stress on the protection of specifically those trees which

yield flowers and fruits and those that provide shade. Fines of varying amounts are said to be imposed for cutting a tree or any part of it, depending on the kind of harm afflicted. He emphasizes on safeguarding particularly those forests that were watered by a river as those could be used as a shelter during rebellion, invasion or other kinds of trouble.

In many other treatises also, the forest is visualized as a site of conflict and they refer to clashes between forest tribes and state armies. They also state that vast forest terrains were spaces where writ of the state did not run smoothly or didn't run at all. Forest hunters who, over the centuries, supplied wild game to feed the residents of settlements are generally portrayed in them as violent, uncultured, barbaric, uncouth etc. Violence or the threat of violence against them was necessary for the spread of agriculture and geographical expansion of cities and states and this is brought to fore in various ancient Indian literary compositions. Forest very dear to her. On the other Epics and Puranas When Rama leaves for exile to the forest lying south of the Gangetic plains, mother Kaushalya is worrisome about his safety. She exclaims, "May the huge elephants not harm you my dear son, nor the lions, tigers, bears, boars or ferocious horned buffalo".

However, forests were a source of pleasure to Sita. Arjuna, Karnikara/Kanaka Champa and Japa Pushpa (Hibiscus) have been outlined as her favourite trees. Sandalwood (chandana) tree was particularly popular around that time. Ravana's Ashoka-vatika in Lanka is said to be full of Ashoka, Champa, and Shala/Sala trees. Poet Valmiki gives vivid descriptions of honey-scented groves, lotus-ponds, herds of deer, geese and ducks in the forest. He defines Aryavarta – land of the Aryans/abode of the Aryans – as the region where black antelope wandered, precisely the landmass to the north of Vindhyan mountain range.

The Mahabharata tells us that the capital of Kurus – Hastinapura – was located in a forest zone. Pollen remains from the excavations at Hastinapura (Meerut district, Uttar Pradesh) show the evidence of Dalbergiasissoo (a kind of timber), Pinus (pine) and other varieties of vegetation. The Bhagavata Purana describes the forests of Vrindavana as "full of bees, flowers, fruits, vegetation and pasturing grass"; "as sanctified as the clear mind of a devotee"; "there were chirping birds and clear-water lakes, with waters that could relieve one of all fatigue. Sweet-smelling breezes blew always, refreshing the body and mind"; "Krishna saw all the trees, overloaded with fruits and fresh twigs, bending down to touch the ground as if welcoming him by touching his lotus feet". He lavishes praise to the trees of Vrindavana, they have dedicated

their lives to the welfare of others. Individually, they are tolerating all kinds of natural disturbances. They supply various kinds of facilities to human society, such as leaves, flowers, fruits, shade, roots, bark, flavour extracts and fuels."

Abhijnana Shakuntalam It is a drama by the greatest Sanskrit poet Kalidasa: one of the "nine luminaries/ gems" (navratnas) of the court of Gupta ruler Changragupta II. It makes references to beautiful tapovanas (sacred groves) where sages/saints/ascetics meditated and did penance. It amply highlights the closeness of rishi Kanva and her daughter Shakuntala to the forest. The forest is projected as a peaceful and quiet place. Shakuntala held plants and deer of the hand, vana in ancient India is also viewed as a space that was bereft of the cohesion of the kshetra, as the abode of those like thieves and brigands who did not live by dharma (courteousness), as "strange, remote, wild and different and teeming with creatures whose appearance and behavior was unpredictable". It was the backdrop of three kinds of human action: the hunt, the hermitage and the place of exile. The Shakuntala narrative opens with Dushyanta hunting in the forest with a large entourage of hundreds of elephants and horses and heavily-armed soldiers as if heading towards a battle. This was because the aranya was an unknown territory, inhabited by rakshasas.

Iron and Deforestation in the Vedic Period

IN 2004, deforestation and biomass decomposition accounted for 17.3% of the total 49 Pg of CO2-equivalent anthropogenic emissions of greenhouse gases (GHGs)1, while fossil fuel consumption represented 56.6%. Global estimates of recent emissions are computed from country level inventories following IPCC guidelines. For past emissions, ancient land-cover changes are either neglected or introduced through a historical frame. In this communication, we assess the consequences of not considering ancient land-cover changes when estimating GHG anthropogenic emissions for a large study area located in South India, focusing on soil organic carbon (SOC) which represents the largest terrestrial C pool. In 2001, the Intergovernmental Panel on Climate Change (IPCC) calculations for land-use (LU) change related emissions amounted to 121 PGC for the period 1850–1990, with LU changes obtained by the difference between potential8 and current9 vegetation maps. Potential vegetation was represented by the 1850 land cover, with the implicit hypothesis that no significant deforestation occurred before that date, and that GHGs emissions due to land-use/land-cover changes had started at about the same time as those due to fossil-fuel consumption When Houghton and Hackler, and Van

Minnen et al. calculated emissions for tropical Asia and for India respectively, historical frames of land-cover changes were introduced. Houghton and Hackler considered the period before 1750 as the 'pre-disturbance period' (i.e. hypothesizing that no major anthropogenic land-cover changes had occurred before 1750), whereas Van Minnen et al.6 proposed four world maps of the 'reconstructed agricultural area (cropland and pasture)' for AD 1700, 1800, 1900 and 2000. In both studies, ancient land-cover changes were not considered, while in the latter one, the 1700s map surprisingly showed South India free of cultivated areas. For estimating past SOC changes in our study area, reference stock (i.e. SOC stock under potential vegetation) was based on a potential vegetation map derived from the forest maps of Pascal et al.10,11 and Ramesh et al. In these maps, the potential area of each vegetation type is mainly given by the bioclimatic.

The oldest iron tools discovered in Karnataka were dated from 1050 to 950 BC; this age corresponds to the 'later Vedic period' (1000–600 BC) of Randhawa. The use of iron tools, axes, sickles and ploughs of different types allowed efficient deforestation and, at the same time, extension of ploughed areas and the true transition to settled agriculture. Further agricultural development of South India was made by rulers of local kingdoms. The first one, the Chera kingdom, corresponding to the present-day Kerala, flourished during the second century AD. Other kingdoms appeared later, mostly to the west of the study area on the deltaic formations of the west coast, and have developed irrigated rice cultivation. Their rulers have continued on the same basis, encouraging land clearance and promoting

Eco-System of Sangam age in South India

Three states, namely, Cholas, Cheras, and Pandya emerged in south India. Sangam literature believes that the dynasties of Chola, Chera, and Pandya belong to immemorial antiquity**.**

Chola Dynasty

The Cholas have occupied the region of Kaveri delta and the adjoining area. The region of Kanchi was also part of the Cholas kingdom.

- The Kingdom was situated towards the north-east of Pandya kingdom and it was also called as Cholamandalam in early medieval times.
- In the beginning, its capital was Uraiyur in Tiruchirapalli, but subsequently shifted to Kaveripattanam. It was called as 'Puhar' at that time.

- A Chola king, known as Elara, conquered Sri Lanka and ruled over it for about 50 years during the middle of the 2nd century B.C.
- Karikala was a famous Chola king of the early time. He was credited because of his two achievements − o He had defeated the joint forces of Chera and Pandya kings and o He successful invaded Sri Lanka and ruled there.
- Karikala was defeated in a great battle at Venni near Tanjore by a confederacy of (about) a dozen rulers headed by Chera and Pandya kings.
- Karikala maintained a powerful navy and conquered Sri Lanka.
- Karikala built big irrigation channels and embankment about a 160 km along the river Kaveri.
- Karikala fortified the town and the famous sea part of Puhar at the mouth of the Kaveri.
- Karikala was a great patron of literature and education.
- He was a follower of Vedic religion and performed many Vedic sacrifices.
- The successors of Karikala were quite weak and family members squabbled for power and position therefore the Chola kingdom faced confusion and chaos after Karikala.
- Illanjetcenni was the only king after Karikala who is known. He had captured two fortresses from the Cheras. However, after Karikala, the Chola Empire declined and the Cheras and Pandyas extended their territories.
- The Cholas were reduced to a small ruling family from about the 4th to the 9^{th} century A.D.
- Pandya Dynasty
- The Pandya kingdom was the second important kingdom in south India during this period. It occupied the region of modern districts of Tirunelveli, Ramnad, and Madurai in Tamil Nadu.
- The capital of Pandya kingdom was Madurai. The Pandyan kingdom was very wealthy and prosperous
- The Sangam literature gives information and names of a few kings.
- Nedunjeliyan was a great Pandya king. He defeated the combined forces of Chera, Chola, and five other minor states in a war against him at Madurai.
- The Pandyan kings assembled literary assemblies called as ‘Sangam’.

- Nedunjeliyan had performed several Vedic sacrifices. He may be taken to have ruled around A. D. 210.
- The capital Madurai and the port city Korkai were the great centres of trade and commerce during the Pandyas' reign.
- The traders profited from trade with the Roman Empire.
- Pandya kings even sent embassies to the Roman emperor Augustus and Trojan

Chera Dynasty

The Cheras were also known as 'Keralaputras' in the history. The Chera kingdom occupied the region of a narrow strip between the sea and the mountains of Konkan range.

- The Chera rulers also occupied high position in the history of south India. Nedunjeral Adan was a famous Chera king. He conquered Kadambas with his capital at Vanavasi (near Goa). He also defeated the Yavanas.
- Nedunjeral Adan had a good relation with the Greeks and Romans who came in large numbers as traders and set up large colonies in south India.
- Nedunjeral Adan fought a battle with the father of the Chola king Karikala. In this battle, both the kings were killed.
- Nedunjeral Adan was called as Imayavaramban. The literary meaning of the term Imayavaramban is "one who had the Himalaya Mountains as the boundary of his kingdom." However, it seems to be mere exaggeration.
- Sengutturan was the greatest king of the Chera dynasty as mentioned in the Chera tradition. He had defeated the Chola and the Pandya kings.
- The Chera power declined at the end of the 3rd century A.D. They again acquired power in the 8th century A.D.
- The important facts about the three early kingdoms of south India are − o They constantly fought with each other; o They made new alliances against the ones who became powerful; and o They also fought regularly with Sri Lanka and ruled there at some point of time.

Asoka - Ecology

The Ashoka Trust for Research in Ecology and the Environment (ATREE) was established in 1996. During its ten years of existence, ATREE has emerged as one of India's premier conservation organizations. As described in the pages of this report, we have launched a

number of programs and our work is having an impact on conservation. While we celebrate our successes, a decade of existence should provide a pause for reflection and time to think about future priorities.

Although organizations such as ATREE are generating new and relevant knowledge, building human resources, and bringing stakeholders together for conservation action, a number of challenges remain. Rapid economic growth, inequitable development, and poor governance continue to extract a heavy toll from the environment. Climate change further threatens to exacerbate environmental degradation and losses of biodiversity. At the same time polarization about such issues as the Forest Dwellers Rights Act, 2006 is preventing the society to reach a consensus on the best ways to conserve and manage biodiversity.

ATREE is developing its strategic plan to confront our most pressing environmental challenges. Improvements in polices and environmental governance, climate change, harmonization of the provisions of the Forest Rights Act and conservation goals are likely to be the key components of the new plan. ATREE will also anchor a multi institutional India Biodiversity Portal, sponsored by the National Knowledge Commission. The portal will advance knowledge about all aspects of biodiversity, provide a forum to scientists and citizens alike to enrich biodiversity databases, and disseminate information about biodiversity.

Central to ATREE's future is our concept of an Academy for Conservation Science and Sustainability Studies that will encompass almost all our research and capacity building programs. An innovative, interdisciplinary doctoral program in conservation science and courses and certificate programs for professionals from non-government organizations and government organizations as well as college and university teachers will constitute the core academic programs of the Academy. Five community conservation centers will serve as the field extensions of the Academy, facilitating the combination of theory and practice, integration of different knowledge systems and the two-way flow of ideas and information between the classroom and the field.

ATREE would need support and advice from our friends and well wishers as we move forward to implement a range of new programs. Thus we welcome comments and inputs from the readers of this report.

ATREE continues to receive support from many sources, but we are particularly grateful to the Arghyam Foundation, Ford Foundation, Suri Sehgal Foundation, Sir Dorabji Tata Trust and an anonymous donor for their generous unrestricted support.

Globally, we are going through a period of far-reaching environmental and economic transformation. The three key elements of environmental change are land-use change, biodiversity change and climate change. Underlying these changes are population growth combined with increasing consumption levels, and policies associated with development, economic growth and international trade. Globalisation – the movement of goods, services, and ideas through international trade and information technologies – is also accelerating economic and environmental changes. All these changes have significant consequences for sustainability and human well-being.

Our understanding of the complex web of these changes and of how best to manage them is fairly limited. For example, chronic rural poverty and environmental degradation are causally linked and mutually reinforcing; they can be resolved only if they are addressed simultaneously. Yet possible solutions are necessarily complex, multi-level and multi-variable, and involve people, policy, livelihood, conservation and governance, at the very least. They also need to be implemented over the long-term and at large enough scales for them to reverse these negative trends.

In South Asia, many ecosystems are largely modified by human presence, extraction of biomass and appropriation of ecosystem services. One of the most challenging issues is the maintenance of biodiversity and ecosystem services under these conditions, and especially identifying the scale and intensity of human use that is compatible with continued maintenance of biodiversity and ecosystem services. Our understanding of economic and environmental change, the forces underlying these changes and the impact of changes on biodiversity and humanity are still not very clear.

The degradation of natural capital – biodiversity and natural ecosystems – is of particular concern for several reasons. First, changes are rapid and when associated with loss of species or ecosystems, irreversible. Second, the loss of natural ecosystems results in loss of ecosystem services such as clean water from watersheds, retention of soil and soil fertility, sequestration of carbon and provision of pollinators and natural predators of pests. Value of these ecosystems services often exceeds the annual gross domestic product of countries. Third, in a country like

India, millions of people rely on products from natural ecosystems to sustain their livelihoods. Fourth, our understanding of biodiversity in natural ecosystems both in terms of the amounts and function remains so woefully inadequate that we are unable to fully comprehend the consequences of its loss. Fifth, with impending climate change and increasing spread of invasive species, biodiversity crisis is likely to get worse with far reaching impacts on human societies. Sixth, developments in science, sampling and decision science have not yet played a key-role in the management of complex ecosystems. Finally, with impending climate change and increasing spread of invasive species, the degradation is likely to worsen, with far-reaching impacts on human societies

Mission statement: 'To integrate rigorous natural and social sciences with policy, education and socially responsible conservation action.'

The Ashoka Trust for Research in Ecology and the Environment (ATREE) was established in 1996 to contribute to efforts to curtail the rapid loss of India's diverse biological resources and natural ecosystems and to address the environmental, social and economic dimensions of this decline. ATREE's goals are:

To conserve biological diversity and promote sustainable development. To improve the institutional and policy framework for protection of the environment. To strengthen the knowledge base and the capacity of government and non-governmental organisations to use the best knowledge and data to evolve solutions to environmental problems.

We seek to accomplish these goals by generating new knowledge, improving policy and governance related to management of biodiversity, and developing social and human capital to address our most pressing environmental challenges.

Over the last decade ATREE has grown and established itself as a leading national institution working in the area of biodiversity conservation. Our staff strength has grown from six individuals to a current strength of over 140 individuals with expertise in diversified disciplines spread over three offices and a number of project sites. ATREE has been recognised as a Scientific and Industrial Research Organisation by the Ministry of Science and Technology, Government of India.

Mughal and Hunding

Hunting in Mughal India was practiced keeping the older traditions as the basic rule thereby adding new important features. Hunting was forbidden on certain days. Though there

were efforts against slaughter. Under Mughal rule, no killing was allowed at sacred sites of the Jains. Species like elephant and cheetah were being hunted on a large scale. The behaviour of the falcons, tribal's hunting techniques and various methods to track down tigers were the striking features. The hunting grounds had few restrictions. Methods like the capture of cheetahs in pit-fall traps or the trapping of francolins were innovative techniques. The second nature of the Mughals was the use of the musket. Hunting was more than a means of pleasure. Hunts were used to camouflage armed expeditions. The Mughals developed hunting into a ritualized activity. Animals are often hunted with huge attendants of soldiers, who drove the game animals into a central stage. The half-moon formation that was formed by the troops required a deep knowledge of the terrain and quarry movements. Despite all the arrangements, the hunters moved on foot and exposed themselves to personal danger when pursuing a lion or tiger. As the Mughals were keen meat-eaters they were particular about observing what they required.

Jahangir had killed over 17,000 animals in the first twelve years of his reign. The Mughal palate used thirty five to forty meat dishes at a proper meal. The hunt symbolized the of the ruler's ability to overcome harmful animals. The tiger and the lion played a key role for the Mughals. The lion figured in the flag of the Mughal Empire and was common enough across the scrub forests and dry savannahs of Northern India.

The foundation of the Mughal Empire was laid by Emperor Zaheeruddin Muhammad in 1526. The Mughal emperors not only earned their name in the world for their glory and victories but were also known for their favorite hobbies. In all these, hunting has been a favorite hobby of the Mughal emperors.

The Mughal emperors Akbar, Jahangir, and Shah Jahan were directly associated with hunting. According to AbulFazl- hunting as a source of knowledge.

- Emperor Akbar had a prestigious place in Mughal history. Due to his enthusiasm for literary, historical and philosophical works, Akbar encouraged artists of his court to create manuscripts, through which, he gained the power of communication with a diverse group of people although the factory was established during the time of Humayun, it was fully developed during the reign of Akbar. His karkhana (royal studio) was filled with Iranian master painters Khawaja Abdul Samad and Mie Sayyed Ali guided many artists in indigenous Hindu artists and craftsmen, as well as outstanding architects. Later in his reign, more than a hundred painters had become renowned masters of the art, and many

had achieved success. The Mughal emperors Akbar, Jahangir and Shahjahan all focused on their taste in hunting paintings. Some important paintings were drawn by Akbar, Jahangir and Darashikoh directly. Of their direct association with hunting and keen observation of those particular incidents, they could draw these paintings. All the paintings of hunting are focused on the personal taste of the emperor. During the reign of Akbar, there was a separate department of hunting in which hunters kept inventing new methods of hunting and making new "tools" for hunting. A picture from Khandan-iTaimuria (which is stored in Patna) shows different methods of hunting and different types of weapons like bows, arrows, spears, guns, iron paths (with iron rings lying on it. An instrument made in the shape of animal horns etc. is also depicted.

- Mughal hunting scenes depict hunting as more than a pastime. AbulFazl insists that Akbar always regarded hunting as a means of increasing his knowledge.
- According to Ain-i-Akbari. "Akbar also invented a new method of hunting leopards, which astonished even the most experienced hunters. He built each pit with a net, which would prevent the animals from breaking their legs if they fell into the pit
- In most of the paintings emperor is shown standing or riding a horse. Animal's facial expressions as well as depicting hunting and excitement, subtle depiction of nature with snow-capped mountains and vegetation and a smoky atmosphere somewhere in the surrounding green field and different types of animals have been depicted in these paintings. The researcher notes that Emperor Akbar wanted to gain knowledge by preserving various manuscripts through his hunting skills and this curiosity of his prevailed throughout his reign. The Mughal emperors believed that Hunting was a royal duty for them. It was an act to demonstrate the emperor's ability to control threatening behavior, successfully mobilize resources, publicize his administrative skills and oversee his reign. Shikargah is a theater in which social hierarchies and political networking are staged.
- Akbar was famous for training his cheetahs. Akbar led the hunt with his trained cheetahs. He had given ranks to his cheetahs. For this work, he hired an animal trainer. Hunting was a great hobby of Emperor Akbar and from this training of cheetahs, it can be said that he was more courageous. Cheetahs were trained to hunt only blackbuck.
- Akbar caught cheetahs from the jungle and their training usually took about three months.

- In the Jahangir period, artists focused on flora & fauna instead of human figures. For Jahangir, his passion for observing nature influenced his artistic tastes. His interest in animals and plants is reflected in the paintings of his period. Like his predecessors, Jahangir was eager to assert his Timurid. According to Jahangirnama, 'Jahangir was the emperor who took forward the Taimurdynasty.

Although the empire was stable during Jahangir's reign, there was a need to establish Mughal legitimacy. Linking his rule to the Timurid tradition underscores his divine kingship and undoubted power. According to Ebba Koch, 'Shahjahani manuscripts were not only created for an aesthetic purpose but they were also ordered and hierarchical. In the Shahjahan period hunting paintings became graded as well as got a mature style. The painting of Shahjahan hunting antelope is one of the best examples of the supreme power of the emperor. EbaKock believed that "being an emperor, the emperor himself must observe discipline and control his behavior.

Cheetah attack on the royal convoy

Historical Background: Emperor Akbar was very fond of hunting. He used to go hunting after taking time out from his royal court work. Many times during the hunt bitter and exciting experiences were encountered which he ordered to be depicted in the Akbar Nama. According to Akbar Nama - "The next day the emperor's convoy was slowly moving forward while hunting. As soon as his convoy reached the Marwar fort, a leopard attacked the convoy along with three cubs like some divine power. The emperor shows his strength like a lion. Without any hesitation, with a single stroke of his sword, he struck the chest of this dangerous animal. The people who were watching this scene were horrified and astonished. His skin was removed and the handle of the dagger and handle of the sword was made for the emperor.

Painting Description

In this painting, an exciting hunting scene has been depicted. The leopard with his family attacked the royal convoy. Akbar attacked the leopard with his sword. In a very dramatic way, the emperor severed the head of the leopard from its torso. His tongue has come out and blood is coming out of his body. In the middle part of the painting, the lion's cub has been killed, and another cub is attacking a courtier. In the lower part, a lion cub has been stabbed by a courtier. A Lion cub has attacked another hunter. The courtiers have been depicted taking guns and arrows behind the elephants. The natural beauty of Malwa has been depicted in the painting. Royal convoys are passing through forests and mountains in lush green grass. Malwa fort and Persian-

style hills have been depicted in the background. Even before this, in Babur Nama, many hunting scenes have been depicted but such type of attack was not depicted anywhere else. In this painting, Basawan created expressions of fear and stress that can be seen on the faces of the figures. The figures have been raised by fine contour lines. Dark colors are predominantly used in the painting and the influence of Persian style is visible in the painting

Jahangir Showing His Hunting Skill to Prince Karan

Historical Background: In comparison of Emperor Akbar's period, few hunting scenes were painted in Jahangir's period. In Jahangir's period the emphasis was given to human personality, flora & fauna. Jahangir's love of nature influenced his artistic taste. His interest in animals and plants is reflected in the paintings of his period. During his visit to Kashmir, he described the beauty of the flowers blooming in the Kashmir valley and described the beauty of the beautiful bird Saaj and its colors. He ordered artists to paint this bird. Jahangir is considered a connoisseur of art among the Mughal rulers. Jahangir was a kind-hearted and nature-loving emperor who studied various animals and beautiful birds during his visits to the kingdom and ordered to paint them. No painting was completed in his workshop without the permission of the emperor. Because of that, the personality of the artist was recognized in the painting. Like his predecessors, Jahangir believed in keeping his Timrod heritage alive. Like his forefathers, Jahangir was also fond of hunting. In Jahangir Nama, There are several paintings in which Emperor Jahangir is depicted playing the game of hunting**.**

Painting Description

This incident took place in 1615 and was made part of the Jahangir Nama by Emperor Jahangir. In this picture, Jahangir shows his skills to the Rajput prince Karan. Jahangir and the Rajput prince Karan heard the news of a lioness near a lake. "Karan asked the emperor if he could shoot an arrow in the eye of the animal?" On hearing this Jahangir shot in the eye of the lioness so that he would not be embarrassed in front of Rajput prince Karan. In The painting the lioness is lying on the ground and one hand is kept on her eye which shows the wound inflicted by Jahangir. Prince Karan shows his respect to the emperor by touching his turban. The painting shows Jahangir and Karan mounted on their elephants that appear restless as they face the ferocious lioness. Thus the painting serves as a message of Jahangir's prowess and valor as an emperor.

Shahjahan Hunting

Historical background: Like his forefathers, Shahjahan was also very fond of hunting. He has described many hunting scenes in his autobiography PadshahNama. Here is one of the important incidents of his life. According to the Padshah Nama, this hunt was played at Palam (near Delhi) in Najafgarh in 1634, but historians.

Believed that the realistic depiction of this place suggests that this hunt was probably played around an area called Rupbas. It is difficult to say precisely as to which place isit because this type of depiction has been created in many paintings of PadshahNama. "The incident is described in the PadshahNama as follows - On 26 February 1634, our convoy reached Palam (Delhi) for hunting on the left side of Najafgarh. The magnificent building at this place was built for this purpose. We stayed at this place for four days and played hunting. One day, the king hunted forty blackbucks with his gun called Khansban. Then there was no need to go again.'' When he told this incident to his father .he said that he hunted 18 deer in one day When Shahjahan got a chance to play hunting at a place called Palampur. He hunted 40 deer's in a single day with a particular gun called Khasbaan.

Painting Description: This painting depicts Shahjahan hunting deer at Palam. This was painted after returning from Kashmir to Agra in 1630. At that time Shahjahan was 43 years old and his son Darashikoh was 20 years old. The growing beard of Shahjahan indicates that this picture was painted around 1640. Also, two of Shahjahan's chief servants, Saadat Khan and Astalat Khan (Mir Bakshi), had joined Shahjahan's court in 1639, which makes it clear that this picture is of the latter because Palam was the center of Shah Jahan's favorite hunting. When he used to travel to Delhi, Palam (Abasiyah) used to come to hunt blackbucks. Shahjahan is kneeling on a carpeted floor with his fingers resting on his special gun Khasban and the barrel of the gun resting on the shoulder of his faithful servant Zafar Khan sitting in front of the emperor. Darashikoh and his three nobles are shown below.

The entire attention of the emperor is on the edge of the pier. The nature's depiction in the picture is very real and completely Indian style, along with the sky shown in the background and Shahjahan's entire attention is focused on deer drinking water at the pier The emperor wearing a halo in which the sun raises and comes out,(a symbol of divinity). The artist created the exciting atmosphere of hunting and the hunting mood of Shahjahan through the brilliant depiction of nature. The reflection of the sunset has been shown with pale pinkish-yellow and

bluishwhite sparkles on the upper part of the painting. There are small hills on the right side and farmers working in the field, brilliant use of perspective and European influence have been depicted.

A herd of deer and some deer are shown drinking water at a distance. The artist used perspective in the depiction of deer and trees by making the surrounding deer and trees bigger and distant deer and trees smaller. It has been proved that by the time of Shahjahan, maturity had come in the Mughal painting and now the artists were well acquainted with the European influence as well. Hunted deer have not shown anywhere. Most of them are female deer than male deer. Landscape painting is according to the Indian style in comparison to the nature paintings of Shahjahani paintings. Blowing wind, rustling of leaves and perspective inspiration has been taken from European paintings. Court poets wrote poems on the theme of hunting. Based on which artists depicted royal hunts. The emperor praised his gun named Khasban and said that - this gun can fire even in the light of a candle. Poets used the candle as a beautiful metaphor. There is a predominance of both light and dark colors in the picture, with trees painted in dark green and the land in yellow and brown. The artist has been successful in depicting the exciting atmosphere of the hunt.

Shahjahan hunting the lions in Burhanpur

Historical Background: In this painting Shahjahan is shown hunting lions in Burhanpur. Court etiquette, which was the main feature of Shahjahan's court, is also clearly visible in the painting. In the foreground of the picture, the emperor and his nobles have arranged hierarchically with three elephants. Shahjahan and his courtiers are shown using a net to hunt ferocious animals. The tightly bound mesh reflects the philosophy of bravery and strength. The middle ground is separated from the foreground by a netted enclosure where all the principal figures and servants are placed. A halo is depicted on the emperor's head and on both sides of him princes are facing a lioness and her two cubs. The lion is only looking at the emperor and threatening him. As a result of the successful Deccan campaign, the lion hunt was hailed as a majestic omen and was celebrated with a high ceremony. According to François Bernier "When a king kills a lion it is considered a favorable omen for the kingdom. if the animal survives, it is considered inauspicious. "According to Bernier, The dead lion was brought to the emperor, who was seated on a throne surrounded by his important nobles. Here the carcass was measured, and

the details of the kill including the size of the lion, and the length of the tusks were recorded in the imperial archives was entered on record.

Painting Descriptions: Shahjahan depicted hunting lions in Burhanpur. Court etiquette, which was the main feature of Shahjahan's court, is also clearly visible in the painting. The main figure of the emperor is shown surrounded by elephants on all three sides and an exciting hunting atmosphere of hunting is depicted. This painting shows Shahjahan's hunting lions as a symbol of the emperor's power. In the foreground of the picture, the emperor and his nobles have arranged hierarchically with three elephants. Shahjahan and his courtiers are shown using a net to hunt ferocious animals. The tightly bound mesh reflects the philosophy of bravery and strength. In the center, a mace-bearer has wrapped his hand in strong leather. Most probably this man gathered the adults and lion cubs after killing them. The middle ground is separated from the foreground by a netted enclosure where all the principal figures and servants are placed. A halo is depicted on the emperor's head and on both sides of him princes are facing a lioness and her two cubs. The lion is only looking at the emperor and threatening him. The painter has created a swampy landscape and the perspective has shown with the fade to blue.

As a result of the successful Deccan campaign, the lion hunt was hailed as a majestic omen and was celebrated with high ceremony. The biggest achievement of Shahjahan's period is that he gave importance to manuscript paintings whose double-page painting is a symbol of his divine character.

Self Assessment Questions

- .How did the prehistoric environment in India shape early human settlements.

- How did these changes impact key aspects such as agriculture, water management, and urban life?

- Reflect on the environmental practices and ecosystems during the Sangam Age in South India?

Unit –III

Ecological Imperialism – Forest Policy: Forest Acts of 1878 and 1927 – Protest Against British Forest Acts and Policies of Monoculture – Plantation – Public Works – Railways – Hill Stations – Systematic Conservation versus Exploitation Deate

Objectives

- To Understand Ecological Imperialism.
- To Forest Policies through Forest Acts of 1878 and 1927.
- To Investigate Protest Movements Against British Forest Acts.

Ecological Imperils

The early Company rule in India tried to make use of the indigenous communities on the margins of the sedentary and settled agriculture in its programme of conquest and pacification. This was a tactic inherited from the practice of making use of fluid political arrangements by the pre-colonial polities like the Marathas. The recognition of the Bhil chiefs as rajas in return for a fixed tribute, establishment of a special Bhil Corps (1823) and a special police force of the Mewatis were part of this approach. The colonial State recognized the importance of forest and wasteland in the settlement of rural society. The disappearance of forest-cover in early 19th century was mostly due to cutting of forests for military or security reasons. Another reason was extension of cultivation under pressure so as to increase the revenue-resource base of the Raj. The colonial state favoured sedentary agriculture. Its main motive was to settle and discipline nomadic and pastoral communities and to wean or coerce tribal people from their traditional slash-and-burn agriculture or hunting-gathering life style. The systematic ecological warfare of the late 19th century, however, was chiefly a product of commercial needs and requirements. Although, indigenous elements in the form of merchant-cum-usurers were associated with the process, the institutional and ideological framework was specifically colonial. This institutional arrangement consisted of the Forest Acts and bureaucracy as well as the Criminal Tribes Acts and the settlements. We will trace the convergence of environmental, legal and social history in the next sub-sections of this here.

Pre-Colonial Legacy

Alfred Crossby (1986) gave a notion of 'ecological imperialism.' According to the notion, a complex set of weeds, animals and diseases brought by the biological expansion and migrations from Europe destroyed the flora, fauna and human societies or the indigenous ecosystems of the New World. Basing themselves on this notion, Gadgil and Guha (1992) projected colonialism in India as an ecological watershed. According to them, although the Europeans could not create neo-Europes in India by decimating and devastating indigenous population and their natural resource-base but they did intervene and radically altered existing food producing systems and their ecological basis. Three basic elements of this unprecedented intervention in the ecological and social fabric of Indian society by colonialism, according to them, are

A shift from subsistence-oriented resource gathering and food-production to commercial production; (b) Destruction of cohesive local communities and their institutions and emergence of individualism in their place; and (c) Breakdown of a system of restraints on traditional resource-use due to development of markets as the focal points for organizing access to resources. Richard H Grove (1998) has criticized this line of thinking as a belief in pre-colonial golden age of ecological balance and harmony.

According to him, exclusivist forms of state forest controls developed in pre-colonial states in South Asia, which saw rapid state-sponsored de-forestation. The control of state over forest-resources was gradually increasing in India since about 800 A.D. It was reinforced in Mughal period and received further impetus during the ascendancy of successor states. The Maratha state tried to acquire control over forests of the Western Ghats and to set-up plantations, both for shipbuilding and revenue. The states of Cochin and Travancore also exercised similar monopoly rights over forests. The Amirs of Sind adopted a policy of afforestation and forest protection during 1740-1840. This was meant to encourage development of their hunting reserves or sikargahs. However, the state control in pre-colonial times was limited to the extraction of certain plant and animal species or to the maintenance of hunting reserves. Sometimes state asserted control over certain specific products. For instance, Tipu Sultan asserted right of state over sandalwood, a valuable tree. Forest management and control was also crucial for military reasons in some cases especially for the defense of forts. Sometimes agrarian empires in the pre-colonial times cleared woodlands to augment land revenue resources in pre-

colonial times. Although commercial and strategic compulsions initiated the process of forest clearance in precolonial periods, there were no sharp conflicts over control of forest-resources like the one that surfaced in the colonial period. In the pre-colonial period, even if there was no perfect ecological harmony, arable land was in abundance, state control was limited and a hierarchy of user-rights rather than an absolute notion of property in arable and forestland was prevalent.

Forest policy

The policy of non-intervention and laissez faire gradually gave way to legitimate State intervention. The Scottish Surgeons like Alexander Gibson and Hugh Cleghorn, in the service of the East India Company, pointed the connection between denudation and droughts after 1837. Protection of forests was now seen as essential for maintaining water supplies and safeguarding agricultural prosperity. Some scholars see conservation, as a justification for the strategic and commercial interests of Empire while Richard Grove believes that a wider concern with agrarian prosperity and social stability was primarily responsible for this shift in the attitudes of the colonial officials. The role played by strategic and commercial needs of the Empire cannot be denied as the colonial administrators indicted traders and private capital in their accounts but the real brunt of state regulation and control was felt by small indigenous forest users like tribes practicing shifting cultivation. In particular, Kumri or shifting cultivation in Western Ghats, was held to be responsible for deforestation. Shifting cultivation was banned in Coorg in 1848 and restrictions were imposed on it in Belgaum in 1856. In 1847, Bombay Forest Department was established. By 1865, an Imperial Forest Department, with a formal bureaucratic all-India structure had been formed. A special executive post of forest officer was created and government's control over larger tracts of woodlands was established. This paved the way for exclusion of private capital as well as rural forest-users and shifting-cultivators from the forests. Dietrich Brandis, a German botanist, was appointed the first Inspector- General of Forests. The Forest Act of 1865 initiated the process of establishing a legal mechanism to curtail the previously open access enjoyed by the rural communities.

The colonial state, prior to Forest Act of 1865, recognized the customary rights of common property resources in forests. The Forest Acts of 1865 and 1878 asserted state monopoly over forest resources. The Forest Act of 1865 was passed to facilitate state's possession of those forests that were required for railway supplies. The preexisting customary

rights of rural people were left untouched. However, the powers of regulation and control were given to the forest officers. Prior to 1878, forest reserves area was limited and there were only 14,000 square miles of reserved forest for the whole of India. However, forest officers were asserting their powers even on non-zamindari private lands. In March 1868, teak, sal and shisham were declared protected species in the Central Province even if they grew on non-zamindari private lands. The status of forests and woodlands as a common property resource became a matter of legal debate among colonial forest administrators. Sharp and conflicting viewpoints emerged in a conference of forest officers in 1874 that was called to examine the defects of the 1865 Act and suggest a new piece of legislation.

The debate on the issue was framed within a specific discourse of property. This discourse celebrated proprietorship and as a result customary common property rights in pastures and woodlands, which were a negation of such notion of private property, were denied. Three distinct strands of thinking manifested within the colonial bureaucracy on the question of customary common property rights. The first section, called 'annexationist' by Gadgil and Guha, wished for a total state control over all forest areas. They argued that all land, those were not cultivated by peasants belonged to the state.

They further claimed that the so-called norms of community and access to forests were dependent on the sweet will of the rulers. They cited Tipu Sultan's edict banning the cutting of sandal wood trees. They asserted that only those rights of use, which were explicitly granted by the state, were to be accommodated and conceded. Baden Powell and the then Secretary of the Agricultural Department, A.O. Hume took this position that state monopoly of forest and wasteland was an undisputed feature of 'Oriental' sovereignty and the colonial state by its 'right of conquest' inherited this monopoly right. The second prominent position mainly held by forest officials of Madras government, denied the legitimacy of any state intervention in the customary rights of use exercised by the rural communities. Intermediate position, represented by the Inspector-General of Forests, Dietrich Brandis and some other officials, held the view that the state had undisputable right in certain cases but favoured retention of customary rights of villagers to freely graze their cattle, cut wood, etc., subject to some restriction by the state. The passing of Indian Forest Act (1878) clearly resolved the question in favour of an 'annexationists' position. The imperatives of colonial economy, conquered subjects, commercial and strategic interests of Empire overshadowed and destroyed the customary rights of use of the rural

communities. The forests were classified into three categories as reserve forests, protected forests and village forests under the Forests Act (1878). The reserved forest consisted of compact and valuable areas, which would lend themselves to sustained exploitation.

A complete state control extinguished private rights, transferred them somewhere else or in exceptional cases, allowed their limited exercise. The second category of protected forests was also under state control where rights of state and other users were recorded. However, state's control was strictly maintained by outlining detailed provisions for the reservation of particular tree species as and when they became commercially valuable, and for closing the forest whenever required to grazing and fuel-wood collection. Subsequently, with the rising commercial demand, many protected forests were converted into reserved forests. The Act also created a class of village forests but this option was hardly exercised over large parts of the sub-continent. The Act of 1878 also enlarged the scope of punitive sanction available to the forest administration, closely regulating the extraction and transit of forest produce and prescribing a detailed set of penalties for transgression of the Act. 'Protection' was meant to increase timber-productivity, which could be achieved only by eliminating trees and species that were not important commercially.

The forest department made a distinction between 'superior' and 'inferior' species for this purpose. To manage such multi-species forests, cutting the 'inferior' varieties and planting 'superior' species in the 'blanks' increased proportion of 'superior' trees. Exclusion of livestock and prevention of fire were two main planks of the 'scientific management' by which forest officials manipulated cycles of renewal to selectively assist timber trees. It was only at the turn of the century that experience demonstrated that such strict exclusion of rural forest users did not increase timber productivity. It was found that grazing and fires did not necessarily affect timber trees. The forest officials towards the end of the 19th century adopted a flexible approach within overall framework of control. Another important aspect of forest administration was that it generated surplus revenue consistently in the period 1870-1925. In other words, the administrative machinery was more than self-financed. This was made possible by the rising demands of the urban centres for fuel-wood, furniture, and building timber material and supply facilitated by improved transport. In the 20th century, a variety of industrial uses of the forest produce such as resin, turpentine, essential oils and tanning material also increased the commercial value of the forests. The strategic value of India's forests was also realized in the

World Wars when they supplied huge quantities of timber and bamboos to the timber branch of monition board

Forest act of 1867, 1865 and 1927

Large-scale commercial logging began in the 19th century. The demands of European entrepreneurs and the colonial state were much more extensive than the demands of earlier rulers. The contractors hewed many teak forests during 1800-1830 on the Western Ghats for the Bombay marine. Palmer & Company, a managing house based in Hyderabad, similarly logged in the Berars. The expansion of Coffee plantation in South after 1840 and of Tea plantation in Assam and the Bengal Hills further accelerated the process. By around 1860, commercial demands for timber were growing due to demand from shipbuilding, iron smelting and other industries. As a result of this Oak forests in Britain started vanishing. Therefore, there was great demand for Indian teak as it was the most durable of shipbuilding timbers. Construction of ships in Surat and on the Malabar Coast and export of teak-timber to meet the demands of the Royal Navy greatly stimulated the process of deforestation and denudation. The revenue orientation of colonial land policy also worked towards deforestation. Forests were seen as an obstacle to expansion of settled agriculture. Under the pressures of heavy land-revenue assessments especially on better soils, peasant cultivators moved into hills or onto poorer waste soils and cleared forests. The British, drawing on their experience of Ireland and Scotland took ecological warfare to new heights. There was a large-scale expansion of cultivable land due to 'clearings' of forests in Northern India after1860. This led to a sharp decline in the fortunes of the extensive nomadic and pastoral economy of the plains.

The expansion of railways after 1850s was another main cause of commercial logging. European and indigenous private contractors made huge gains in the process of utilizing woods for commerce. Before the opening of Raniganj coalmines, railways used wood as fuel. The railways were using fuel wood in North Western Province even in 1880s. H.Cleghorn, in his work, The Forests and Gardens of South India (1860) described the impact of the railways especially in Melghat and North Arcot Hills. The pace of deforestation was correlated with the expansion of railways. The railways expanded from 1349 Kms in 1860 to 51,658 Kms in 1910. The demand for railway sleepers grew proportionately. Only three Indian timbers- teak, sal and deodar were more suitable as sleepers. Sal and teak forests were available near railway lines in

the Peninsular India and were worked in early years. However, subsequently deodar forests in the sub-Himalayan region of Kumaon and Garhwal were also utilized.

Forests are one of the essential natural resources available in the country and cover around 1/3rd of the earth's total area. The word forest is derived from a Latin word "Foris" meaning outside. The forests act as the guardians and protectors of the wildlife of the country. Its uses are many in terms of fertility, shelter to animals as well as tribal population to mention a few which in turn helps to maintain the ecological balance all over the country. Forests are a means of generating revenue for the state by supplying various raw materials in its most natural form to the industries globally. They are a reason behind climate change and in controlling the quality of air and water. The forests are in use in the hands of the majority population due to which the resources available are being consumed at an alarming rate resulting in depletion. The users of the forests have recklessly utilized the forests for cultivation and destroyed them in the name of agriculture and other personal consumption of wood, timber, fuel and fodder. The need for a legislation protecting and regulating the forests was required, which was met by the Indian Forest Act, 1927 imposing Governmental control over forests by classifying them into reserved, protected and village forests. The Act of 1927 is a comprehensive legislation incorporating all the pre-existing laws enacted to protect the forests as well as the rights of the people residing in the forests. The first legislation was enacted in 1865during the British rule which was an attempt to protect the forests the Act had its fallouts with relation to the rights of the people that were not protected. The amendment of 1878was aimed at improving the deficiencies of the Indian Forest Act of 1865.

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The Indian Forest Act, 1927

The Indian Forest Act, 1927 aimed to regulate the movement of forest produce, and duty livable forest produce. It also explains the procedure to be followed for declaring an area as Reserved Forest, Protected Forest or a Village Forest. This act has details of what a forest offence is, what are the acts prohibited inside a Reserved Forest, and penalties leviable on violation of the provisions of the Act. After the Forest Act was enacted in 1865, it was amended twice (1878 and 1927).

History

Indian Forest Act of 1865: The Imperial Forest Department set up in 1864, attempted to establish British control over forests, by various legislations it empowered the British government to declare any land covered with trees as a government forest and make rules to manage it. Indian Forest Act of 1878: By the Forest Act of 1878, the British Administration acquired the sovereignty of all wastelands which by definition included forests. This Act also enabled the administration to demarcate reserved and protected forests. The local rights were refused in the case of protected forests while some privileges which were given to the local people by the government which can be taken away are anytime. This Act classified the forests into three – reserved forests, protected forests and village forests. It attempted to regulate the collection of forest produce by forest dwellers and some activities declared as offences and imprisonment and fines were imposed in this policy to establish the state control over forests.

Indian Forest Act of 1927: This Act impacted the life of forest-dependent communities. The penalties and procedures given in this Act aimed to extend the state's control over forests as

well as diminishing the status of people's rights to forest use. The village communities were alienated from their age-old symbiotic association with forests. Further amendments were also made to restrain the local use of forests mainly by forest-dependent communities. It was enacted to make forest laws more effective and to improve the previous forest laws

Objective

To consolidate all the previous laws regarding forests. To give the Government the power to create different classes of forests for their effective usage for the colonial purpose. To regulate movement and transit of forest produce, and duty leviable on timber and other forest produce. To define the procedure to be followed for declaring an area as Reserved Forest, Protected Forest or Village Forest. To define forest offences acts prohibited inside the Reserved Forest, and penalties livable on the violation. To make conservation of forests and wildlife more accountable.

Types of Forests

Reserved Forests: Reserve forests are the most restricted forests and are constituted by the State Government on any forest land or wasteland which is the property of the Government. In reserved forests, local people are prohibited, unless specifically allowed by a Forest Officer in the course of the settlement. Protected Forests: The State Government is empowered to constitute any land other than reserved forests as protected forests over which the Government has proprietary rights and the power to issue rules regarding the use of such forests. This power has been used to establish State control over trees, whose timber, fruit or other non-wood products have revenue-raising potential. Village forest: Village forests are the one in which the State Government may assign to 'any village community the rights of Government to or over any land which has been constituted a reserved forest'.

Forest Settlement Officer the Forest Settlement Office is appointed, by the State government, to inquire into and determine the existence, nature and extent of any rights alleged to exist in favour of any person in or over any land comprising a Reserved forest. He/she is empowered even to acquire land over which right is claimed.

Drawbacks the government claimed that the act was aimed to protect the vegetation cover of India. However, a deep investigation of the act reveals that the real motive behind the act was to earn revenue from the cutting of the trees and from the forest produce. The act gave immense discretion and power to the forest bureaucracy which often led to the harassment of the forest dwellers. Moreover, it led to depriving the nomads and tribal people their age-old rights and

privileges to use the forests and forest produce. The revenue earning potential from timber overshadowed the other values like biodiversity, prevention of soil erosion, etc.

Later Initiatives

Indian Forest Policy, 1952: The Indian Forest Policy, 1952 was a simple extension of colonial forest policy. However, it became conscious about the need to increase the forest cover to one-third of the total land area. At that time maximum annual revenue from forests is the vital national need. The two World Wars, need for defence, developmental projects such as river valley projects, industries like pulp, paper and plywood, and communication heavily depended on forest produce on national interest; as a result, huge areas of forests were cleared to raise revenue for the State. Forest Conservation Act, 1980: The Forest Conservation Act, 1980 stipulated that the central permission is necessary to practice sustainable agro-forestry in forest areas. Violation or lack of permit was treated as a criminal offence. It targeted to limit deforestation, conserve biodiversity and save wildlife. Though this Act provides greater hope towards forest conservation it was not successful in its target. National Forest Policy, 1988: The ultimate objective of the National Forest policy was to maintain environmental stability and ecological balance through conservation of forests as a natural heritage. The National Forest Policy in 1988 made a very significant and categorical shift from commercial concerns to focus on the ecological role of the forests and participatory management. 3/4 Some of the other Acts related to forest conservation are : The Wildlife Protection Act of 1972, The Environment Protection Act of 1986, and The Biodiversity Protection Act of 2003. Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006: It has been enacted to recognize and vest the forest rights and occupation of forest land in forest dwelling Scheduled Tribes and other traditional forest dwellers, who have been residing in such forests for generations.

Protest against British forest act

The Forest Rights Act 2006 (FRA) is the product of an unprecedented historical conjuncture which brought the historical injustice of the non-recognition of the rights of forest dwelling communities centre stage in Indian national politics. The Act was passed at the end of 2006 but came into force on 1st January 2008 with the passage of its associated Rules. The Act does not provide for the state to magnanimously ‘grant’ rights as an act of benevolence. Rather it

provides for preexisting (often customary) rights, which were not recognised during the unsound processes of state appropriation of forested landscapes, to finally be recognised.

Twenty three percent of the country's geographical area has been designated as forest, upon which an estimated 200 million people depend for their livelihoods to varying degrees. The FRA has particular significance for the forested, tribal inhabited and mineral rich but most impoverished belt of central and eastern India. Here ancestral tribal lands, despite being protected by the Constitution, have largely been declared state forests without following the due legal process of enquiring into the pre-existing rights of the customary tenure holders. It is this population of the country's poorest people, numbering perhaps 100 million, who have suffered institutionalised disenfranchisement during colonial rule and after independence, who stand to benefit the most from proper implementation of the FRA.

The FRA 2006 therefore appears to be a strong example of a pro-poor institutional reform. However this paper asks: to what extent is this really so? The final text of the Act is an outcome of drafting processes, prompted by the Prime Minister's Office, which involved both what we might call 'technical bureaucratic' and 'political-economic' aspects, which affect the extent to which the final text fulfils its aims. In terms of its 'technical' considerations, a key challenge in drafting the Act was to target a wide range of extremely complex and diverse local rights deprivations scenarios without either focusing too narrowly, thereby excluding legitimate groups, nor too broadly to include non-legitimate opportunists. This paper examines the Act's effectiveness in providing for redress across this range. In terms of the 'political-economic' aspects of drafting, there was however no consensus over the need for or aims of the Act. The final text is rather the outcome of contest between three main social forces who had greater or lesser influence during different periods of the long drawn process. At one end of the spectrum was 'the Campaign' representatives of tribal and other forest citizens led by the umbrella Campaign for Survival and Dignity (CSD), who sought a comprehensive replacement of the oppressive control of the forest bureaucracy on forested tribal homelands by restoring democratic control over forest governance to statutorily empowered village assemblies. At the other end was the forest bureaucracy, supported by highly vocal hard-line urban wildlife conservationists popularly dubbed the 'tiger-wallas'. These lobbied for the continuation of centralized bureaucratic forest management based on the quasiautocratic colonial model, and 'fortress' conservation. This alliance tried their best to prevent the law from being enacted at all, and also

to dilute it's provisions so as to render them inconsequential. Less visible and less known, in the middle there was a mixed group of people both from within and outside government, who supported the law but did not favour a major change; they wanted only limited recognition of land rights, just sufficient to ameliorate the underlying causes for the intense conflict prevalent in forested tribal inhabited areas.

The intense contestation over the precise wording of the Act led to many ambiguities in the final text and dilution of original proposals, even at the most fundamental level of definitions. This means that the 'pro-poor' mandate is much more thrown in question than one might expect, and that for understanding whether the text will really facilitate pro-poor reform we must seek 'the devil in the details'. For instance the Act defines 'forest dwelling scheduled tribes' as members or community of scheduled tribes who 'primarily reside in and who depend on the forests or forest lands for bonafide livelihood needs' and includes the scheduled tribe and pastoralists communities. The 'other traditional forest dweller' is defined as any member or community who has for at least three generations (which is 75 years before 13 December, 2005 according to the Act) primarily resided in and who depend on the forests or forest land for bonafide livelihood needs. Narrowly interpreted, this covers only those actually residing on forest land as eligible for claiming rights. In practice this opened the risk of excluding the majority of potential tribal and non-tribal claimants who may not be dwelling on forest land but are dependent on it. The Ministry of Tribal Affairs (MoTA) had to issue a special clarification that those dependent on but not necessarily living on forest land were also eligible (Ministry of Tribal Affairs, 2008).

In order to answer the headline question this paper reviews the content of the Forest Rights Act 2006 (FRA) and the FRA Rules, 2008. In particular it considers the extent to which the FRA covers the range of existing forest rights deprivations and rights deprived poor, and the adequacy with which it does this. It also discusses the prescribed mechanisms for implementation**.**

The Act's Objectives, Contents And Envisaged Implementation Procedures

This section reviews the text of the Act2 itself. The Act contains a Preamble followed by seven chapters containing 14 sections. The Preamble articulates the ambitious sweep of the Act's aims. Subsequent sections provide definitions of key terms, the rights to be conferred under the Act, the conditions attached to the rights, empowerment of right holders and their

Gram Sabhas (village assemblies) for conservation, and the authorities and procedures for the recognition of rights. Section 11 provides that the nodal ministry responsible for implementing the Act shall be the Ministry of Tribal Affairs (and not the Ministry of Environment and Forests (MoEF)). Other sections deal with miscellaneous matters, including the relationship of the FRA to the application of other laws**.**

The main rights to be recognized under the Act

At the outset, it is useful to point out that four of the listed rights are based on guidelines issued by the Ministry of Environment and Forests (MOEF) on September 18, 19903. These were based in turn on a framework for the resolution of disputes related to forest land between tribal people and the State recommended by the Commissioner for Scheduled Castes and Scheduled Tribes in his 29th report (1987-89) to the President of India. The Commissioner had observed widespread disquiet in the central Indian tribal-forest belt caused by major irregularities in the declaration of vast areas of tribal lands as state forests without proper enquiry into their rights as required by law. He had also come across serious anomalies in official land records such as vast areas of the same land being recorded as both revenue and forest lands. While revenue departments had allocated pattas (land titles), leases or grants over this land to poor cultivators, forest departments treated these as illegal 'encroachments'. Whereas guideline FP(2) dealt with recognition of rights not recognised by forest settlements, FP(3) required granting legal title to those allocated land by revenue departments despite the land also being recorded as forest land. However, only the first of these guidelines, for regularizing supposed 'encroachments' on forest land prior to enactment of the Forest Conservation Act, 1980, had been partially implemented, the rest being left ignored.

The key section of the Act listing the rights which may be recognized is Forest Rights. The listed rights are to be recognised on all categories of forest land, including in wildlife sanctuaries and national parks.

Plantation

Definitions

The term Plantation crops refers to those crops which are cultivated on an extensive scale in a large contiguous area, owned and managed by an Individual or a company. These plantation crops are high value commercial crops of greater economic importance and play a vital role in our Indian economy.

Definition: A group of commercial crops of perennial nature, cultivated extensively in tropical and subtropical situations which need employment of labour throughout the year and the producers of which are usually consumed after processing.

Definitions in traditional sense – Plantation crops are those which are cultivated on extensive scale like tea, coffee and rubber. Here the term plantation or estate is used synonymously. Estate or plantation means large scale agricultural unit usually of a single crop.

Scope and impediments

The Scope and impediments of plantations are as follows:

Expansion in non-traditional areas

As population and spice crops have restricted geographical distribution, the possibility of expansion in the traditional areas is limited. However, there is ample scope for expansion of area in non-traditional regions such as North Eastern States where there is irrigation potential. Due to the development of drip irrigation technology new area nontraditional area under plantation crops is increasing.

Export potential

Plantation crops earn foreign exchange. Coir based products, Coir export and Coffee. Main products and by-products not only have export prospects but also have considerable internal demand in several ancillary industries. Earning from export of plantation crops accounts to 27% of total agricultural Commodities and 4.8% of total export.

Employment generation:

Cultivation of plantation crops provides year round gainful employment on the farm and factories**.**

Crop diversification:

These crops provide ample scope for diversification and thereby it creates sustainable agriculture.

Economic importance of plantation crops:

They contribute to national economy by way of export earnings.

India is the leading country in the total production of certain plantation crops in the world.

Plantation industry provides direct as well as indirect employment to many millions of people. For instance, tea industry offers direct employment to 10 lakhs and indirect employment

to 10 lakh people, while-cashew processing factories alone provide employment to 3 lakhs people besides 2 lakhs farmers are employed in cashew cultivation.

Plantation industry supports many by-product industries and also many rural industries. These crops help to conserve the soil and ecosystem. Tea planted in hill slopes and cashew in barrel and waste lands protect the land from soil erosion during the rainy season or due to heavy winds.

Plantation forests

Plantation forests can provide most goods and services that are provided by natural forests. These include timber, non timber forest products, protection of clean water and clean air, soil erosion control, biodiversity, esthetics, carbon sequestration, and climate control. Nonetheless, as the value of environmental services from natural forests is higher than that from forest plantations, the demand for conservation of natural forests is stronger. It is possible that a division of land, with some land specialized in timber production and other land in providing environmental services, would produce more forest-related goods and services to society. Because forest plantations grow much faster than natural forests, forest plantations are seen as an increasingly important source of timber supply. Should more forest plantations be developed, more natural forests might be saved.

In FRA 2000 "forest plantations" are defined as those forest stands established by planting or/and seeding in the process of afforestation or reforestation. They are either of introduced or indigenous species which meet a minimum area requirement of 0.5 ha; tree crown cover of at least 10 percent of the land cover; and total height of adult trees

Types of the plantation:

Types of the plantation are as follows

Industrial Plantations: Industrial plantations are the “arable” crops of forestry; their principal objective is to grow a product, usually wood fiber, efficiently. The main purposes include fuel production-firewood and charcoal, pulpwood for paper and cardboard, panel products, sawn timber (lumber or sawn wood), and sometimes veneers. Commonly one plantation supplies several of these products in the course of a rotation. Of course there will always be other products, whether as other round wood products such as posts and poles, or non-wood forest products, and benefits such as amenity or even biodiversity enhancement, where a plantation has been established on an impoverished site. But the dominant objective is to grow a

commercial product. Industrial purpose dominates management in terms of species choice (usually only one), stocking density, thinning prescriptions, rotation length to maximize financial returns or grow crops to a particular market specification, and clear-cutting silvicultural systems for efficiency of harvest.

Social and Community Plantations and Woodlots

Planting trees is one way of compensating for loss of natural forests as a means of providing domestic products such as building poles, fencing materials, firewood and even leaves for livestock fodder. It was widely promoted in the 1970s and 1980s in countries of the African Sahel, in India, and elsewhere in usually the drier tropics, but was not always successful. Sometimes choice of species was poor, sometimes tenure and ownership of land, or even the planted trees, were unclear, but commonly the problems lay in a failure to involve the local community or village adequately in the decision-making process. Woodlots were foisted on communities rather than being their initiatives to help in local wood supply.

Tree planting for social and community needs are now embraced as part of rural development forestry, and are subject to participatory processes to place them firmly in local people's control. In India, these are sometimes termed as "Communities of Protection," in the Philippines they are termed community based forest management (CBFM), while in Ethiopia many planting projects begun as food-for-work initiatives during the 1980s famine have become a village resource. Collectively these kinds of plantation projects often form part of joint forest management (JFM) initiatives

Planting plan

A planting plan is a construction document that shows the location, quantity, and other characteristics of vegetation to be planted in the landscape. It should be easy to read and understand. Planting plan should include:

- A description of your objectives
- A map of the property and a site description
- Detailed plans for site preparation
- The number of trees required by species
- Planting arrangement and tree spacing
- Plans to control unwanted vegetation

Major objectives of planting plan you may want to plant trees to:

- Improve the environment
- Increase the value of your property
- Provide a treed space for recreation
- Produce wood products such as lumber or fuel, or specialized crops like Christmas trees or nuts
- Prevent soil erosion by wind or water
- Provide habitat and food for wildlife
- Conserve energy Planting process Planting plan includes the following steps:

Choice of the species:

There are many broadleaf tree and shrub species available through MNR and private nurseries to help to meet your objectives.

- To improve the availability of food for birds and other wildlife, fruit bearing shrubs should be planted.
- For wildlife cover consider a plantation of cedar, spruce, or pine. These species will provide excellent cover for small animals such as rabbits in less than ten years, and winter cover for larger animals such as white-tailed deer in 30 to 40 years.
- Valuable forest products such as veneer logs and sawlogs may also be produced from numerous hardwood species. But hardwoods are much more sensitive than conifers to competition from weeds and grasses. Be prepared to control all weeds before planting and for several years after planting.
- Poplars, cedar, white spruce are good choices for windbreaks.

Planting arrangement

Planting trees in relatively straight, equally spaced rows provides tractor access for mowing, spraying or other operations. Allow a minimum of 2.4 m (8 ft) between rows. Trees of different species seldom grow at the same rate on the same site. Often one species will outgrow and eventually eliminate the other. If you wish to plant a mixture of species, plant each species in approximate squares or circles of no less than 20 trees. This will ensure that some trees in the centre of each cluster will not be overgrown by faster growing neighbors.

Spacing

If forest products are your primary objective, spacing and arrangement are critical to maximizing growth and yield of your trees. For example, you may wish to establish sugar maples in an orchard for the production of maple syrup. Such an orchard should be planted with 10 m (30 ft) between trees to encourage the development of deep, large crowns essential for maximum sap production.

Plant conifers for sawlog and pulp production in rows that are a minimum of 2.4 m (8 ft) apart. The trees should be planted within the row at 1.8 m (6 ft) spacing. This will result in a plantation of 2,300 trees per hectare (900 trees per acre). Hardwoods should be planted in rows 3 m (10 ft) apart, but with only 1.5 m (5 ft) between trees.

Planning site description

Map: The best way to appreciate the site conditions is by making a thorough inspection of your planting site. A good first step is to prepare a sketch of your site. On the sketch, indicate the orientation of the site using a north arrow. Also show the location of the access routes, buildings and any relevant boundaries such as fences or edges of woodlots. Power line corridors and other areas which should not be planted should also be shown on your map. Note the lay of the land. Show any steep slopes or other obstacles that may be a problem for equipment.

Soil characteristics: Each tree species is adapted to a specific range of site conditions. To choose the appropriate species for your planting site you should be aware of the soil texture and drainage. To inspect your soil, use a shovel and sample the soil at different locations across your planting site. Trees cannot be successfully planted everywhere. Extremely shallow soils over bedrock are very susceptible to drought, depriving trees of essential moisture. Soils that are flooded for prolonged periods deprive tree roots of oxygen. Avoid sites with less than 30 cm (1 ft) of soil over bedrock or sites where the year-round water table is very close to the surface.

Present vegetation: While inspecting the soil conditions on your site, also take note of the vegetation growing there. Take note of grasses, broadleaf weeds and woody shrubs that will compete with your trees for moisture, nutrients, light and space. Too much competition will reduce the growth of your seedlings or even cause them to die. Tall grass and weeds, weighted down by snow, can crush young seedlings. Thick vegetation is also ideal habitat for rodents that will feed on the bark of your seedlings during winter months.

Site preparation: Like vegetables in your garden, tree seedlings will benefit from the removal of competing weeds and preparation of the soil prior to planting. Refer to the Extension

Note: Clearing the Way: Preparing the Site for Planting for help in planning appropriate site preparation for your site. You are not finished after putting the trees in the ground. You should be prepared to inspect the plantation several times per season to check for weed and insect problems. In addition, you may have to spend some time controlling weeds around your new trees in order to ensure their survival.

Public work

Public works is the combination of physical assets, management practices, policies, and personnel necessary for the public and private sectors to provide and sustain structures and services essential to the welfare and high quality of life for our citizens.

The American Public Works Association (APWA) serves professionals in all aspects of public works – a fact that sets it apart from other organizations and makes it the 'voice of public works' throughout North America. With a membership more than 30,000 strong, APWA includes not only personnel from local, county, state, provincial, and federal agencies, but also private sector personnel who supply products and services to those professionals. Public works professionals are first responders and they often get to work – sometimes before our other first responder partners, and then after to restore essential services – wherever there is an emergency affecting public services.

Membership in APWA is open to any individual, agency, or corporation with an interest in public works and infrastructure issues. Common job titles include public works directors; city engineers; city managers; fleet managers; community development directors; transportation managers; park directors; county officials; and representatives from engineering and other consulting firms, manufacturers, construction companies, and a multitude of other service providers.

Railways

Indian Railways Environment Management

To promote Green environment and clean energy while making the Indian Railways a global leader in sustainable mass transport solutions

Mission

- .To provide clean and hygienic environment to customers.
- To promote energy conservation measures.

- ❖ To maximize the use of alternate forms of clean energy, thereby minimizing the carbon footprint of Railways.
- ❖ Noise reduction in Railway operations.
- ❖ To March towards Zero waste discharge from the major Railway units.
- ❖ To promote Green built-up spaces and expand tree-cover.
- ❖ Building in house capacity to set up an effective Environment Management System.
- ❖ To promote conservation of water and other natural resources.

Indian Railways (IR) is one of the world's largest rail networks, spread over 67,415 route Km. IR is the lifeline of the country carrying nearly 23 million passengers every day making it the targets passenger carrying system in the world. It is also the 4 largest freight transporters in the world moving 1,225 million tonnes of freight annually, as it traverses the length and breadth of the country. Rail-based transport is the most environment friendly mass transport system due to the inherent gains it provides in terms of energy efficiency and resource optimization. Railways are about 12 times more efficient in freight traffic and 3 times more efficient in passenger traffic as compared to road transport. As the Indian economy transitions, with economic growth and sustainable development as twin goals, mobility will play a key role. It has been estimated that for the sustainable development of Indian Economy, the inter-modal share of freight traffic by rail should go up from the current share of 36% to 45% by 2030. Accordingly, Indian Railways is gearing up for a massive growth to achieve such increase in inter-modal share by augmentation of its network and rolling stock fleet along with increase in productivity. For IR to be a low carbon mass transport system working for a green environment, an integrated approach, which includes resource efficiency at its core, will be critical. As the country's lifeline, the national transporter, in January 2015, set up the Environment Directorate in the Railway Board, to coordinate all environment management initiatives across the Indian Railways. Since then, the Railways has taken steps to streamline its initiatives with regards to environmental management, with some notable initiatives including Energy Efficiency, Renewable and Alternate sources of Energy, Water Conservation, Afforestation, Waste Management and Green Certifications.

Hill station

A hill station is a town located at a higher elevation than the nearby plain which was used by foreign rulers as an escape from the summer heat as temperatures are cooler in high altitudes.

Munnar

Munnar the famed hill station is located in the Idukki district of the southwestern Indian state of Kerala.

- Munnar is situated in the Western Ghats range of mountains.
- The name Munnar is believed to mean "three rivers", referring to its location at the confluence of the Mudhirapuzha, Nallathanni and Kundaly rivers.
- The hill station had been the summer resort of the British Government during the colonial era.
- Munnar also has the highest peak in South India –Anamudi, which towers over 2695 meters
- Munnar is also known for Neelakurinji, a rare plant which flowers only once in twelve years.
- The Eravikulam National Park, Salim Ali Bird Sanctuary and tea plantations are its major attractions.

Devikulam Hill Station

Devikulam is located in the Idukki district in Kerala. Situated at an altitude of 1800 meters above sea level, this hill station will give you peace, serenity and breathtaking natural beauty.

- The Devi Lake, which is said to have mineral water, is a gift from the nature.
- It is said that Goddess Sita (Wife of Lord Rama) bathed in the lake after which it is named since then, skin-ailments treating water of the lake

OOTY

Ooty is one of the best hill stations in India and also known as Udhagamandalam, Ooty is often referred to as 'Queen of hill stations'.

- It is the capital of Nilgiris district in the state of Tamilnadu.
- Ooty was much visited by British during the colonial days.
- Ooty Lake, Botanical Garden, Rose Garden, Pine Forest, Doddabetta Peak, Emerald Lake, Pykara Dam,Avalanche Lake & Sanctuary are the top places to visit.
- The toy train, known as Nilgiri Mountain Railway that runs from Mettupalayam to Ooty is a UNESCO World Heritage Site and a must be experienced.

- The annual Tea and Tourism Festival (Jan) and Summer Festival (May) attract crowds in huge numbers.

Kodaikanal

Kodaikanal, often referred to as the 'Princess of Hill stations'is located in Dindigul district of Tamil Nadu.

- ❖ Kodai is a beautiful hill station at an altitude of about 7000 feet (2133 m) on the southern tip of upper Palani hills.
- ❖ Kodaikanal is not extensively commercialized like Ooty and it offers a pleasant experience to tourists with relatively less crowd.
- ❖ Kodaikanal has several tourist attractions like Kodai Lake, Bryant Park, Bear Shola Falls, Pillar Rocks, etc are the places to visit.
- ❖ The hills offer beautiful views all around, especially from the Coaker's Walk.

Yercaud

Yercaud is a beautiful hill station in Salem district of Tamil Nadu. It is located in the Shevaroy range of hills in the Eastern Ghats .

- ❖ Yercaud town got its name from the Yercaud Lake located at its center. In Tamil,Yeri means lake and Kaadu means forest.
- ❖ It is also known as poor man's ooty and jewel of the South.
- ❖ Some of the best places to visit in Yercaud are Emerald Lake, Anna Park, Shevaroy Temple, Small Lake, Bear's Point, Pagoda Point, Killiyur Falls and Botanical Garden.
- ❖ It is known for its plantations majorly of coffee, orange, jackfruit, guava, cardamom and black pepper.

Coonoor

- ❖ Coonoor is a beautiful hill station and known for its production of Nilgiri tea. It is famous for its verdant environs and for a variety of wildflowers and birds.
- ❖ It is the second largest hill station in the Nilgiri hills after Ooty.
- ❖ The major attraction of Coonoor is Sim's Park, a well-maintained Botanical Garden that houses several varieties of plants found missing in the other Hill Stations.
- ❖ Viewpoints and picnic spots around Coonoor include Lambs Rock, Dolphins Nose, Law's fall, St. Catherine Falls, etc.

- Coonoor is an ideal base for a number of trekking expeditions leading into the Nilgiris. One of the popular trekking trails is to Lamb's Rock that is 9 km from Coonoor. Lamb's rock is situated about 8 km from Coonoor. It provides you an awesome view of Coimbatore plains.
- Apopular pastime is birdwatching, as an extensive variety of birds can be spotted

Idukki Hill Station

- One of the most scenic hill stations of Kerala, Idukki is home to thick green forests, exotic wildlife, beautiful valleys and extensive plantations .
- Popularly known as the hilly district of Kerala, Idukki is known for the wildlife sanctuaries.
- It is one of the most sought after hill stations.
- The major attractions in Idukki include Idukki Dam, Painavu,& Idukki Wildlife Sanctuary.
- Idukki district is also home to South India's highest peak,Anamudi .
- Idukki offers diverse attractions like wildlife sanctuaries, hill stations, spice plantation centers and mountain treks.

Wayanad Hill Station

- Known for its lush-green landscape and serene environment, Wayanad is an enchanting hill station on the earth located on the Western Ghats in the state of Kerala.
- It is nested among the mountains of the Western Ghats on the borders of Tamil Nadu and Karnataka States.
- The dense vegetation, tranquil surroundings and mist-capped hills offer an unforgettable experience to the visitors.
- Its plantations of tea and spices, pristine waterfalls, gorgeous lakes, exotic wildlife and ageold caves make it one of the most celebrated hill stations in Kerala.
- It has several Waterfalls (Meenmutty Falls, Soochipara Falls, Kanthampara Falls), Dams / Lakes (Pookote Lake, Banasura sagar dam, Karappuzha Dam), Wildlife Sanctuaries (famousWayanad).
- Edakkal Caves is one of the prime places of sightseeing in Wayanad.

Systematic conservation versus explanation debate

Deep ecology is a radical environmental philosophy that was articulated and presented in April of 1984 by Arne Naess and George Sessions, to essentially gather up environmental thought with eight basic principles. However, it has really been a compilation of decades of thought and ideas about the environment, which was drawn from many different religions and philosophies. The "deep ecology movement is a direct outgrowth of the ecological concerns of the 1960's (Zimmerman, 161)," and has really attributed its influence to many people over time. According to Naess and Sessions, deep ecology's religious roots span from many differing religions, but its philosophical roots can be "found in the ecocentrism and social criticism of Henry David Thoreau, John Muir, D.H. Lawrence, Robinson Jeffers, and Aldous Huxley (Sessions, ix)." The deep ecology platform consists of eight basic principles, or guidelines for a reformed way of thinking about our environment (not being entirely exclusive to the living plants and animals, or the paradigmatic thought of the word 'environment', but basically the world around us, the place we live)

a. The well being and flourishing of human and nonhuman life on Earth have value in themselves [this is commonly referred to as inherent worth, or intrinsic value]. These values are independent of the usefulness of the nonhuman world for human purposes; and
b. Richness and diversity of life forms contribute to the realization of these values and are also values in themselves; and
c. Humans have no right to reduce this richness and diversity except to satisfy vital needs; and
d. The flourishing of human life and cultures is compatible with a substantial decrease of the human population. The flourishing of nonhuman life requires such a decrease; and
e. Present human interference with the nonhuman world is excessive, and the situation is rapidly worsening; and
f. Policies must therefore be changed. The changes in policies affect basic economic, technological structures. The resulting state of affairs will be deeply different from the present; and
g. The ideological change is mainly that of appreciating life quality (dwelling in situations of inherent worth) rather than adhering to an increasingly higher standard of living. There will be a profound awareness of the difference between big and great; and

h. Those who subscribe to the foregoing points have an obligation directly or indirectly to participate in the attempt to implement the necessary changes.

The first principle of deep ecology has a couple of basic points which it aims to get across. The most important part, however, is that every living being, human and nonhuman, has its own inherent value, and thus has its own right to live and flourish. Essentially, everything has an "own" to it, and therefore has its own irreducible right to live, to blossom, to reach its own fullness in existing and reproducing. In its own right, each living thing is independent and separate of its "usefulness" to any other thing, specifically of humans. Lastly, these all mean that deep ecology is really about ecocentrism, and not anthropocentrism, in that it is against seeing everything in terms of its beneficial usefulness (or lack thereof) to humans. It is important to note that not just the actual living and breathing beings are the ones that should be considered. The "non-living", as Naess put it, which includes watersheds, landscapes, and ecosystems as their own wholes, should never be overlooked, in that they too have an unbelievable amount of importance in their own right.

The second principle addresses the issue of why everything should be seen as having its own value, through the explanation of interconnectedness. This point reinforces the importance of biodiversity in the world--that everything is connected to everything else. There is no hierarchy that exists of living things, simply because without everything**,** everything else would not exist. There is a reliance of everything upon everything, and therefore nothing can be less or more than anything else in the web of life. Deep ecology really calls for humans to view everything as in the relationship Naess describes between object A and object B: "An intrinsic relation between two things A and B is such that the relation belongs to the definitions or basic constitutions of A and B, so that without the relation, A and B are no longer the same thing ." In their infinite relationships, all things help to contribute to the richness and diversity in life, and the web is moreover not about the complication with the inclusion of all things, but the beautiful complexity that is brought about by all things. We need to value the richness and diversity of life forms in and of themselves, because we as humans also rely on them. It furthermore explains that ecosystems are self-regulating and self-maintaining because of this biodiversity and interdependence.

Ecosystems require every member to function, but as long as they have that, there is no other need for human interference. It is next explained in the third principle to what extent a

living being's inherent value can be ignored. Essentially, this inherent value, or intrinsic worth, is only reducible by vital needs of the individual. This is somewhat of a vague area, and it was meant to be left this way for the individual's interpretation of what they define as vital needs. Vital needs are opposite of "other" needs, meaning that while it is the individuals job to determine the difference between the two, all of these should be categorized as such. While some would say that vital needs are just food, clothing, and shelter, many others may say that all of the daily activities and ways of life are vital needs. It is also important to look into the intention of reducing a living things inherent worth. While some individuals go hunting for food to eat, others go for the sport. While some accidentally step on a bug, others do it on purpose.

Basically, it is being stressed that no human has the right to reduce any other living things right to live and flourish, except in the case of its own vital needs, and every living thing needs to be taken into consideration. If an individual does so happen to violate another beings' right when it is not a vital need, it should never be done with intention or awareness of doing so. The fourth principle is perhaps one of the most controversial parts of deep ecology, and thus is where much of the criticism of deep ecology is rooted as well. Because of excessive human interference in the environment, deep ecology calls for a decrease in human population, and this will then lead to a higher quality of life. Increasing population is simply not the best for quality of life, nor is it good for the environment, and therefore needs to be significantly cut back. By doing so, this will bring about stabilization of the ecosystems. If this is not done, Naess says that "substantial decreases in richness and diversity are liable to occur." While this is ideally supposed to be recognized and started upon as quickly as possible, it is also important to realize that this will take many years to become a reality. The fifth principle identifies where environmental problems are stemming from, and that is human interference. This goes back to the second principle, in humans being able to identify that ecosystems are self-regulating, and there is no need for human involvement.

Essentially, humans are a part of nature, and are expected to interfere in their environment to a certain extent. Naess explains that every animal interferes on their surroundings, such as a beaver building his dam, or a bird building her nest. However, human interference has been going on excessively, and must be put to a stop. Without exception, it seems, human interference has continually done more harm than good, because ecosystems are developed to maintain themselves. In the sixth principle, there is a call for new policies and

radical social changes to be made. To make changes, new ideals and mindsets need to come about, and thus, new policies will emerge on how humans treat the environment. This is nothing that can be done overnight, but needs to be done over decades. It is not something that can suddenly be made into a law, and it is essentially thought to have a purpose of completely transforming every single part of human life. The seventh principle supports a simplified lifestyle. It addresses the fact that quality of life should take precedent over quantity of things, to reach a higher level of happiness instead of a higher standard of living. It calls for voluntary simplicity, meaning that not only is it that the human reduction of needs must happen, but that it must be wanted to happen, and through this, a greater happiness will emerge. Lastly, the aforementioned seven principles, after being read and understood, call for an "obligation" of direct or indirect action.

It is not necessarily about obligation, however, but what the understanding of these principles should bring about in its awareness and intention of a better living, and in theory, a better environment. Deep ecology does not call for just the Earth to be fought for in itself, but for these values to be fought for, and for a new change in the world to develop and take over. By addressing just the environment, there are many things that are overlooked, and essentially, what this philosophy is trying to get across is a coming about of a better world as a whole, spawned by the better individual. It is something that can and should be adopted by all humans, and through living these principles, it is theorized that not just the environmental problems will disappear, but social, political, economical, and human relational problems will dissolve as well.

Basing thought on the environment is a start, but it is not solely about that and in its hopes, a better place will be attained. It is first important to distinguish between shallow ecology and deep ecology. Shallow ecology is probably what people are most familiar with in the western world. Shallow ecology is a much more anthropocentric point of view, in that it holds values of nature entirely on the premise that nature's sole purpose is for human needs. Shallow ecology neglects many of the important aspects that deep ecology touches on, the most important being that it neglects every living beings', human and nonhuman, intrinsic right and value to live and flourish. Shallow ecology sees nature at the disposal of humans, whereas deep ecology recognizes no right other than vital needs for humans to dispose of nature.

The dynamic between deep ecology and shallow ecology can possibly be better explained in terms of conservation and preservation. Conservation is comparable to shallow ecology in

that it is more of a controlled usage and systematic protection of natural resources. Typically, the method of conservation is used in terms of humans conserving nature for their own future needs. Humans conserve such resources as water, forests, and oil so that they will be there for following generations. Preservation, on the other hand, is much more similar to deep ecology, in that it is more along the lines of keeping safe**,** as from injury or peril, or attempting to keep resources unchanged and intact. This is more in terms of humans preserving nature from human use. Its intent is more for keeping nature at its original state, free from human interference and damage, with the idea that nature holds its own right.

Discussions

There are many criticisms of deep ecology that have been made since its articulation in 1984 from fellow ecologists and anti-ecologists alike. Fellow ecologists are mainly criticizing deep ecology for having misdirection in its message. For instance, a main critique is from the ecofeminist movement, which dislikes that association that deep ecology makes of both men and women being where the cause of the environmental crisis lies. Social ecologists feel that deep ecology is missing out on the bigger picture, the problem being that the crises live in the dominating nature of society. In general, however, deep ecology has been accused of everything from being too mystical, too religious, unrealistic, hypocritical, making of too large of claims, narrow-minded, and even antihuman. A main critique comes from Richard A. Watson, who has read thoroughly into deep ecology and has made several arguments against the movement in his article, "A Critique of Anti-Anthropocentric Biocentrism". For one, Watson finds deep ecology to be hypocritical in its desire for man to be treated equally with nature, when all other nature is allowed to live out its "evolutionary potential in interaction with one another ," while man is supposed to not do so. Furthermore, Watson dislikes the return to religious or mystical grounds, because he feels that it will not be effective.

However, Watson's biggest problem with deep ecology is he thinks that it will be ineffective in its anti-anthropocentric approach. Watson believes that humans will only care about the environment if they see its usefulness for humans: "There is a very good reason for thinking ecologically, and for encouraging human beings to act in such a way as to preserve a rich and balanced planetary ecology: human survival depends on it ." Moving beyond anthropocentrism has the risk of losing the majority of the population in the environmental movement, and this is where Watson feels Naess and Sessions have failed most of all. Naess,

however, gives a defense of Watson's argument against the anti-anthropocentric movement that he started. Naess only sees shallow ecology has helping out certain problems, but not addressing deeper problems, or the well-being of every living thing in their own right. Naess gives an example by telling the story of a pack of wolves which came into a small village. The small village went out to their untended herd of sheep one day and realized that a pack of wolves had eaten every single sheep. The people of the village became very upset and worried, because they feared that if the wolves had eaten their sheep, what would stop them from eating their own children on the way to school.

The people of the village decide that the best thing to do is to kill the pack of wolves. Now, as an environmental protector of these wolves, an anthropocentric argument would not save them. No one would understand why it would be beneficial to save the wolves, because they would not understand the premise of the wolves being a necessity to human survival. However, people would be much more likely to defend the wolves from being killed if they saw that the wolves had their own intrinsic value, just as humans do, and just as the sheep did, to live and flourish. In this case, the killing of the wolves would be decided against, and the community members would work something out where the wolves and their children would all be protected. As previously stated, deep ecology has been criticized for being anti-human in trying to separate man from his environment. It is often misinterpreted that deep ecology sees that the only way for ecological balance is in the absence of humans, when in reality, this is not the case.

The platform of deep ecology begins by saying that human interference is too excessive, but never once says that it needs to be eliminated all together. It is also extremely important to remember that although this is somewhat of a radical movement, it was devised by people who love nature. Some people still have continued to argue that humans should realize their connection with nature, but remain completely out of nature, alienated from the natural world. Naess argues that nature should never be something that is "hands-off", nor should humans ever be alienated from their environment. As quoted in his article "A Defense of the Deep Ecology Movement", Naess says that "there is no general norm in ecosophy against our full life in nature, and this implies acceptance of hurting and killing. Ecosophy, as I conceive it, says yes to the fullest self-realization of man (Brennan, 125)." As Naess spoke of this full self-realization, Bill Devall also brought up how deep ecology principles can help to reach a higher self.

Bill Devall wrote many articles on deep ecology, one being his book Simple in Means, Rich in Ends, and it is essentially about living practically by the deep ecology principles.

Devall particularly gets into the ecological self, which is one of the best explanations of the deep ecologists' view on the role of humans in their environment. The ecological self is that which is beyond, mature, aware, sensitive, and caring towards the environment and nature. We all have the potential to reach our ecological self, but we are dis-encouraged by the surrounding institutions of society to pursue such a self. The self is furthermore not about being independent from the "other", in reference to nature. By calling nature the other, we allow ourselves, free from guilt, to manipulate, use, and control nature for our own benefits, because basically, no one is able to identify with the other. Deep ecology suggests that humans need to start seeing the relation of them to the environment. Devall quotes Frances Vaughn in saying that the healthy self is "an open living system in an intricate web of mutually conditioned relationships." By realizing our relationships with nature, we realize our dependence on nature, and thus our responsibility as humans to care for nature and to treat it for its true worth is created. Devall agrees, when he says that "as we reach our ecological self we will joyfully defend and interact with that with which we identify; and instead of imposing environmental ethics on people, we will naturally respect, love, honor, and protect that which is of our self."

In our realization of nature as a part of humans, humans will not only begin to care for nature as it is its own, but humans will reach a higher level of self as well. The idea of a higher self implies a lot of changes in thought for one to be able to finally reach it, for those who have spent their entire lives in Western civilization. In Lynn White, Jr.'s essay "The Historic Roots of Our Ecologic Crisis", he identifies anthropocentrism as being the main cause for the environmental problems of today. While deep ecology also points this out, White goes further by explaining where he believes this anthropocentric view came from. White identifies the source as being fundamental Christianity: "Especially in its Western form, Christianity is the most anthropocentric religion the world has seen…[it] not only established a dualism of man and nature but also insisted that it is God's will that man exploit nature for his proper ends ." However, White does not entirely give up on religion. As he continues further, he displays how there have been many Christians who have played a very significant part in the environmental thrust forward throughout the ages, namely Saint Francis of Assisi. It does not so much seem to be that religion is the problem for White, but conventional, institutional and, as previously stated,

fundamental Christianity that has set apart man from his environment, and thus has fueled the inherited notion that man is superior to his environment, leading to the assumption that it is there for his disposal.

White later states that "since the roots of our trouble are so largely religious, the remedy must also be essentially religious, whether we call it that or not " This is what appears to have opened doors for religion in the environmental movement, and also the same philosophy that Naess and Sessions may have had by stating that deep ecology did have a great religious and philosophical foundation that it was built upon. There have been many religions associated with deep ecology which include Christianity, but Taoism in pa particular seems to have had one of the largest influences on the deep ecology mindset and the principles it presents. The origins of Taoism, while not exact, are attributed to a man named Laotse.

There is very little known about Laotse's actual life, and it is even questioned whether he actually existed. Laotse was thought to have been born in 571 B.C.E. He lived in society for the majority of his life as a Confucian. However, as folklore goes, Laotse became tired of the errors and wrong-doings of society, and decided to leave mainstream civilization and live out the rest of his life alone and in peace among nature. However, there was a river Laotse was forced to cross on his way out of town, and to get across, one needed to ride in a ferry boat. The ferry boat driver knew of Laoste, and asked him where he was going. Laotse replied that he was going to live out the rest of his life alone and away from the problems in society. The ferry boat driver was very upset in hearing this, because he knew how important Laotse's teachings were, and he wanted to ensure that they would be there for future generations. He told Laotse that he would not take him across the river until he wrote down everything there is to know about Taoism, and so he did, and what Laotse wrote down is now what we call the Tao Te Ching. Taoism, while commonly referred to as an Eastern religion, is actually much more of an Eastern philosophy for living life.

The most important principle of Taoism is the idea of the Tao, or the Way: "For the countenance of great virtue, only the Way is to be followed." Despite the fact that Taoism has been around much longer than deep ecology, there are still very many similarities between the two. These include everything from their mystical qualities to basic values of sensitivity, simplicity, and joy. In Deng Ming-Dao's book, Everday Tao, he talks about eight important qualities special to the Taoist way of life, each of which holds similar comparison to deep

ecology. The first is simplicity, which relates to the deep ecologist principle of valuing quantity of quality, and what is phrased as voluntary simplicity. Simplicity for the Taoist means keeping life as simple as possible and being content with what one has. By doing so, in theory, this maintains equilibrium in one's life, and as deep ecology says, keeping stabilization. This not only means for the individual, but for the surrounding environment. Secondly, the Taoist has sensitivity, in being observant and aware of others, and in this awareness, loving fellow beings and nature. This is very similar to the deep ecology principle of valuing nature, by understanding and becoming aware of its value. It is thought that the first step for humans is to recognize the intrinsic worth, and in its hopes, one will then be able to understand what the Taoist does, in terms of learning and absorbing from their surroundings.

Next, flexibility is highly valued. The Taoist is flexible in his understanding of the all-connectedness, synonymous with deep ecology's interconnectedness. The Taoist sees everything as relative to everything else, and in seeing this, they do not hold absolutes, and are flexible to what is going on around them. The deep ecologist would also support this principle. Fourth is the value of independence of the individual. This is not the independence from other beings or from nature, but the independence from the fundamental institutions of society, which have shaped much of the ideals for domination over nature in Western culture. The Taoist does not follow conventional morality, but a higher, more profound level of spirit. Deep ecology would also agree with this, in that it calls for a new reform of thought, away from anthropocentrism, which Lynn White, as earlier discussed, attributes to fundamental Christianity. By letting go of these inherited values, individuals are able to reform new values by their relationships and experiences with nature and others around them. One of the most important principles in Taoism is the fifth which Ming-Dao mentions, that of focus.

Focus is meant in terms of following the direction of life, as to what is better known as the Tao. Deep ecology also recommends looking beyond daily concerns of civilization, and following the natural life-flow in the environment. Sixth, there is the ideal of cultivation, as in the attempt to always follow the Tao more perfectly. While the deep ecology principles leave much up to the interpretation of the individual, there is also an obligation in the eighth principle of action and inaction after the realization of the importance of all things to be living in accordance of a more perfect life. Discipline is the seventh principle, and this means making one's actions in order for the attainment of one's goals. This is not meant to be limiting in

structure by any means, but it is more of an extension of the quality of focus. In deep ecology, there is a certain discipline that goes along with the understanding and appreciation of nature. It is not law, but it is a moral obligation, to an extent, of what the individual feels after realization of the importance and value to all beings. Finally, all Taoists have joy. This is received through living in the Tao, and it is inevitable because the Tao is most perfect. Deep ecology has the same intent. Happiness is a very important aspect of human life, and above all, this is seen as something to be attained in living in both the Tao and the mind of a deep ecologist.

Self Assessment Questions

- Assess the Forest Acts of 1878 and 1927 in the context of British forest Policy.

- The Monoculture, Plantations Public works, Railways and ecological implications Local communities respond to these Policies.

- Evaluate the colonial era debate between systematic conservation and resource exploitation.

Unit - IV

Independent India's Environmental Policy – Forest Policy – Resolutions and Acts of 1952, 1980, 1988 and 2018 – Development Versus Environment – Big Dams and Hydro – Electric Power Projects – Bhopal Gas Tragedy – Tsunami and its Impact – Move Towards Sustainable Development – National Environment Policy – National Conservation Strategy and the Policy – Statement of Environment and Development 1992 – National Environment Tribunal – National Green Tribunal.

Objectives

- To Observe Independent India's Environmental Policy.
- To the Impact of Big Dams and Hydro-Electric Power Projects.
- To observe Environmental Disasters, including the Bhopal Gas Tragedy and Tsunami.

Independent India's environmental policy

A diverse developing society such as ours provides numerous challenges in the economic, social, political, cultural, and environmental arenas. All of these coalesce in the dominant imperative of alleviation of mass poverty, reckoned The present national policies for environmental management are contained in the Some sector policies such as the and have also contributed towards environmental management. All of these policies have recognized the need for sustainable development in their specific contexts and formulated necessary strategies to give effect to such recognition. The National Environment Policy seeks to extend the coverage, and fill in gaps that still exist, in light of present knowledge and accumulated experience. It does not displace, but build son the earlier policies. National Forest Policy, 1988 National Conservation Strategy and Policy Statement on Environment and Development, 1992 Policy Statement on Abatement of Pollution,1992 National Agriculture Policy, 2000 National Population Policy, 2000 National Water policy 2002 in the multiple dimensions of livelihood security, health care, education, empowerment of the disadvantaged, and elimination of gender disparities.

Across the political spectrum of the country there has been recognition of the vital role natural resources play in providing livelihoods, and securing life support ecological services. In this perspective a need for a comprehensive policy statement has been evident for some time in order to infuse a common approach to the various sect oral and cross-sect oral, including fiscal, approaches to environmental management. As our development challenges have evolved and our

understanding of the centrality of environmental concerns in development this sharpened, there is also a need to review the earlier objectives, policy instruments, and strategies.

This dynamic requires an evolving and flexible policy framework, with a built in system for monitoring and review, and where necessary, revision. Sustainable development concerns in the sense of enhancement of human well-being, broadly conceived, are a recurring theme in India's development philosophy.

The present day consensus reflects three foundational aspirations

For this to occur there is a need for balance and harmony between economic, social and environmental needs of the country. India also plays an important role in several significant international initiatives concerned with the environment. It is a party to the key multilateral agreements, and recognizes the interdependencies among, and transboundary character of, several environmental problems. The National Environment Policy (NEP) is also intended to be a statement of India's commitment to making a positive contribution to international ale forts.

The is a response to our national commitment to a clean environment, mandated in the Constitution in Articles 48 A and 51 A (g), strengthened by judicial interpretation of Article 21. It is recognized that maintaining a healthy environment is not the state's responsibility alone, but also that of every citizen. A spirit of partnership should thus be realized throughout the spectrum of environmental management in the country. While the state must galvanize its efforts, there should also be recognition by each individual - natural or institutional, of its responsibility towards maintaining and enhancing the quality of the environment.

The National Environment Policy has been motivated by the above considerations and is intended to mainstream environmental concerns in all development activities. It briefly describes the key environmental challenges currently and prospectively facing the country, the objectives of environment policy, normative principles underlying policy action, strategic themes for intervention, broad indications of the legislative and institutional development,

First, that human beings should be able to enjoy a decent quality of life; second, that humanity should become capable of respecting the finiteness of the biosphere; and third, that neither the aspiration for the good life, nor the recognition of biophysical limits should preclude the search for greater justice in the world. Needed to accomplish the strategic themes, and mechanisms for implementation mandrel view. This been prepared through extensive consultation with experts, as wells diverse stake holders, and this processes also documented.

The National Environment Policy is intended to be a guide to action:

In regulatory reform, programmes and projects for environmental conservation; and review and enactment of legislation, by agencies of the Central, State, and Local Governments.

. The policy also seeks to stimulate partnerships of different stakeholders, i.e. public agencies, local communities, academic and scientific institutions, the investment community, and international development partners, in harnessing their respective resources and strengths for environmental management.

The dominant theme of this policy is that while conservation of environmental resources is necessary to secure livelihoods and well-being of all, the most secure basis for conservation is to ensure that people dependent on particular resources obtain better livelihoods from the fact of conservation, than from degradation of the resource.

The purpose of the text "Development and Environment" is not only to provide necessary data, information and knowledge, but also to find relations and consequences in depth, ways to find solutions and to show possible courses of development assistance. Integral element of the text forms references on other sources for the studying particular parts of the text. Besides, the aim of the course is to convince participants of the acute need for dealing with this discourse within development studies disciplines.

Environment versus development

Content of the first lessons is definition of the basic terms (environment, development, security) and explanation the relationship among these terms. Various views on sustainable development strategies are explained in detail. Understanding the problems requires brief analysis of the main environmental problems on a global scale and their relations to development of poor (developing). The United Nations Program of Millennium Development Goals is included due to its topicality. Environmental development goals and related problems are mentioned in the text. Furthermore, the text contains problems concerning the little explored issue of environmental migration and benefits of green revolutions (in relation to GMOs). The end of the course is devoted to development assistance and cooperation in the environmental field.

Relationship between Development, Security And Environment

On one hand, material and social poverty are often identified as two of the main causes of living environment devastation. On the other hand, the bad quality of environment can be a cause

of poverty as well. In order to comprehend the subject, it is necessary to start with brief analysis of selected environmental problems on a global scale and their relation to the development of economically and socially poor (developing) countries. We shall be concerned with: a brief description of the millennium development goals focused on environment; the problem of soil degradation (desertification) and desert expansion, with special attention paid to the Sahel region; the problem of deforestation, agriculture and export cash crop plantation in developing countries; the lack of drinking water in Sub-Saharan Africa and Central Asia; the problem of biodiversity loss, with laying out the main causes of biological species extinction and defining cases when a species is to be considered extinct; climate change, air pollution and their impact on economy, water supply and agriculture; the phenomenon of environmental migration; the pluses and minuses of the so-called „first“ and eventual „second“ Green Revolution (specifically of transgenic crops).

Basic Terminology

1. Environment Environmental is a system which provides natural surroundings for the existence of organisms (including humans) and which is a prerequisite for their further evolution.
2. Abiotic components of environment (atmosphere, water, minerals, energy etc.) and biotic components of environment (organisms – from the simplest to the most complex) are its main elements. To summarize, it is all which surrounds us. It is noteworthy that this is essentially an anthropocentric (non-biological) definition perceiving environment as one in which a man can live.

Ecological Approach: Environment is a set of all factors with which a living subject interacts, and of all surroundings which encompass it. Thus, it is everything that a subject influences, directly or indirectly. A subject can be an organism, a population, a human or whole human society. Usually, the notion of living environment is conceived in the sense of human environment.

Biological Approach: 'environment' denotes the surroundings of an organism or a species, eventually the ecosystem in which an organism or a species lives. At the same time, it is a physical environment and other organisms with which the organism or the species enters into contact (interacts). The notion of biome is very similar to a living environment

Development The opinions on what development is to actually mean have passed great evolution in the last half of century and there is no consensus on how to define this notion at present. The causes of this differentiation can be found in the historical contexts of the approaches to development. Economic growth was regarded as central to the development endeavors up to the 1980's. Gradually, development came to be interpreted as multidimensional concept which should encompass material, social, environmental, political and cultural components (with all of them having a direct impact on the quality of human life). This way it was recognised that there is no single model of development appropriate and desirable for all countries. At the same time emerged the idea of „sustainable development", emphasising the questions related to demographic processes, considerate use of natural resources and mutual influences between a human and his living environment.

Environment and security („peace is more than the absence of war") The generally defined notion of security means a subjective philosophic and psychological state of mind. Within social sciences, we talk about certain attributes/values linked to individual and social systems. According to the United Nations there are a few types of threats: poverty; contagious diseases; environmental degradation; interstate and internal conflicts; mass destruction weapons; and supranational organised crime.

Security is a necessary factor of human development. Henceforth, still more attention is being paid to the concept of human security, concerned with the problem of provision of sustenance and security to people. It became obvious that the price of letting the inhabitants of given regions in their deep security problems can be immense.

Environmental problems do not endanger solely the global ecosystems vital to the people's survival. Environmental stress and its socioeconomic and political effects touch all world's regions and states. They influence local, regional and international security in a still more decisive manner. The definitions of international and internal (national) security have gone through marked changes since the end of Cold War in 1989 – 1991. It is not only about reaching a military balance anymore but also about recognising the social, economic, political and environmental factors related to the issue. In connection with this shift the links between environment, global problems, migration and security gain more and more interest. Two sets of issues, the new dichotomy between the societies of the rich global North and the poor South and at the same time the threats of global ecological (environmental) problems, are more frequently

discussed. In the beginning of the 1990's, the terms such as 'global village' and 'global society' were used, expressing the idea that problems in one of its parts (the South) can lead to problems in another of its parts (the North) and other way round. Hotly discussed topics among others are the environmental threats and their impacts on society and regions. Thus, we talk about socalled environmental security.

Environmental security is a concept stemming from the idea that environmental degradation or lack of natural resources of raw materials and energy can be a cause as well as a result of political strains or military conflict and hence can endanger human security. Even that it is a relatively new concept from the scientific point of view, historically it is nothing new. Fighting for land, pasture, sources of water, energy and raw materials is old as humanity itself. What is new is the global reach of human agency caused by increased number of Earth's inhabitants and by technologies making greater and faster destruction of environment possible.

The Need for New Institutional Arrangements

Contemporary global political, legal and economic institutions have been founded during the 20th century to great extent as a reaction to the Second World War or Cold War. Therefore today, on both global and local level they operate with obsolete concepts, often not containing implementation of preventive procedures. If global institutions are to be effective in resolving the security threats of the 21st century, they need (among others) to be provided tools for solving problems related to environment.

As an example of such initiative the Global Partnership for Development (Nováček & Mederley, 2002), better known as 'Global Marshall Plan', can be taken, first introduced by the American ex-president Albert Gore in 1993. This plan is to be founded on extensive, long-term and precisely targeted financial aid to the developing countries for discovering new environmental technologies and their transfer to them, and finally on stabilization of world's population. Among the other instruments of the initiative are: new, worldwide valid international covenants (including sanctions in case of their violation as well) monitored by United Nations; change of economic norms used for assessing environmental impacts of our agency; and finally, the organisation of worldwide environmental education ('what's crucial is to persuade people that global ecosystem starts at their court').

The relationship between development and the environmental condition This interaction can be characterised as one of interdependence. Just as development is impossible without a

good condition of living environment, so quality environment cannot be maintained in inhabited or intensively exploited areas without their sustainable development. The impact of development on environment This impact is determined specifically by the following two factors:

Approach to development If we regard development narrowly only as economic growth, the quality of environment in general is not quite so important as abundance, quality and accessibility of natural resources of raw materials and energy central for the economy. If we understand development more broadly, for example in the sense of sustainable development, the quality of environment and its sustainable condition will become one of key priorities. In that case, the long term preservation of environment's inhabitability or eventually the betterment of its condition (in case of its past devastation) will be at the centre of attention. The condition or quality of living environment after/during implementation of development programmes The implementation of development programmes or projects can have negative or positive impacts on living environment

Environmental Millennium Development Goals

Millennium Development Goals is a programme aiming at reduction of the global poverty. It seeks to implement the sustainable development on the global level. It consists of eight general goals and eighteen particular targets that are expected to be reached by the year 2005. These goals have been drawn from international agreements admitted during 1990s and subsequently confirmed at the so-called Millennium Summit in New York in September 2000. The Millennium Declaration was adopted by representatives of 189 countries. In 2002 in Monterrey rich countries committed themselves to provide financial support for this ambitious program by devoting 0, 7 per cent of their GDP to development assistance by the year 2015.

First seven goals are aimed at improving conditions in the poorest countries, the last goal refers to developed countries that should strive for developing a global partnership in the ield of development cooperation. The year 1990 is considered as a starting point for comparison of individual indicators

Development versus Environment

Importance of Environment

The economic significance of the environment is evident with the range of ecosystem services that it offers. These include: Provisioning services (food, irrigation, drinking water).

Regulating services (climate regulation, water quality regulation). Cultural services (recreational and religious services). Supporting services (nutrient recycling, soil formation). Millions of households and developmental activities utilise these ecosystem services for production and consumption.

Relation of Environment with Development

Rapid industrialisation and urbanisation are inevitable to bring in desired levels of economic development. This is also believed to be essential to substantially increase the per capita income. However, these income-generating activities are sure to have negative environmental consequences such as pollution. Noticeably, environmental quality is being compromised for the goals of mass employment generation and poverty reduction. It is believed that with gradual increase in income levels along with growth in financial and technological capabilities, environmental quality could be restored. But the reality is that the continued growth generating activities only increasingly deteriorates the environmental quality

Developmental Factors Affecting Environmental Sustainability

Lack of Environmental Compliance: Neglect of environmental principles is a key reason why natural hazards end up causing a significant number of avoidable casualties. Any exercises to scientifically ascertain the risk from natural hazards to a region are barely implemented in the right spirit. Unregulated quarrying and the unscientific cutting of slopes into hills aggravates the risk of soil erosion and subsequently increases the risk of landslides.

Ill-effects of Subsidies: In pursuit of providing welfare to vulnerable sections of society, the government has provided a bulk of subsidies. However, subsidised nature of services like energy and electricity leads to their overuse and undermines environmental sustainability. Further, subsidies also undermine the revenue base and limit the government's capacity to invest in new, cleaner technologies. No Cost to Environmental Resources: Access to natural resources is entirely open and no individual user bears the full cost of environmental degradation and resources are consequently overused. Complexity of Population Dynamics: Increasing population tends to exacerbate the linkages between underdevelopment and environmental degradation. Further, poverty generates significant incentives to raise large families and stimulate migrations, which makes urban areas environmentally unsustainable. Both outcomes increase pressure on resources and consequently worsen environmental quality, diminish productivity and reinforce poverty.

Big dam and hydroelectric power projects

Introduction and perspective

Hydropower is by far the most significant renewable resource of electricity exploited to date. According to the International Energy Agency's (IEA's) 'World Energy Outlook 2013', hydropower output worldwide is projected to increase from 3,490 TWh in 2011 to between 5.5 and 5.9 TWh by 2035, at a steady 15% or so of total global electricity generation.

In 2001 hydropower was the world's second largest source of electricity. In 2013 it ranks fourth behind coal (37% now, changing to between 33 and 40% by 2035, depending on scenario assumptions), gas (22% now, and remaining roughly at this percentage until 2035) and nuclear (12% now, reducing slightly to 2035). According to the IEA, the share of hydropower in electricity production will remain flat at its current share of 16%, or decline slightly by 2035, yet only about one third of the economic potential worldwide has been built to date.

In the OECD countries the best sites have already been exploited and environmental regulations constrain new development, although the construction of smaller size plants proceeds apace in many countries, and there is considerable activity in the refurbishment of existing schemes to extend their lives and, in many cases, increase their outputs. New hydro projects in developing countries are a massive area of development activity, following a maturing of our understanding of how to balance environmental, social and energy concerns. Projects now tend to have less water storage and hence smaller environmental footprints and reduced need to resettle people from inundated lands, but are still able to contribute controllable low carbon electricity at what is usually a competitive price. The largest projects are able to do this on a vast scale compared to most other renewable energy resources, and also bring enhanced electricity security and reduced foreign exchange requirements for imported fossil fuels to the countries they serve.

Energy Conversion Principles

Hydro-electric engineering is concerned with the efficient and economic conversion of energy 'freely available' from a supply of water deposited at a suitable head by the action of the cycle of evaporation and rainfall produced by the effect of solar radiation. An essential requirement is, therefore, that the water should be at a suitable height above a lower reference point to where the water could flow and be discharged. The difference in levels between the

water and discharge point represents the potential energy that would become available for use should water be allowed to flow between the two levels.

Since earliest times the direct conversion by gravity of the potential energy existing in differences in heights of water levels has been employed in the shape of the bucket water wheel. The efficiency of conversion is not very high as only a part of the potential energy is available due to water spilling out of the buckets before they reach the lowest part of travel. The undershot paddle type of water wheel has also been used; here, the water strikes only the bottom of the wheel, and the water, in falling down a channel or flume, has its velocity increased to provide more striking force on the paddles. Although the workings of such schemes are self-evident, it should be noted that the potential energy of water is converted into rotating mechanical energy.

Hydroelectric plants, on the other hand, convert the potential energy of water into an electrical output. The process involves flow of water from the source, through the turbine to the turbine outflow (tailrace), which acts as a sink. In the process of conversion, use is made of water turbines, of associated civil structures and of rotating electrical machinery.

The power generated is proportional to the head (the height of the water), the flow rate, and the conversion efficiency of the turbine.

Hydroelectric projects are normally considered in terms of the gross heads they create. Exploitable heads vary from a few metres to 2000 m.

The greatest outputs, on modern units, have been achieved at net heads of around 120 m where flow rates of 700 t/s yield outputs of 715 MW. Similar rates of flow have been considered for some feasible low head, tidal installations.

Given a reasonable amount of rainfall and runoff, the essential physical requirements are: provision for collecting water at a suitable head; and means for taking it to a piece of machinery for conversion of energy to power output. There are only two basic types of arrangement of the powerhouse within a scheme: either ‘run-of-river’ or ‘diversion’, although there are variations. In run-of-river schemes the power house is local to the dam, i.e. is built into in the dam or is situated alongside it. In diversion schemes the water supply is taken from a damned river or lake and flows through a ‘head race’ canal to a head pond or ‘forebay’ in the vicinity of the remote powerhouse and thence down through a system of pressurised pipes (‘penstocks’) to the turbines.

Rainfall and run-off

Rivers, upland lakes, coupled with their catchment areas, estuarial tidal cycles and upper reservoirs of pumped storage plants can provide the source of energy to be converted. Considering Scotland as an example, the western part of north Scotland consists of mountains at a high elevation above sea level, falling sharply to the sea in the west and falling more gradually and cut by deep valleys to the east. The topography of the Highlands has generally facilitated hydro-electric development.

Variations in Rainfall For the design of hydro-electric schemes the following information is required about the rainfall over the catchment area:

The mean annual rainfall the mean monthly rainfall the maximum and minimum rainfall for a year and for each month the maximum intensity, duration and extent of major rain storms. Rainfall in Britain is mainly aerographical in character, i.e. due to the prevailing moisture laden westerly winds being deflected upwards by high ground. Rainfall of this type tends to be persistent rather than of high intensity. An important feature, therefore, is that it is due to permanent physical features and can be dependedupon. In Britain rainfall distribution at sea level is generally such that it is wetter in the north than in the south and likewise in the west compared to the east. Rainfall on the westward or windward slopes of hills increases with altitude and has a corresponding tendency to decrease on leeward slopes. The configuration of the high ground has, therefore, an important bearing on the pattern of rainfall in a particular area.

Rainfall is measured by gauges which should be distributed over the catchment area and, if possible, over the adjoining territory and cover a range of altitudes.

Fluctuations occur in the amount of rainfall comparing one year with another and since it is necessary to obtain the long-term average rainfall, records should be available over a number of years. The error inherent in the estimate is related to the number of years for which records are available.

In north Scotland records have been taken of rainfall going back in one case to 1881 and these have proved invaluable in the development of hydroelectric power there. For areas of reasonable size, the annual variation in rainfall can be expected to vary from 70% in a dry year to 150% in a wet year. Rainfall distribution through the year is reasonably even and, averaged over a number of years.

Losses - Run-off

Having made an estimate of the amount of rainfall, it is necessary to allow for certain losses. Some of the rain is lost by evaporation from soil water and vegetation surfaces, some absorbed by vegetation and some lost by percolation, which, depending on the geology might reappear as springs outside the catchment area. In the Highlands of Scotland, for example, temperatures are moderate and humidity high which, combined with a high degree of cloud cover, means that evaporation losses are small particularly in winter. Evaporation, nevertheless, accounts for the major proportion of loss, amounting to some 30 cm (12 ins.) of which 22 cm (8 1/2 ins.) is lost during the period April to September.

Due to the presence of impervious rocks and absence of serious faults in most of the development areas, losses due to percolation are small.

The higher rate of evaporation in the summer has the effect of altering the distribution of monthly run-off compared with rainfall. The winter run-off is nearly twice that occurring during the summer River flow records, representing run-off, are used to plot a flow duration curve. A typical flow duration curve for a Highland river shows such rivers as “flashy” i.e., have a large ratio of maximum flow to minimum flow, and few of them carry their average flow for more than one-third of the year. The extent of the diversity of flow gives a measure of the amount of water storage that has to be provided to ensure continued operation during dry periods.

Storage

Purpose of Storage Storage is provided in order that water may be made available when required to meet the electrical system load. The average annual load cycle may not coincide in amount or time with the average run-off cycle and, therefore, the provision of storage means that the water may be utilised at a different period to that when it came into storage. This is called seasonal storage. In addition to such variations within a year, variations can occur comparing one year with another and storage can be provided to offset such variation. This is called long term storage.

Seasonal storage under average conditions may not present any great difficulty if the average run-off cycle very nearly coincides with the load cycle, but considering short spells of two to three months; variations from average can be quite large and in practice provide the main operational problem.

Increasing the amount of storage eases operation of the scheme to meet load requirements, but the cost of storage can be high. Topography and perhaps geological conditions limit the amount of storage possible. If the amount of storage is small in relation to the average yearly run-off, generation may have to take place at times when the load conditions do not merit it and, in very wet weather, run-off can be wasted if it occurs at a greater rate than can be dealt with by the plant. Conversely, in dry weather, the installed plant capacity should be available when required to meet the load, in order that this capacity can be regarded as "firm." Any additional capacity provided in order to save, or to reduce, spillage from the reservoir would have to be justified solely on this basis.

Methods of Storage The most suitable method of providing the required storage depends on a number of factors, topographical, geological, climatic and such availability of skilled labour and materials. The construction of a dam may not be feasible or its provision may not be justified economically due, perhaps, to the open nature of the country at the reservoir mouth, in which case there is the simple arrangement of a natural reservoir from which the power station draws water at a lower level.

In most cases, however, the construction of a water retaining structure is economically justified. With such structures, the primary consideration affecting design is that of safety.

In the design of any dam, certain forces have to be taken into account. Firstly, there are those that are a function of fluid pressures and weight density of materials and, secondly, there are those due to earthquakes, silt deposits, ice, uplift pressures, and effects of floods. Those in the first category are amenable to calculation, but coping with the remainder depends largely on experience. When there are fishing interests, provision may also be made for the passage of fish both into, and out of, the reservoir.

A variety of dam designs exist as follows

Embankment Dams - an earth or rock-filled dam across the reservoir outlet. This form of construction is nearly always cheaper than any alternative particularly if rock-spoil is available from tunneling.

Solid Gravity Dam - Dams of this type rely on their weight for stability and the weight usually provided entirely by the quantity of concrete or the masonry in the structure. A sound foundation, usually on rock, is required.

Buttress Dams - With the potential for seepage in its foundations the gravity dam is subject to an unavoidably large area exposed to uplift forces and, as a result, the stresses and factors of safety against overturning are low in relation to the strength of the concrete. Buttress type dams were developed in order to achieve:

Reduction of uplift forces by having minimum downstream area in contact with the ground. „ Utilisation of the stored water pressure to give stability by sloping the upstream face and, therefore, reducing the amount of concrete required. Utilization of the strength of the concrete to a safe minimum.

Pre-Stressed Concrete Dam - Another way of counteracting the uplift forces and increasing the stress in the gravity dam is to replace part of the mass by preloading the structure.
Arch Dam - Arch dams are characterised by their extreme thinness in relation to their height having this ratio as low as 0.15 and even lower for cupola arch dams with curved cantilever sections. The design of such dams involves complex calculation of stress and model testing is often resorted to.

Hydraulic System

The natural catchment area may be extended by diverting adjacent streams or by tunneling from an adjacent watershed. Unless the power station is constructed within the dam, it is necessary to provide an aqueduct between the storage and power station. In such 'diversion' schemes the supply is taken from a dammed river or lake, from which water flows through a headrace canal to a head pond or forebay in the vicinity of the remote powerhouse. From the forebay the water flows to the turbine through a system of pressurised pipes known as penstocks. The purpose of the forebay is to ensure that sudden changes in rates of flow caused by changes in turbine control do not result in unacceptable changes of the water levels in the canal.

In a variation of this scheme a low-pressure tunnel replaces the canal and takes the water to as near as possible to the power station where there are two possibilities for completing the route. If the rock cover over the route near the station is good and generally steeply sloping, it will usually be economic to provide either a sloping tunnel or combined vertical section and horizontal tunnel. This latter section of tunnel or pipeline is referred to as the high-pressure section.

To permit quick starts of the turbine without loss of head caused by the need to accelerate water quickly within the tunnels, and in order to protect the low pressure tunnel from pressure

surges (water hammer) where turbine control conditions lead also to sudden decreases of rates of flow, use is made of a surge chamber or surge tank. These are usually most conveniently located at the junction between the high and low-pressure sections. A free water surface is thus provided at this point.

The period of oscillation set up in the tank/ chamber in this way is usually of the order of several minutes. In the absence of flow in the tunnel the oscillations can take several hours to die away appreciably. Such oscillations in the surge chamber level are presented to the turbine as a variable head, and if the turbine is speed governed, it will adjust the flow in such a way that unless the oscillations are quickly damped by friction they could, if the chamber were incorrectly proportioned, impose a forced oscillation upon the mass of water in the chamber and produce dangerous conditions.

The chamber has to be designed so that under all conditions of load change, the oscillations are damped to give stable operation. It is important to ensure that the draw down in the chamber is not such as to allow air to be drawn into the tunnel.

Underground power stations must also have a length of tunnel for the tailrace. If the tailrace tunnel contains water under pressure, it would have to be considered in relation to surges in the same way as for a high-pressure system and a surge chamber may be provided.

Power Station

Structure unless the power station is to be incorporated in a dam, the station can either be constructed on the surface or located underground. Provided underground rock is sound an underground station has a number of advantages. For instance, the length of high pressure tunnel and amount of steel lining and reinforcement can be kept to a minimum, the tailrace tunnel can be unlined and the superstructure required for a surface station becomes unnecessary.

Depending on the layout of a scheme, the turbines, their auxiliaries and the electrical plant may be housed either at or below ground level. Run of the river stations are invariably housed at ground level and are located either inside or alongside the dam. On very low head schemes they may be housed within the structure of a submerged weir, with provisions for spilling excess flow over the roof and side of the station. In diversion schemes, the power station is housed either in a purpose-built structure at ground level or in an underground cavern. The underground arrangement is also attractive from the amenity aspect. The relative costs are a little

different, but the underground arrangement does use less steel and the reduction in the amount of tunnel lining work can save time.

In underground stations special attention has to be given to guarding against flooding, fire and leakage of carbon dioxide from firefighting equipment.

The Bhopal gas tragedy

The Bhopal gas tragedy On the evening of 02 December 1984, operators began routine maintenance activities in the factory owned by Union Carbide India Limited (UCIL). Washing of pipes was performed to keep a filter system clean by flushing contaminants out with water It will never be possible to know exactly how water reached a tank of a highly reactive pesticide intermediate, but the most widely accepted theory is as follows: One of the overflow devices downstream from the filter was blocked. Water began to flow back into the vent system through a leaking isolation valve. Water could not have flowed so far if the safety procedure had been followed, whereby a slip blind is installed to achieve an impenetrable seal between the pipes. Water travelled through hundreds of metres of pipes from the filter, eventually reaching storage tank E-610 containing 42 tones of methyl isocyanine (MIC)

The pressure gauges connected to the tank were ignored as operators presumed the gauge to be faulty. Also, there was no reliable way of monitoring the tank temperature. The pressure of the tank was supposed to be maintained at a certain level with inert gas to prevent backflow into the tank. However, there was an undetected leaky valve connecting the tank to the plant's main pipe system. If gas could get out, then water could get in. A chemical reaction between MIC and water began and heat was generated. The reaction mixture inside the tank progressively warmed as conditions moved closer to a thermal runaway reaction. The tank should have been kept cool with a refrigeration system, which had been switched off months earlier. Soon, the thermal runaway reaction took place. Hot MIC vapour burst through the tank's automatic pressure relief system and started to escape through the dysfunctional vent gas scrubber, which was meant to neutralise toxic gas exhaust from the plant. When the operator finally noticed the actual condition inside the tank, it was already too late to stop the catastrophic loss of process containment. At this point, nothing could have been done to stop the release. The deadly gas drifted downwind into surrounding communities, causing the death of thousands of residents of Bhopal, leading to what is known as the world's worst industrial disaster, the Bhopal gas tragedy.

The sequences of events leading to the occurrence of the disaster are illustrated in Figure It should be noted that if any of the safety measures (in green boxes) had been functioning properly, the incident could have been prevented. to escape through the dysfunctional vent gas scrubber, which was meant to neutralise toxic gas exhaust from the plant. When the operator finally noticed the actual condition inside the tank, it was already too late to stop the catastrophic loss of process containment. At this point, nothing could have been done to stop the release. The deadly gas drifted downwind into surrounding communities, causing the death of thousands of residents of Bhopal, leading to what is known as the world's worst industrial disaster, the Bhopal gas tragedy. The sequence of events leading to the occurrence of the disaster are illustrated in Figure 1.It should be noted that if any of the safety measures (in green boxes) had been functioning properly, the incident could have been prevented.

Historical Tsunamis in India

The Indian coastal belt has not experienced many tsunamis in the past. Waves accompanying seismic activity were reported in the northern Bay of Bengal. Tsunamis were reported during an 1881 earthquake that had its epicenter near the center of the Bay of Bengal. The 1941 Bay of Bengal earthquake caused devastation in the Andaman region. This was unusual since most tsunamis are generated by shaking occurring on or near the sides of continental slopes. During the earthquakes of 1819 and 1845 near the Rann of Kutch, there were rapid movements of water in the sea. There have been no waves reports of these earthquakes along the coast overlooking the Arabian Sea and tsunamis are unlikely to have been triggered. Further west, in the Persian Gulf, the Makran earthquake of 1945 (magnitude 8.1) unleashed a tsunami 12 to 15 meters high. This caused a huge flood, with a significant loss of life and property in Ormara and Pasi. The estimated height of the Gulf of Cambay tsunami was 15 meters, but no damage report is available. The estimated wave height was around 2 meters in Mumbai, where boats were pulled from their moorings and casualties occurred. A list showing the Tsunami that affected Indian coast prior to Sumatra Earthquake of December 26, 2004

Tsunami Prone Areas in India

The government has identified a list of areas prone to tsunamis in India on the eastern coast. These include - Puri, Kakinada, Machilipatnam, Nizampatnam-Vetapalem, Chennai, Cuddalore-Pondicherry, Rameshwaram, Thoothukudi, Alappuzha-Chavara, and Kochi [16]. You should know that tsunamis aren't common in India due to their geography. However, India isn't immune

to tsunamis. Records show the tsunami-affected areas in India suffered a major blow. These tsunamis originated in the Indian Ocean [16

Impacts on Resources

Another major issue that will have to be addressed is the impacts of tsunamis on natural resources such as minerals, surface water, groundwater resources, forest, biomass, coastal ecosystem, and coastal and marine biodiversity. Mineral Resources: The mineral resources observed in the area are mostly the places that are predominantly found in the southern parts as far as the Tamil Nadu coast is concerned. During the recent tsunami, a lot of sediments with black minerals, probably scooped out from the continental shelf, were dumped along the Tamil Nadu coast. Similar sediment dumping has been reported from Andhra Pradesh and Kerala coasts also. Now, such dumped marine sediments have both positive and negative effects on the placer mineral resources. While some of the placer deposits might have been blanketed by the tsunami sediments, such newer tsunami sediments might have also brought some host sediments for placers. Hence, both positive and negative effects of such tsunami sediments over the placers need to be assessed. Surface Water Resources: The surface water resources which have been affected by the recent tsunami (2004) are backwaters, creeks, rivers/streams, etc. On the east coast of India, several major backwater ecosystems exist viz: Chilka lake in Orissa, Kolleru in Andhra Pradesh, Puilcat, in Marakkanam, and Vedaranniyam backwaters in Tamil Nadu. These backwater ecosystems are unique and self-styled and the recent phenomenal influx of seawater into these backwaters from the tsunami might have caused a perceptible change in the aquatic environment and would affect the ecosystem at large. Hence, the same warrant detailed studie [6] Forest and Biomass: As the tsunami-ravaged Tamil Nadu coast, most of the palm trees, bushes, etc. have been uprooted and deflected. Even leaves of the palm trees have dried up to the level of tsunami run-up. Hence, the forest and biomass responses to tsunamis need warranting studies.

Impacts on Environment Coastal Environment

In the context of the above tsunami inundation and dumping of marine sediments/pollutants, the inundated areas viz: beach ridges/swales, creeks, backwaters, etc. need to be studied for the environmental impacts.

Terrestrial Environment

The terrestrial ecosystem along the coastal zone, which is inundated by the tsunami, normally receives the wastes which got deposited along with marine sediments. Hence, its impacts also warrant studies to reclaim the soil, forest, and biomass, agricultural fields, etc.

Loss of life and property

Tsunamis can have devastating effects on life and property. This major displacement of water is destroying homes and infrastructure in the affected areas. Many people lose their lives. According to the data, tsunamis have been responsible for the loss of more than 430,000 lives since 1850. Tsunamis cause building collapses, electrocution, gas leaks, explosions, tank damage, and floating debris causing further injury and death.

Disease

Tsunami causes floods in the affected areas and destroys the basic infrastructure like the sewage systems. Flooding and contamination caused due to the destruction of sewage systems cause outbreaks of diseases, infections, and illnesses thus causing more death. Impact on

environment and biodiversity

Tsunamis not only affect human beings but also cause harm to insects, animals, plants, and natural resources. Plants are uprooted due to violent waves of a tsunami, nesting sites are destroyed, land animals get killed by drowning, and marine life is harmed by the flow of toxic chemicals into the water body. Solid waste and disaster debris are other critical environmental problems faced by a disaster-hit area.

Economic Costs

The tsunami causes soil and water pollution. It increases the salinity of the soil. The mixing of disaster debris with the soil and the high salinity render the soil infertile and unsuitable for cultivation, leading to financial losses for farmers and increased food insecurity . Reconstruction after the tsunami also requires huge financial investments. Thus, the tsunami has enormous economic costs on the economy

Stages of Tsunami Disaster Management

Tsunami disaster management can be divided into the following two phases: (i) The stage before the onset of the tsunami disaster and The stage after the tsunami disaster.

Pre-Tsunami Disaster Stage: The following measures should be taken to reduce the damage caused by the tsunami:

a. Prepare maps of the areas affected by the Tsunami.
b. Maps of convergent zones of the world should be prepared.
c. People should not be allowed to build houses etc. in Tsunami affected areas
b. The speed of tsunamis is very fast (500 to 1000 km/h), but due to their high wavelength and low height in deep seas, they are not felt, so boaters and fishermen should be informed that When a tsunami arrives, go deep into the ocean and do not come towards the shore.
a. Tsunami warning devices should be installed on the coasts of oceans and seas. Always be ready for rescue work.
c. Post-Tsunami Disaster Stage: The loss of life and property can be reduced by taking the following measures in case of disaster:
a. People trapped in disaster-prone areas should be immediately taken to safe places.
b. Prompt medical treatment and doctors should arrange for the treatment of the injured persons.
c. Prompt arrangements for drinking water and food should be made in the tsunami-affected areas. Food and drink should be dropped from the helicopter for the affected people.
d. Arrangements should be made for the rehabilitation of the affected people.
e. Do not go to Tsunami affected areas unless there is a compulsion, as your presence may hamper the rescue operation.
f. Children, old people, and the sick should be helped.
g. If water is filled around the houses, then they should not be entered, because the filling of water can weaken the foundation of the houses, and houses can collapse.
h. When you want to enter the house again, you should walk carefully.
i. Do not use a battery-operated lantern. Candles and matches should not be used. Also, make sure that there is no gas leak in the house. • One should enter the house keeping in mind that snakes etc. can come inside the house

Mitigation

Mitigation strategies can help reduce the impact of damage and destruction caused by a tsunami. Some of them are:-

- Coastal land use planning should include limited development strategies and sustainable development strategies.

- ❖ Evacuation strategies should include building tsunami evacuation structures and improving evacuation routes.
- ❖ The construction of dykes, breakwaters, anti-tsunami gates, and the development of forest barriers can also help prevent major damage.
- ❖ Proper planning must be done before the construction of buildings and the adoption of building codes to avoid damage to life and property.
- ❖ Protecting coastal ecosystems such as mangroves and coral reefs can help reduce tsunami risk.
- ❖ Development of tsunami forecasting and warning systems.
- ❖ Evacuation of the population and necessary community assets from threatened areas and post-tsunami reconstruction planning must be carried out

Move towards sustainable development

Over the course of thousands of years, the Earth has undergone numerous environmental changes, yet the environment has remained remarkably stable for the past 10,000 years. This period of stability, referred to by geologists as the Holocene, has different definitions of sustainable development among environmentalists and scientists. However, it can be concluded that sustainable development aims to build a future model of economic, social, and environmental progress while fulfilling the needs of the current generation and preserving and conserving natural ecosystems. It requires a collective effort globally, not just by a small group or one single country. A systematic approach should be adopted to balance the three interdependent factors: the environment, society, and the economy. In 1992, the Union of Concerned Scientists published the "World Scientists' Warning to Humanity." In it, they expressed concern about the potential damage to the Earth's ecosystem, including ozone depletion, depletion of marine life, climate change, freshwater scarcity, and continued human population growth. The scientists were worried that humanity was exploiting and pushing the ecosystem beyond its capacity to support life. Since that first publication, these challenges have only increased, reaching an alarming level except for the stabilization of the stratospheric ozone layer. A second warning has been issued that humanity is jeopardizing its future by not managing and monitoring consumption and by not addressing rapid population growth. The global decline in ozone-depleting substances serves as an example that positive changes can be made through proper planning and implementation.

Pursuing Sustainability: Strategies and Solutions Sustainable development is a global effort to protect the planet, eliminate poverty, and enhance the quality of life for all. This requires balancing three critical aspects: economic growth, social inclusion, and environmental protection. On a small scale, this can be achieved through practices like recycling, lifestyle changes, increased public awareness, education and training, increased afforestation and decreased deforestation, sustainable use of resources, and proper waste management. To bring about broader change, larger-scale initiatives and programs must be implemented. Here are three key strategies for advancing the environmental aspect of sustainable development.

Renewable Energy Technologies

A key component in achieving sustainable development is to harness renewable energy sources, which are replenishable and don't deplete. This involves converting natural phenomena into useful forms of energy, such as solar energy from sunlight and wind, heat from the sun, falling water, and plant growth. Over the past few decades, solar energy technology has advanced significantly, particularly in photovoltaics. However, there are challenges, such as high setup and maintenance costs and limited accessibility that need to be addressed through ongoing research and development. The focus is on improving collection and conversion efficiencies, reducing setup costs, and optimizing conditions for wider use.

Energy Efficiency and Conservation

Another important aspect of sustainable development is to improve energy efficiency and conserve resources. This involves improving the efficiency of renewable energy, implementing appropriate pricing policies, and managing resource loads. Conservation measures should be adopted at every stage, from energy production to consumer use. Despite efforts by nations and international organizations, many countries have not yet embraced conservation practices due to technical, financial, managerial, and policy barriers.

SDG Implementation

Jeffrey D. Sachs and colleagues presented six transformational strategies for achieving the United Nations' Sustainable Development Goals (SDGs) in 2019. These transformations, including energy decarburization and sustainable industry, sustainable food, land, water, and oceans, and sustainable cities and communities, are viewed as the building blocks for SDG achievement. They require long-term, structural changes in all aspects of society, from resource usage to technology to social relationships. These transformations have time-bound targets, such

as net-zero carbon emissions by mid-century, and require regular monitoring and evaluation to ensure progress and make adjustments as needed.

The Concept of Sustainable Development

Definition and Principles - Different scientists have different interpretations of the concept of sustainable development, but there is a general consensus that it is a development process that is environmentally friendly. There is no universally agreed upon definition for sustainable development, but the most widely accepted one is from the Brundtland Report, which defines it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Commission, 1987). Trzyna (1995) views sustainable development as "improving the quality of human life while living within the carrying capacity of supporting systems". Karami (1923) sees it as a way of conserving the environment and protecting it from the impact of traditional societies. Popescu (2005) considers sustainable development to be a system that evolves without losing its qualitative and quantitative attributes. Lele (1991) takes into account all aspects of science, culture, human progress, civilization, ethnic groups, nations, and people, and believes that sustainable development requires growth in these areas while maintaining a balance between ecology and human development (Cristian et al., 2015). Lahsaee Zadeh et.al (1923) view sustainable development as encompassing social, environmental, and physical aspects and consisting of "maximal and sustainable output". They believe that if environmental conservation and economic considerations are taken into account, sustainable development can become an anti-development tool.

Despite the differences between these concepts and their limitations, they all share the common goal of ensuring sustainable development. Sustainable development is a systematic approach to efficiently using available resources while also maximizing population satisfaction The Environmental Challenges of Modern Development - The relationship between the environment and economy is complex, and it's essential to understand the state of both at any given time to determine the outcomes of sustainable development. Sustainable development cannot be based on an "if-then" relationship. For instance, while scientists have warned that increased CO2 concentrations will result in global warming, they couldn't predict the exact rise in temperature. Moreover, just knowing what needs to be done is not sufficient, as society must agree on measures like limiting CO2 emissions and pass relevant laws. Since monitoring is not

feasible for the general public, these laws must be followed voluntarily (Klauer, 2016). Another challenge in implementing. the concept of sustainable development could be a lack of financial resources, diverse interests, and socio-economic development (Klarin, 2018). Key factors like global warming, deforestation, intensive farming, and globalization are contributing to the emergence and spread of deadly diseases and pandemics (Kumar et al. 2020). The rapid growth of the tourism industry, reaching record levels in this decade, is also having negative impacts on the environment, posing another challenge for development

The Importance of Environmental Sustainability for Future Generations

In today's world, environmental sustainability should be incorporated into every aspect of life, from individuals to communities and governments. The COVID-19 pandemic has highlighted the significance of environmental sustainability. The increasing emergence of diseases in human populations is a result of disruption to animal and pathogen life cycles, as well as the mutation of microorganisms due to elevated pollutant levels. The deforestation of forests and changes in land use, along with the rising demand for meat and global trade, has led to the emergence of zoo noses. Environmental sustainability is crucial for the well-being of future generations

The Role of Government, Business, and Civil Society in Promoting Sustainable Development

The need for environmental sustainability is becoming increasingly important, as observed during the Covid-19 pandemic, as humans are becoming more susceptible to diseases due to disturbances in the life cycles of animals and pathogens and their hosts. The rise in meat consumption, wet markets, and global trade are also contributing to the emergence of zoo noses in human populations. The role of government in promoting sustainable development can take both direct and indirect approaches, such as motivating consumers to demand sustainable products and processes, and regulating and taxing companies to reduce harmful environmental practices. A comprehensive strategy is needed to effectively implement regulations and laws in a society. Civil society, including marginalized groups such as youth, indigenous people, and women, is also crucial in promoting and achieving sustainable development, as their participation and voices can help to improve decision-making processes.

Result and Discussion The relationship between the environment and sustainable development is a crucial one as the environment forms a major part of the three dimensions of

sustainable development. It has been observed that the exploitation of natural resources has reached an alarming level, leading to the depletion of resources that are required to meet the needs of future generations. This highlights the importance of sustainable development and the need to adopt measures that not only conserve the environment but also ensure economic stability and social wellbeing. The United Nations has played a key role in promoting sustainable development by outlining the Sustainable Development Goals (SDGs) as part of the Post-2015 Development Agenda. The SDGs aim to create a framework for global development and focus on the three dimensions of sustainable development, including the environment, economy, and society. This serves as a reminder of the importance of considering the environment in the development process and the need to adopt environmentally friendly practices.

However, the implementation of sustainable development initiatives faces various challenges. One of the major challenges is the lack of awareness and education about sustainable development and its importance. Many individuals and organizations are still not fully aware of the consequences of exploiting natural resources and the need to adopt environmentally friendly practices. In addition, the absence of adequate infrastructure and technology, as well as the lack of political will, also hinders the implementation of sustainable development initiatives. Despite these challenges, there have been several initiatives aimed at promoting sustainable development. One such initiative is the implementation of environmental laws and regulations that aim to reduce the negative impact of human activities on the environment. For example, the Paris Agreement, signed by nations in 2015, aims to reduce greenhouse gas emissions and limit the global temperature increase to below 2°C. Another example is the use of renewable energy sources, such as solar and wind power, which not only helps in reducing carbon emissions but also provides a cleaner source of energy. Moreover, there are several projects and initiatives aimed at promoting sustainable development in different parts of the world. For instance, in the field of agriculture, there are initiatives aimed at promoting sustainable farming practices that help in preserving the soil and reducing the use of pesticides and fertilizers.

In the field of transportation, there are projects aimed at promoting the use of public transportation and reducing the reliance on personal vehicles, thus reducing carbon emissions. The relationship between the environment and sustainable development is an intimate one, and the need for sustainable development has never been more pressing. The exploitation of natural resources, population growth, and climate change are some of the key issues that need to be

addressed in order to ensure that the needs of the present are met without compromising the ability of future generations to meet their needs. The SDGs and various initiatives and projects aimed at promoting sustainable development serve as a reminder of the importance of considering the environment in the development process and the need to adopt environmentally friendly practices. While there are challenges to the implementation of sustainable development initiatives, it is crucial to continue working towards promoting sustainable development and ensuring a sustainable future for all.

National environmental policy

The Need for a National Policy on the Environment Sri Lanka's landscape, vegetation and climate, and its people, had once blended to form an island of incredible beauty and serenity, and the country was called Serendipity. Much of this has changed over the past few centuries, particularly in the past few decades. It is the people that have brought about these changes. Sri Lanka's population, now reaching 19 million, places the island among the most densely populated countries in the world, and a good proportion of the population live in poverty. These are the most potent underlying factors that have brought about the changes in Sri Lanka's environment, threatening to undermine the nation's natural resource base. The nation's effort to advance its pace of development, while maintaining the essential freedom of the people to make choices, has had adverse impacts on the four primary natural resources, the land, water, atmosphere and living resources, and on the living environment.

While recognizing the imperative of socio-economic development in addressing the underlying causes of environmental degradation, there has been, in recent years, a growing realization that uninhibited development, while it may yield immediate benefits, will undermine the development process by causing irreparable damage to the natural resources that support development. Optimizing development, and therefore maintaining its sustainability, will only be possible by safeguarding the environment through protecting nature and its life support systems. Legal, policy, and institutional interventions aimed at addressing environmental issues have been made since the 1980s. National Environmental Action Plans have been in place since 1992, and various measures aimed at controlling environmental degradation have been adopted in the different sectors. These actions, however, fell far short of what is required for ensuring that the development process remains sustainable and that environmental integrity is maintained. This underscored the need for a national policy on the environment; a policy that will bind all

organisations and individuals who use environmental resources or otherwise have an impact on the resources to exercise due care to avoid environmental degradation. Such a policy, in its implementation, will pave the way for sustainable development. This is the basis on which the National Environmental Policy has been formulated.

The National Environmental Policy

The Constitution of Sri Lanka makes it "The duty of every person in Sri Lanka to protect nature and conserve its riches". The National Environmental Policy acknowledges this duty and seeks to provide the direction according to which steps will be taken to conserve and manage Sri Lanka's environment in all its aspects. The National Environmental Policy renews the commitment of government, in partnership with the people, effectively to manage the environment for the benefit of present and future generations. The aim of this policy is to ensure sound environmental management within a framework of sustainable development in Sri Lanka. This Policy is supported by many other policies and strategies developed for other sectors. The National Environmental Policy emphasizes that caring for the environment is the bounden duty of any institution, government or non-government, and of any individual that uses, or otherwise carries out an activity that has an impact on, the resources of the environment.

Objectives

- To promote the sound management of Sri Lanka's environment in its entirety without compromise, balancing the needs for social and economic development and environmental integrity, to the maximum extent possible while restricting inimical activities.
- To manage the environment by linking together the activities, interests and perspectives of all groups, including the people, non-government organizations and government at both the central and the local levels.
- To assure environmental accountability.

Principles

- The guiding principles of environmental management will be "the polluter pays" and the need to reduce consumption, and recycle and reuse materials to the maximum extent possible.
- When living natural resources are used, it will be ensured that such use is wise, sustainable, and consistent with the integrity of ecosystems and evolutionary processes.

- When non-living resources are used, it will be ensured that such use is consistent with environmental best-practice, bearing in mind the need to provide also for future generations.
- Traditional knowledge and practices will be respected in the development of environmental management systems. 5. Effective governance will be ensured through the decentralization of environmental management services to the maximum possible extent.

Statements

- Resources such as land, water, air, minerals and biodiversity will be managed in a manner consistent with the viability of ecological processes.
- Environmental management will be through participatory, transparent, predictable and accountable decision-making processes at all levels.
- In addition to protecting the environment from abuse, management systems will take into account the need to restore environments damaged in the past.
- Environmental management systems will be encouraged to be flexible so as to adapt to changing situations (e.g. climate change, invasive species and living genetically-modified organisms) and adopt the Precautionary Principle.
- The economic value of environmental services will be recognized so as to assure the sustainability of such services for the benefit of the people.
- The state of the environment will continuously be assessed and reported on through an appropriate institutionalized monitoring framework based on a comprehensive set of indicators.
- The institutional framework for sound environmental management will be strengthened through capacity-building, legislative instruments and improved inter-institutional coordination and linkages.
- "Life cycle" and 'cleaner production' principles will be applied to improve the efficiency of natural resource use and to improve environmental quality
- Responsible public-private and community partnerships and linkages will be promoted at all levels of environmental management and conservation.
- Education at all levels, together with research, will be promoted in a manner designed to increase the level of awareness of all aspects of the environment and its care and management among all stakeholders.

- Socially responsible behaviors will be encouraged and further developed through an effective framework of awareness building, incentives and enforcement.
- International commitments will be honoured as part of our responsibility to the national and global communities.

National Environmental Tribunal

An Act to provide for strict liability for damages arising out of any accident occurring while handling any hazardous substance and for the establishment of a National Environment Tribunal for effective and expeditious disposal of cases arising from such accident, with a view to giving relief and compensation for damages to persons, property and the environment and for matters connected therewith or incidental thereto.

WHEREAS decisions were taken at the United Nations Conference on Environment and Development held at Rio de Janeiro in June, 1992, in which India participated, calling upon the States to develop national laws regarding liability and compensation for the victims of pollution and other environmental damages;

AND WHEREAS it is considered expedient to implement the decisions of the aforesaid Conference so far as they relate to the protection of environment and payment of compensation for damage to persons, property and the environment while handling hazardous substances;

This Act may be called the National Environment Tribunal Act, 1995.

It shall come into force on such date or dates as the Central Government may, by notification, appoint, and different dates may be appointed for different States and any reference in any provision of this Act to the commencement of this Act shall be construed in relation to any State or part thereof as a reference to the coming into force of that provision in that State or part thereof.

Definitions

In this Act, unless the context otherwise requires;--

"accident" means an accident involving a fortuitous or sudden or unintended occurrence while handling any hazardous substance resulting in continuous or intermittent or repeated exposure to death of, or injury to, any person or damage to any property or environment but does not include an accident by reason only of war or radio-activity;

- "Bench" means a Bench of the Tribunal;
- "Chairperson" means the Chairperson of the Tribunal;

- "environment" includes water, air and land and the interrelationship which exists among and between water, air and land, and human beings, other living creatures, plants, microorganism and property;
- "handling", in relation to any hazardous !substance, means the manufacture, processing; treatment; package; storage; transportation by vehicle, use, collection, destruction, conversion, offering for sale, transfer or the like of such hazardous substance;
- "hazardous substance" means any substance or preparation which is defined as hazardous substance in the Environment (Protection) Act, 1986, (29 of 1986.) and exceeding such quantity as specified by the Central Government under the Public Liability Insurance Act, 1991; (6 of 1991.)
- "Judicial Member" means a Member of the Tribunal appointed as such under this Act, and includes,the Chairperson or a Vice-Chairperson who possesses any of the qualifications specified in sub-section (3) of section 10;
- "Member" means a Member (whether Judicial or Technical) of the Tribunal and includes the Chairperson and a Vice-Chairperson.
- "notification" means a notification published in the official Gazette;
- "prescribed' means prescribed by ruler. made under this Act;
- "rules" means the rules made under this Act;
- "Technical Member" means a Member of the Tribunal who is not a Judicial Member within the meaning of clause (g);
- "Tribunal" means the National Environment Tribunal established under section 8;
- "Vice-Chairperson" means the Vice-Chairperson of the Tribunal.

Explanation

In the case of the Tribunal having two or more Vice-Chairpersons, references to the Vice-Chairperson in this Act shall be construed as a reference to each of those Vice-Chairpersons;

(o) "owner" means a person who owns, or has control over handling, any hazardous "owner" means a person who owns, or has control over handling, any hazardous substance at the time of accident and includes,-

- in the case of a firm, any of its partners;
- in the case of an association, any of its members; and

- in the case of a company, any of its directors, managers, secretaries or other officers who is directly in charge of, and is responsible to, the company for the conduct of the business of the company.

National Green Tribunal

The National Green Tribunal, established in 2010, as per the National Green Tribunal Act is a specialized judicial body equipped with expertise solely for the purpose of adjudicating environmental cases in the country.

Recognizing that most environment cases involve multi-disciplinary issues which are better addressed in a specialised forum, the Tribunal was setup as per recommendations of the Supreme Court, Law Commission and India's international law obligations to develop national laws on environment and implement them effectively.

The Tribunal is tasked with providing effective and expeditious remedy in cases relating to environmental protection, conservation of forests and other natural resources and enforcement of any legal right relating to environment. The Tribunal's orders are binding and it has power to grant relief in the form of compensation and damages to affected persons

The Tribunal has a presence in five zones- North, Central, East, South and West. The Principal Bench is situated in the North Zone, headquartered in Delhi.
The Central zone bench is situated in Bhopal, East zone in Kolkata, South zone in Chennai and West zone in Pune.

The Tribunal is headed by the Chairperson who sits in the Principal Bench and has at least ten but not more than twenty judicial members and at least ten but not more than twenty expert members.

In 1995, the Central Government established the National Environment Tribunal (through the National Environment Tribunal Act 1995) to provide for strict liability for damage arising out of accidents caused from the handling of hazardous substances.

2011 is distinctive for the establishment of the National Green Tribunal (NGT) by the Ministry of Environment and Forests (MoEF). The MoEF was galvanised by the Supreme Court in this direction. Created to focus on environmental issues, the law constituting the NGT received presidential assent in June 2010, but was only enforced by October 18 that year, through a Central Government notification. The coming into force of the NGT Act implied an automatic repeal of two existing laws: the National Environment Tribunal Act 1995, and the

National Environment Appellate Authority Act, 1997, and, therefore, the closure of the National Environment Appellate Authority (NEAA) — a quasi-judicial body empowered to hear appeals against the environmental approvals granted (or not) to projects. All the cases pending before the NEAA were to be heard by the NGT.

Act

National Green Tribunal Act, 2010 (No. 19 of 2010)

The National Green Tribunal has been established on 18.10.2010 under the National Green Tribunal Act 2010 for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto. It is a specialized body equipped with the necessary expertise to handle environmental disputes involving multi-disciplinary issues. The Tribunal shall not be bound by the procedure laid down under the Code of Civil Procedure, 1908, but shall be guided by principles of natural justice. The Tribunal's dedicated jurisdiction in environmental matters shall provide speedy environmental justice and help reduce the burden of litigation in the higher courts. The Tribunal is mandated to make and endeavour for disposal of applications or appeals finally within 6 months of filing of the same. Initially, the NGT is proposed to be set up at five places of sittings and will follow circuit procedure for making itself more accessible. New Delhi is the Principal Place of Sitting of the Tribunal and Bhopal, Pune, Kolkata and Chennai shall be the other 4 place of sitting of the Tribunal.

Self Assessment Questions

- .Evolution of India,s Environmental Policy.

- Consider policy decisions, Challenges and the government's efforts to strike balance.

- Analyze India's responses to major environmental disasters like the Bhopal Gas Tragedy and the Tsunami.

Unit- V

Environmental Movements: Bishnoi Movement – Chipko Movement – Appiko Movement – Narmada Bacchao Andolan – Silent Valley Movement – Jungle Bachao Andolan

Objectives

- To the Bishnoi Movement
- To the Chipko Movement
- To Understand the Appiko Movement

Environmental Movement

An environmental movement is a type of social movement that involves an array of individuals, groups and coalitions that perceive a common interest in environmental protection and act to bring about changes in environmental policies and practices.

Environmental and ecological movements are among the important examples of the collective actions of several social groups.

Cause of Environmental Movements

The increasing confrontation with nature in the form of industrial growth, degradation of natural resources, and occurrence of natural calamities, has resulted in imbalances in the bio-spherical system.

Major reasons for the emergence of environmental movements in India are as follows:

- Control over natural resources
- False developmental policies of the government
- Right of access to forest resources
- Non-commercial use of natural resources
- Social justice/human rights
- Socioeconomic reasons
- Environmental degradation/destruction and
- Spread of environmental awareness and media

Major Environmental Movements in India

Many environmental movements have emerged in India, especially after the 1970s. These movements have grown out of a series of independent responses to local issues in different places at different times. Some of the best known environmental movements in India have been briefly described below:

The Silent Valley Movement

- The silent valley is located in the Palghat district of Kerala.
- It is surrounded by different hills of the State.
- The idea of a dam on the river Kunthipuzha in this hill system was conceived by the British in 1929.
- The technical feasibility survey was carried out in 1958 and the project was sanctioned by the Planning Commission of the Government of India in 1973.
- In 1978, the movement against the project from all corners was raised from all sections of the population.
- The movement was first initiated by the local people and was subsequently taken over by the **Kerala Sastra Sahitya Parishad (KSSP).**
- Many environmental groups like the Narmada Bachao Andolan (NBA), Bombay Natural History Society (BNHS) and Silent Valley Action Forum participated in the campaign

Bishnoi Movement

The Bishnoi movement was among the earliest groups to campaign for environmental preservation, wildlife protection, and sustainable living. The Bishnoi family is regarded as India's first environmentalists. This movement was the first in the history of environmental movements to embrace the technique of hugging and embracing trees to protect them. One of the first initiatives for environmental protection is the well-known Bishnoi movement Amrita Devi movement. When Jodhpur's King Abhay Singh was constructing his new palace in the 1730s, he ordered his soldiers orders to clear the trees in the village of Khejarli for wood. Amrita Devi fought for the survival of trees by clinging to them as a sign of protest as she stood against the military. Asu, Ratni, and Bhagu, three of her daughters, supported their mother. The other town residents joined them in standing up for the trees and circling their trunks in support. Without stopping to listen to the people's requests, the soldiers kept felling trees.

The Bishnoi community cultural beliefs, which are reflected in their sect's tenets and advocate the preservation of trees and wildlife, were the primary factor in their opposition to tree cutting. Another factor or a cause of the Bishnoi movement was their reliance on the forest for the source of fuel wood and fodder, which was directly tied to their rural way of life. Bishnoi from Khejarli and nearby villages joined the protest and hugged these Khejri trees one by one to save them from being cut down at the possibility of losing their lives. In this movement, 363

Bishnois of Rajasthan gave their life to safeguard the Khejri trees in the Rajasthani village of Khejarli. The Bishnoi movement had a profound impact on people's minds and memories, leaving an ever-lasting impression.

Bishnois of Rajasthan

The Bishnois are a religious sect from India that is strongly committed to protecting the environment, including animals. The group was established in 1485 AD and had 29 tenets, also referred to as the 29 principles as well as commandments that Guru Jambeshwar had taught. Livestock and agriculture are the two main pillars of the Bishnoi community subsistence economy. They are known by the name Vishnoi and uphold the idea of conserving plants and animals. The Bishnoi people strongly oppose using animal products for entertainment or food. According to their philosophy, every living thing whether an animal or a plant is sacred and should not be killed by people. Because of their sustainable lifestyle & attention to environmental conservation, they have been referred to as the world's first ecological community because of their sustainable lifestyle and attention to environmental conservation. It is prohibited for community members to cut down trees or go handing.

The Bishnois of Rajasthan specialize in dairy farming and are well-known for their high-quality dairy products & soap-making abilities. In addition, they grow cotton, jowar, millet, wheat, and bajra.

Origin of Bishnoi Community

By Guru Jambheshwar, the Bishnoism sect was established. To be followed by the sect, he established 29 precepts. Bish is equivalent to 20, while noi is equivalent to 9. Bishnoi means twenty-nine, as a result. The name "BISHNOI" would be given to those who sincerely adhere to the 29 ideals. Western India, particularly Rajasthan, is home to the non-violent Bishnoi community, which worships the environment.

Objectives of the Bishnoi Movement

There were four main objectives of the Bishnoi movement, which are as follows: • To protect the region's biodiversity by guaranteeing a healthy, eco-friendly social life for the community. • To encourage proper personal cleanliness, fundamental health, and responsible social engagement. • Another objective of the Bishnoi movement is to campaign against the removal of such trees and support anti-deforestation movements. • To protect biological variety and promote responsible animal husbandry.

Success of Bishnoi Movement

Following this incident of the Bishnoi movement, the maharaja issued a stringent royal proclamation prohibiting tree chopping in all Bishnoi villages. The history of Bishnoism, which began around 1730 A.D., is where the idea of embracing trees and tree huggers originated. The Chipko Movement of the 20th century, led by Sunder Lal Bahuguna, was inspired by the Bishnoi movement and sacrifice. Additionally, the governments of Rajasthan & India presented the Amrita Devi Bishnoi Smrithi Paryavaran Award and the Amrita Devi Bishnoi Wildlife Protection Award in recognition of their contributions towards the preservation of nature and the protection of wildlife, respectively

Chipko movement

Chipko movement came into existence in 1973 to protect trees from cutting down. It was a non-violent movement initiated by the women in Uttar Pradesh's Chamoli district (now is a part of Uttarakhand, India) for the conservation of forests to maintain ecological balance in the environment. After some time, the movement spilled onto the other Northern states of India.

The movement was named as "Chipko" that came from the word "embrace" because the villagers (especially women) hugged the trees and encircle them to protect from cutting. The movement also stands for an Eco-feminist movement because women only created the nucleus of this movement. The power of protest through non-violent worked as a powerful agent for the conservation of the forest land.

Objectives of chipko movement

The slogan of the chipko movement was "ecology is a permanent economy," as coined by Sunderlal Bahuguna. He said to embrace the trees and save them from being felled down because they are the property of our hills. Save them from being looted.

One of the main objectives of the movement was to protect trees and forest area because it was the primary source of livelihood for the tribal people of this region. They were highly dependent on the forest resources for their survival.

Along with this, the chipko movement played an essential role in conserving the environment to maintain proper ecological balance in the region. It was one of the most significant movements of India against deforestation to preserve ecology.

Chipko Movement History

The original chipko movement is linked with Rajasthan. In the 18th Century, the Jodhpur's king had ordered to cut trees to build a beautiful palace. The Andolan started in Khejarli village of Rajasthan, where 363 people sacrificed their lives to protect khejri trees.

This was the first time when a huge number of people led by 'Amrita Devi' from the 'Bishnoi' community resisted cutting of trees by embracing them. After the strong protest of the movement, the king of Jodhpur gave a royal decree **preventing cutting of trees** in all the Bishnoi villages.

In modern India, the origin of the chipko movement is a village named 'Mandal' in Uttarakhand (former part of Uttar Pradesh) in the upper 'Alaknanda' valley. However, the Andolan got momentum in the 1970s but evolved as one of the most influential protests of Indian history in the year 1973.

An environmentalist and Gandhian social activist 'Chandi Prasad Bhatt' was the founder of modern India's chipko movement. He was also a founder of a cooperative organization named 'Dasholi Gram Swarajya Sangh'. In 1964 he used to foster small industries for the rural people using local resources.

In 1970, a tragic monsoon flood occurred due to industrial logging. Almost 200 people were killed in this flood. Then Chandi Prasad Bhatt and his cooperative organization 'Dasholi Gram Swarajya Sangh' involved completely in the protest of large-scale industrial logging. As a result, the first chipko protest was initiated in Mandal village in April 1973.

Later on, the movement was actually triggered by the government's decision where a large plot of forest land was allotted to a sports goods manufacturing company. When the appeal of the villagers was denied, then as a reaction of anger, the villagers encircle the trees to prevent them from cutting. Chandi Prasad Bhatt spearheaded this movement and, after several days of protest, the govt. canceled the company's logging permit.

After the success story of Mandal village, the workers of Dasholi Gram Swarajya Sangh and Sunderlal Bahuguna (a Gandhian activist) started sharing the movement's tactics with the local people of other villages throughout this region. Some other success stories of chipko movement followed by Mandal village includes-

In 1974, a major protest near 'Reni village' happened where more than 2000 trees were planned for cutting. The government summoned the men from surrounding villages for

compensation. However, the women of the town, spearheaded 'Gaura Devi', refused to cut the trees. As a result, the loggers had to withdraw their plan of cutting the trees in the region.

From now, the chipko movement emerged as a women's movement to fight for forest conservation. 'Sunedrlal Bahuguna' also took part in this protest. He fasted for two weeks (inspired by satyagraha movement) to protest against the felling of trees.

- **In 1978**, 'Dhoom Singh Negi' led the chipko movement to protest auctioning of the forest in the 'Advani' forest in 'Tehri Garhwal' district. He fasted to protest the auction. Also, the local women tied sacred threads around the trees and read 'Bhagavadgita' to protect the trees.
- An estimate is that between 1972 and 1979, nearly about 150 local people participated in the chipko movement, protesting about 12 major and many other minor confrontations to protect trees in the Uttarakhand region.
- **In 1980**, a big success was achieved lead by 'Sunderlal Bahuguna'. He gave a direction to the movement and appealed Indira Gandhi (the prime minister of India that time) to stop felling the trees. As a result, the govt. initiated a 15-years ban on commercial cutting of trees in Uttarakhand Himalayas for the conservation of the environment.

Some other participant name associated with the movement includes – Suraksha Devi, Bachni Devi, Virushka Devi, Sudesha Devi, and many more. Later on, the success of the chipko movement inspired other Himalayan states to take the initiative to protect the cutting of trees in their regions.

Causes of Chipko Movement

This movement was started for an ecological purpose to save the trees. These are some of the primary reasons that force the tribal people stood bravely in front of the loggers to protect their forest land.

- In the 20th century, the common people of the Uttarakhand hill region suffered a lot due to **large-scale deforestation**.
- The problems started with the inefficient policies of the govt.
- Rejection from the govt. to the appeal of the poor condition of local people.
- The ecological balance of the Uttarakhand region was affected big time by cutting of trees.

- The local people also had to face the problem of scarcity of water and poor land condition.
- Lack of awareness about the environmental and ecological importance of the trees in the society.
- The local people of the region gave up on keeping a high number of livestock.
- Malnutrition among local people was also a reason for the origin of the chipko movement.

Importance of Chipko Movement for Environmental Protection

- Chipko movement was basically a forest conservation movement started against unquestionable rights of govt. agencies to order the felling of trees. The word chipko literally means "hugging" the trees to save them from cutting. The local people acts as a protective shield against contractors by hugging the trees.
- In the 1970s, an organized protest to ***stop the destruction of trees*** spread throughout India quite rapidly from its epicenter Mandal village. It was the courage of local people, especially women who confront the loggers as interpose between them and the trees.
- The importance of the chipko movement was to ***protect forest resources*** from destruction. Trees are not only used as resources for fuel-wood, timber, food, fodder, etc. but it has much more importance. Trees help to prevent soil erosion, flood, and bring rainfall, etc.
- In short, we can say it ***maintains ecological balance*** in the environment. So, the people of the hill region of Uttarakhand saved the trees not only for their own benefits but also to help the environment.

Chipko movement is an important environmental initiative took by the villagers of the Uttarakhand Garhwal region. They took the non-violence method to fight against the loggers and contractors. They gained considerable popularity as an Eco-friendly movement for the environment. The movement started in Mandal village paved the way for various such environmental changes in India.

Appiko Movement

Appiko Movement is one of the forest-based environmental movements in India. The movement took place in the Uttara Kanada district of Karnataka in the Western Ghats. The story

of the movement is that for several decades the forest department had been promoting monoculture plantations of teak after clear-felling the existing mixed semi-evergreen forests.

About Appiko Movement In September 1983, women and youth of the region decided to launch a movement similar to

- Chipko, in South India. The movement was named Appiko which means "hug" in Kannada, symbolising protection for the tree. The movement was founded and led by environmental activist Panduranga Hegde.
- The aim of the movement was to conserve the trees of the Kalse forests in Karnataka.
- Women and youth from Saklani and surrounding villages walked five miles to a nearby forest and hugged trees there. They forced the fellers and the contractors of the state forest department to stop cutting trees. The people demanded a ban on the felling of green trees.
- The agitation continued for 38 days and this forced the state government to finally concede to their demands and withdraw the order for the felling of trees. Like the Chipko, the Appiko movement revived the Gandhian way of protest and mobilisation for a sustainable society in which there is a balance between man and nature

Background

- In August 1983, the villagers of the Sirsi Taluk of Uttara Kannada requested the forest department not to continue the felling operations in the Bilegal forest under the Hulekal range. The forest department, however, did not pay attention to the request of the villagers and the clear-felling of the natural forests by the contractors continued. The villagers felt the ill effects of this arrogance on the part of the forest department
- There was severe soil erosion and drying up of the perennial water resources.
- In the Salkani village of Sirsi Taluk, people were deprived of the only patch of forest left near this and surrounding villages to obtain biomass for fuelwood, fodder, and honey. Moreover, the spice-garden farmers of Uttara Kannada, who were critically dependent on leaf manure from the forests, were also badly hit.

Objectives of Appiko Movement

- The Appiko movement succeeded in its three-fold objectives, which include: Protecting the existing forest cover Regeneration of trees in denuded land Utilizing forest wealth with proper consideration for the conservation of natural resources.
- Effects of Appiko Movement The Appiko movement saved the basic life sources for the people, that is, trees like bamboo useful for making handcrafted items which they could sell for earning some money for their livelihood. It also saved medicinal trees for their use by the local people.
- Further, the movement created awareness among the villagers throughout the Western Ghats about the ecological danger posed by the commercial and industrial interests to their forest, which was the main source of sustenance. Like the Chipko movement, south India's Appiko movement also achieved successful results.

Narmada Bachao Andolan

Narmada Bachao Andolan was an Indian social movement against constructing various dams across the Narmada River under the Narmada Dam Project. Save the Narmada movement or the Narmada Bachao Andolan began in 1985. The Andolan was led by the local tribes, environmentalists, farmers, and activists that aimed to protest against the lack of proper rehabilitation and resettlement of the people dependent on the river for their living and livelihood after the construction and development of the Narmada Dam Project

Narmada River Narmada

River is the Indian peninsula's largest west-flowing river that flows through Maharashtra, Rajasthan, Gujarat, and Madhya Pradesh. The river has a course of 1312 km and ends up in the Arabian sea after moving through rocky gorges, agricultural regions, hills, and lush forests. This River System in India has 41 tributaries, and these tributaries are surrounded by the mountain ranges of Maikal, Vindhya, and Satpura on three sides, while the fourth side merges into the Arabian Sea. Along the Narmada river, more than 81% area of the surrounding includes villages and tribal populations consisting of Baigas, Gonds, Bhils, and people belonging to the primary occupation (agriculture) as the river is highly rich in natural resources.

Narmada Bachao Andolan- Origin

Narmada Dam was constructed over the Narmada river, resulting in submerging the villagers' land. In this project, 3000 small and big dams were built. One of the major dams,

Sardar Sarovar Dam, was supposed to displace more than 25000 people. Seeing the effects, the most powerful mass movement, Narmada Bachao Andolan, was started by Medha Patkar and her colleagues against the construction of the huge dams over the river in 1985 for rehabilitation or resettlement of the affected people.

Features of Narmada Bachao Andolan

The key features of the Narmada Bachao Andolan are as follows-

- Narmada, also called the Reva, is India's 5th longest river. After independence, the government called for the construction and development of large, medium, and small dams on the river to aid local and national development.
- It was proposed that two dams, Narmada Sagar and Sardar Sarovar, should be constructed.
- The Narmada Water Disputes Tribunal approved the Narmada Valley Development. The project included 3000 small dams, 135 medium dams, and 30 large dams. Also, it was suggested that the height of the Sardar Sarovar dam should be increased.
- After the project's approval in 1985, Medha Patkar and her colleagues decided to visit the site. She noticed that the work for the project was being checked on orders of the Ministry of Environment and Forests, Government of india.
- The construction of the Sardar Sarovar Dam began in 1987. However, no information was conducted about the people supposed to be affected by the dam's construction. Perhaps, they were offered rehabilitation.
- Seeing the condition of the people, the Narmada Bachao Andolan was organized in May 1990 by 2000 people. It was a five-day sit-in at PM's residence in New Delhi. As a result of this movement, PM reconsidered the Narmada Valley Development Project.
- Also, 6000 women and men collectively began the Narmada People's Progress Struggle March in Dec 1990. In this Yatra, people marched over 100 KMs
- In January 1991, Baba Amte and his seven-member team started a 22-day-long hunger strike.
- At last, in 1999, the construction of the Sardar Sarovar Dam started again. Its construction continued till 2006 and was inaugurated in 2017. The height of the project was increased to 163m.

Role of World Bank in Narmada Bachao Andolan

Narmada Project is one of the most significant multipurpose rive valley projects in India. The government requires funding for the construction of the dams. So, Narmada Water Disputes Tribunal gave clearance to the World Bank to begin construction on the Narmada Project. As a result, the World Bank, in 1985, agreed to finance the project.

- It contributed $450 million to the construction of the Sardar Sarovar Dam.
- The protest led by Medha Patkar testified to the role of the World Bank in Washington, D.C, which increased pressure on the bank to withdraw itself from the project.
- Later, World Bank, announced that it would give an independent review of the project.
- It resulted in the Morse Commission's establishment for human displacement, environmental cost, and construction of the dam in 1991.
- In 1993, the participation of the World Bank was canceled. Also, in 1991, Medha Patkar and Baba Amte, the leading spokesperson of the Narmada Bachao Movement, received the Right Livelihood Award. This campaign includes support from notable film and art personalities, rallies, hunger strikes, and court actions. The movement was joined by various NGOs, activists, and local people. The primary supporting committee's were-Maharashtra-Based Narmada Dharangrastha Samiti.
- Madhya Pradesh-based Narmada Ghati Nav Nirman Samiti.
- Gujarat-based Narmada Asargrastha Samiti.

Success of Narmada Bachao Andolan

- Narmada Bachao Andolan aimed to bring justice to society. The Andolan won the Right Livelihood Award for its consistent non-violent struggle. The major highlights of the Narmada Bachao Andolan's success are as follows-
- 1993 - Removal of the World bank from the Sardar Sarovar project.
- 1994-99 - Halt of Sardar Sarovar construction.
- 1999-2001 - Foreign investors' withdrawal from the Maheshwar dam.

Silent Valley Movement

The silent valley is a tropical evergreen forest area located in Kerala. It is one of India's last remaining portions of virgin tropical evergreen forest and is extremely biodiverse. Environmentalists and residents were outraged when a hydroelectric power project was proposed in 1973. In 1985, the government was forced to declare it a national reserve forest due to public

pressure. It was then named the silent valley national park. This national park is home to the most species of lion-tailed macaques in India, which is also a critically endangered animal.

Save Silent Valley Movement

The Silent Valley is well-known for its rare animal and bird species. Because this forest is lushly forested and has a huge area under vegetation, there is no loud sound in the forest apart from that of some birds and insects, which is why this valley is identified as Silent Valley. This Valley covers a surface area of 90 square kilometers. The Kunthipura river passes through the Silent Valley. This runs for about 15 kilometers and falls from an altitude of 2400 meters. According to mythology, the Pandavas are said to have chosen to settle in the silent valley after losing their empire and land.

- The silent valley movement arose in response to the official statement of the construction of a dam on Kunthipura's upper stream, also called the silent valley project.
- The first survey was conducted by the state government in 1958. • The dam over the top stream, according to British technicians, can help generate hydroelectricity.
- The planning commission gave its approval in 1973. The project's main goal was to produce 120 megawatts of electrical power and water to yield 240 megawatts of electric power.
- In 1976, a bunch of environmentalists began to oppose the silent valley project.
- A task force was set up under the presidency of the then Vice-President of the World Wildlife Fund India.
- The task force continued to work for over a year and conducted several surveys that recommended that the project be halted.
- The task force's report stated that the project's construction will lead to significant harm to the green cover. It will eventually harm flora and fauna, as well as the water. This will result in high-scale forest disasters.
- This report also advised that in case the government is compelled to construct the dam, then they must also adhere to the 17 recommendations outlined in the given report.
- In 1979, the task force's leader admitted that the initial report was a blunder and made a plea to the government to cease the project entirely.

Outcome of Silent Valley Movement

The silent valley movement played a vital role in saving the valley from biodiversity damage. The effect that the silent valley movement had is explained below:

- The movement was initiated by Kerala Sasthra Sathiya Parishad (KSSP), which was an NGO along with being Kerala's biggest science organization.
- The proposal to ban the project was welcomed by the state government, and the KSSP began a massive signature campaign to prevent its construction.
- ❖ The legislative assembly then approved the project. The KSSP released a guidebook titled "The Silent Valley Movement Hydroelectric Project: A Techno-economic and Sociopolitical Assessment."
- The state government was instructed to abandon the project in 1979 by India's thenprime minister.

Silent Valley Movement

The Kerala State Electricity Board (KSEB) put forward a proposal to build a dam over the Kunthipuzha River, which flows through the Silent Valley in Kerala. The Planning Commission then gave its approval to this project in 1973 in the month of February, at an estimated budget of 25 crore rupees. Quite a few people were worried that the project might dilute 8.3 square kilometers of untouched evergreen forest. Numerous non-governmental organizations firmly condemned the proposal and demanded that the government take it back. Indira Gandhi announced that Silent Valley would be safeguarded in January 1981 in reply to uncompromising public pressure. The Central government re-examined the matter in the month of June 1983 with the help of a commission presided over by Prof. M.G.K. Menon. The Silent Valley Hydroelectric Project was dropped in November 1983. The Silent Valley National Park was officially inaugurated in 1985 by then-Prime Minister Rajiv Gandhi.

Jungle Bachao Andolan

In the early 1980s, the Jungle Bachao Andolan took shape when the government proposed to replace the natural Sal forest of Singhbhum District, Bihar (now Jharkhand), with commercial teak plantations. The Jungle Bachao Andolan movement is said to have originated in Bihar and slowly spread to states like Jharkhand and Odisha.

Contextual Background

Jharkhand literally means "the land of forests", and until a few decades ago most of the present-day Jharkhand state, in fact, most of the Chotanagpur plateau, where the young state lies, was covered by dense subtropical forests. The Chotanagpur plateau is also home to numerous indigenous peoples (in India called Adivasi) who fought for the creation of a state of their own, a state for the indigenous peoples, covering the historical "forest land": Jharkhand. The Indian government finally conceded, and on 15 November 2000, the present state of Jharkhand was created. It however consists only of what earlier formed the southern part of Bihar state, and therefore only a fraction of the historical Jharkhand. Today, reserved forests in Jharkhand are also heavily degraded, some even completely denuded. In its greed for revenues from timber the Forest Department of Bihar state, right after independence also took control over the management of privately owned forests. Over the past decades, communities all over India have started to protect whatever forests remain and to regenerate denuded forests. In Jharkhand, the Jungal Katai Andolan was launched as early as 1978, as a protest movement against the devastation of forests in the Kolhan-Singhbhum area, mostly inhabited by the Hos. The forest rights movement remained particularly strong in Munda and Ho inhabited regions of Ranchi and West Singhbhum districts, and protests continued in a sporadic manner until the emergence of the Jharkhand Jungle Bachao Andolan (JJBA - Jharkhand Save the Forest Movement) in 2000.

Jharkhand Jungle Bachao Andolan

Jharkhand Jungle Bachao Andolan (JJBA) was launched as a grassroots movement for the restoration of forest rights of the Adivasi, providing them with a common platform for sharing experiences and coordinating their activities. JJBA emerged out of an initiative to launch a campaign for the restoration of forest rights of the Adivasis in Jharkhand. The Adivasi communities gathered under JJBA have understood that they can protect their forests in the long run only if their rights over their forests are recognized

Achievements of JJBA

The achievements of Jharkhand Jungle Bachao Andolan (JJBA) go far beyond the goal of "Saving the forest". JJBA has also turned out to be a popular movement, through which indigenous peoples are asserting their rights and identities. The movement not only has a very clear target (forest rights) but has also developed a simple strategy to achieve it. This strategy is

called Community Forest Governance. It is conceived as resting on “four pillars”. The four pillars include:

The traditional village council (Gram Sabha) o The Forest Protection Committee o The women’s cooperatives o The youth forum (Bal Akhra) Even though the approach is termed Community Forest Governance, the four “pillars” are representing an encompassing community-based self- governance system combining the traditional self-governance institution of the village council (Gram Sabha) with three new institutions.

Self Assessment Questions

- How well can you Bishnoi Movement to environmental Conservation?

- Can you evaluate the effectiveness of the Chipko Movement.

- How would you assess the significance of the Narmada Bachao Andolan..

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