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The Human Footprint on Environment Issues in India

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Chapter 1



Introduction

I have been teaching the course on environment to the undergraduate students for years, telling them all about the historical wrongs and the contemporary issues on environment. I must, at the same time, confess that there has been a contradiction in what I taught to my students and what I actually practiced in reality. It has been impossible for me or for that matter any human being to live in today's modernized world without leaving some impact on environment. One could turn his or her own lights out, but residing in a culture that provides street lighting, based on thermal electricity, means he or she is still contributing to the environment through the municipality tax. But is it so difficult for a technology-savvy man to live on this earth without damaging the environment? Let me share my own experience.

It was vacation time for the kids and they had gone with their mother to spend some time with their grandparents. So, I was staying at my house all alone, on the outskirts of Delhi, remembering my carefree bachelor life. One Sunday, I attempted to live for a day without making any net impact on the environment. The first thing that came to my mind was to avoid filling up my garbage can. I also decided not to cause any green house gases emission through my driving to the nearby park, or running the air conditioner. I went to the nearby supermarket on my son's bicycle and made a point to buy foodstuff, fruits or vegetables which are grown locally and have not come from the far off land (so no Chinese or American apple). My conscious effort in becoming a perfect environmentalist also meant no T.V., no elevators to climb up the stairs, no plastic bags to buy things, no packaged products, etc. The priority of the day was to buy unpackaged food and food products. Therefore, I searched out my long neglected jute bag and empty glass jars to carry the unpackaged food home. I was cycling through the bicycle path to reach the market, deliberately avoiding the use of car, and suddenly found a huge traffic jam on the road with long queue of trucks. There were black smoke and exhaust fumes coming out from these slow moving trucks, and I got badly exposed to the fumes coming out of the trucks and other heavy vehicles. In order to avoid the inhalation of the polluting gases, I started paddling the bicycle faster.

On reaching the superstore, when I took out the empty jars and put them on the counter asking the shopkeeper to put my rice and oil in those jars as I did not intend to use plastic bag, he gave me a bewildering look. Even the customers behind me were in for a shock, as they looked at my face as if I had gone crazy. When I came back to my house, I was really tired and like always was about to step into the elevator. Suddenly, I realized my pledge and followed the stairs to reach the second floor. Inside the house, I was not supposed to use electricity despite sweating profusely. I went inside the kitchen to cook my breakfast, making it sure that I don't eat anything coming as packaged item. Nothing could have been less carbon emitting than preparing porridge with green vegetable in a pressure cooker. But once again, I was standing in a moral quandary in front of the LPG gas burner and was forced to consider the most difficult part of my one day experiment with truth. Not using electricity, car or elevator and not filling up garbage or trash was the easiest part, but how could one live without food?

At the end of the day, I could realise that all this is weird as I was very close to leading a life of asceticism. I got baffled. If I wished to live sustainably, I could no longer get exactly what I wanted. It not only meant renouncing the worldly pleasure and luxury, but also living without food. We have got so intermingled with the impact making system that it is virtually impossible to get the things we need without leaving an imprint or footprint in the form of trash, pollution and greenhouse gases. Just imagine how much do we consume, use and discard on an average in our lifetime. All this leaves a mark on the earth's surface in the form of environmental impact. This is what I meant by human footprint.

So 'no human footprint', is simply not possible and feasible. While I begin to explore ideas and options to edify my students how to at least reduce human footprints, the first thing that I tell them is to stop watching T.V., chatting on cell phone and start reading and spending time with friends. This will not only enhance creativity but will also contribute in reducing footprints. But we need to reduce the evils of consumption. We need to buy absolutely necessary consumables and use them to the maximum, so that they don't go as waste. This in no way will affect our youth's employability. Rather it will make them responsible citizens of the country striving to contribute towards the economic development of India and the mankind. I often give example of Gautama Buddha's concept of asceticism to my students. According to him, there are two extremes of life – life full of pleasure and lust, and worldly denial through asceticism. And between these two extremes, is the 'Middle Path'. So we do not need to be an ascetic to reduce damage to the environment, as this will mean complete rejection of being a human itself.

In the present world of consumerism, we often live a lifestyle which may not be sustainable to the ecosystem. However, occasionally, we think beyond short-

term gains and listen to our heart more closely. And when we do, we find thoughts of doom on the future of the earth. In this, we humans are guilty. Every other day we come across the news of new bacteria or viruses, unpredictable and never before weather conditions, in torrential rains or droughts. We also come across the news of widespread cancer due to pollution in the air and the use of pesticides in the foodstuff, etc. Many would suggest that this is the beginning of the collapse of the economy and the current worldwide depression is an indicator. However some analysts strongly feel that everything is well and fine on this planet. Huge space and resources on the earth are enough to feed the entire human population sumptuously and the modern technology would solve all our problems and fulfil our needs. Environmental changes that we are witnessing today is a not a new phenomena and different parts of the earth have undergone phenomenal transformation due to natural forces, like volcanic eruptions, earthquakes, landslides, floods, drought or even major climate changes like long winters in some parts of the world or unprecedented torrential rain in dry areas. But human activities over the last two centuries have, for the first time in the history of the earth, induced harmful environmental changes on this earth. The use of natural resources have increased at an alarming pace over these years that there has been an unparalleled deterioration in the ecosystem.

According to United Nation's Millennium Ecosystem Assessment Report 2005, 'Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in the human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber, minerals and fuel. This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth. The changes that have been made to ecosystems have contributed to substantial net gains in human well-being and economic development, but these gains have been achieved at growing costs in the form of the degradation of many ecosystem services, increased risks of nonlinear changes, and the exacerbation of poverty for some groups of people. These problems, unless addressed immediately, will substantially diminish the benefits that future generations obtain from the ecosystems.'¹

WHY DO WE STUDY ENVIRONMENT?

Environment could be defined as that which environs the conditions, or influences under which any person or thing lives or is developed. However, in normal parlance, when we talk of environment, it specifically means the surroundings and immediate

¹<http://www.millenniumassessment.org/documents/document.356.aspx.pdf>. Retrieved on 20 January, 2011.

environment of human beings. The reason why we study environment as a subject is that it has undergone tremendous changes in the past, and the process is still on. The importance of environment cannot be disputed. The need for sustainable development (a development that meets the needs of the present generation without compromising on the ability of future generations to meet their needs) is a key to the future of mankind. The degradation of our environment is linked to continuing problems of pollution, loss of forest cover, solid waste disposal, issues related to economic productivity and national as well as ecological security. Currently, the increasing levels of global warming, the depletion of the ozone layer and a serious loss of biodiversity has made everyone aware of growing environmental concerns and the dangers thereof.

The face of the Earth has always been changing with or without human intervention. There has been a constant change taking place for millions of years. Even before the hominids (early humans) came on the scene, changes like plate tectonics, change in climatic pattern, change in sea level, evolution of new plants and species have been taking place. These were comprehensive changes and we generally do not cover these changes under the ambit of environment. When we talk of **environmental changes**, we specifically mean local changes, like changes in the course of a river, soil erosion or deposition, increase or decrease in annual average rainfall, increase or decrease in the population of plants, animals and human beings, change in the land-use pattern, etc. It is in this context that we talk about anthropogenic factors, i.e. changes occurring due to human interference.

Environmental Crisis

It is now well-established that human beings and their activities have been a major factor of environmental change over the last 10,000 years, especially after agriculture became a regular mode of sustenance. Agriculture has had far reaching ramifications so far as the environmental history of India or any other part of the world is concerned. It not only meant manipulating the nature for crop production (gradually surplus production), but also forcing people to settle at a particular place to reap the benefit of the crop sowed, and in turn exploit the surroundings where they lived. However, the rate at which such changes took place has been too slow to lead to any crisis.

However there are numerous instances in the Indian history, when crisis situations have reached and eventually led to the decline of the civilization, urban centers and expansion of agricultural land at the cost of forest land. We have examples from historical past such as decline of the great Indus Civilization in and around 1750 BC largely due to man-made environmental factors. Similarly, during the post Vedic period, the introduction of iron technology led to large scale

deforestation for agricultural expansion. The Mughal period, especially under Akbar, witnessed 100 per cent (doubling) expansion of cultivated area at the cost of forest and wasteland. The British colonial rule was the worst phase so far as the environmental degradation is concerned. They came with such policies in India so as to make maximum use of the resources and this disturbed the existing pattern of land-use. The East India Company systematically turned the doab into a cash crops area. The crop area was also extended at the cost of forest clearing. The deforestation exposed the soil. As a result, the low lands rapidly became saline. The forest offered sufficient protection against this, but because of the increase in water evaporation, salt moved up to the surface and was deposited in the soil. This led to a reduction in soil's capacity to store water. It has been reported in the Famine report that in 1838 water flowing through the Ganges and the Yamuna was one-third less than the usual in the dry period. The water table came down to alarming levels after 1838. Thus, the colonial period was a watershed in terms of the exploitation of the resources of India. The massive exploitation of natural resources under the Colonial rule and the continuation of moderate form of resource exploitation even in post-independence India, have forced us to reach a crisis like situation. There have been many scientific discoveries thereafter, but unfortunately these have moved humans towards greater consumerism and exploitation of resources at a much faster pace than ever before.

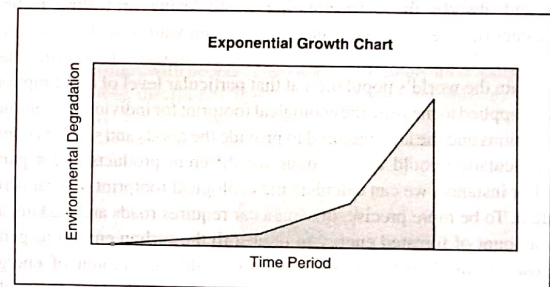


FIGURE 1.1 Exponential Growth Chart

When scientific and many other developments take place at a rapid pace, the changes in the environment could be fast enough to lead to a catastrophe. We are consuming natural resources at a much faster rate than nature can regenerate them. We are polluting the environment at a rate greater than its ability to absorb the pollution. This pace of environmental change could be compared with the 'exponential growth' in mathematics. There are few phenomena occurring over the

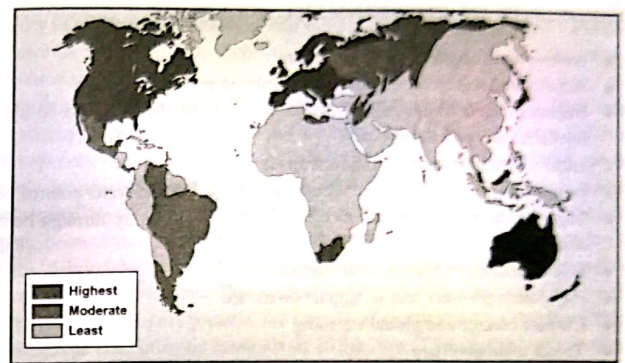
last four centuries at a rapid speed which have grave implications on the life on earth, e.g. excessive carbon dioxide emission, depletion of forests, extinction of species and wildlife, huge increase in human population, excessive consumption and production of goods, etc. In each of these categories, the curve is flat as shown in Figure 1.1. The graph suddenly takes a vertical turn over the last few centuries. This phenomena is sometimes referred to as 'hockey stick curve'. The Intergovernmental Panel on Climate Change's (IPCC) Third Assessment Report concluded that 'it is likely that the rate and duration of the warming of the 20th century is larger than any other time during the last 1,000 years.' A 'hockey stick' shaped graph is reconstructed to show that the twentieth century was unusually warm compared to the preceding centuries.

It has been established that after the Industrial Revolution, the rate of consumption of natural resources has increased exponentially and the 'ecological footprint' is becoming bigger and bigger.

What is Ecological Footprint?

The ecological footprint is a computation of human consumption on the Earth's ecosystems for sustaining themselves. It is done by assessing the biologically productive land and sea area required to produce the resources a human being consumes and absorbs the corresponding waste, using prevailing technology. Different categories are created to study the footprint values, such as carbon, food, housing, and goods and services as well as the total number of footprint, that each needs to sustain the world's population at that particular level of consumption. The same basis is applied to measure the ecological footprint for individuals, communities and organisations and the area required to provide the goods and services consumed by them. Calculation could also be done for different products or for particular activities. For instance, we can calculate the ecological footprint of a car driven by an individual. To be more precise, driving a car requires roads and parking as well as a large amount of forested energy to re-absorb the carbon emissions generated from the use of fossil fuel. Similarly, we may add the amount of energy and materials used for construction and maintenance of the vehicle in the ecological footprint computation.

Per capita ecological footprint (EF) tool informs us about the extent a nation uses more (or less) than what is available within its territory, or extent to which the nation's lifestyle would be replicable worldwide as shown in Map 1.1. The footprint can also be a useful tool to educate people about their carrying capacity and over-consumption by humans. By doing this, we may convince people around the world that many of their current lifestyles are not sustainable.



Source: WWF

MAP 1.1 Global Ecological Footprints

MULTIDISCIPLINARITY

Environmental study is inherently interdisciplinary and the issues which have larger implications on humankind are studied as Environmental issues. We not only study about animals, plants, other organisms, water, soil, air, ocean, earth's crust, etc., but also their relationships with people. They are so intricately interconnected with each other that numerous disciplines from sciences and geography to humanities get involved into it as shown in Figure 1.2.

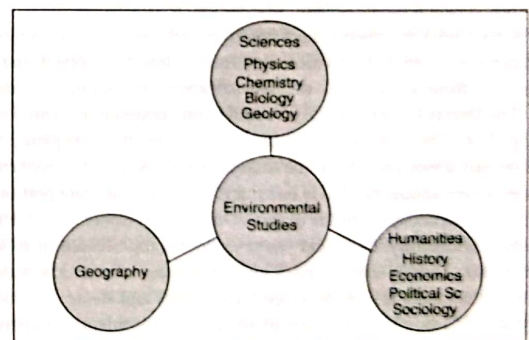


FIGURE 1.2 Multidisciplinary Nature of Environmental Studies

COMPONENTS OF ENVIRONMENT

- Atmospheric degradation by pollution
- Accelerated soil erosion through overgrazing and deforestation
- Impact of modern agricultural technologies through the increased use of fertilizers and pesticides
- Land-use pattern change and its impact
- Implications of construction of dams and the politics of water control
- Impoverishment of natural species directly or indirectly through human actions
- Environmental impact of urbanization
- Population pressure and its impact on nature
- Climate change and global warming
- Threat to biodiversity
- Exploitation of non-renewable natural resources

ECOSYSTEM: STRUCTURE AND FUNCTION

The living things interacting with natural environment within approximately 20 km thick sphere over the earth's surface make up an ecosystem. It is thus a functional unit consisting of all the living organisms (plants, animals and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. Equally connected to the ecosystem is ecology. Ecology is the study of the relationship between the organism and its environment. The thick layer which includes land, water and soil over the earth's surface is called the biosphere. The biosphere consists of three non-living components: the land (lithosphere), the water (hydrosphere) and the air (atmosphere).

The natural ecosystem is divided into forest, desert, cropland and aquatic ecosystems. All these ecosystems are self-sufficient interacting systems in the biosphere. The forests (ecosystem) are natural plant communities with dominance of flowering plants. Trees, shrubs, herbs and climbers are present in plenty. In India, the forests occupy about 18-20% of the total land area. A desert ecosystem occurs in the regions where annual rainfall is less than 25 cm. A significant portion of land (about 17 per cent) is occupied by the deserts. Due to high temperature, intense light and low water availability, flora and fauna is poorly represented in it. Here we mostly get bushes, shrubs, some grasses and a few trees. Due to low water table, root system of the plants is well developed and leaves and stems are modified to conserve water. The best known desert plants are the succulent and spiny leaved cacti. The main consumers in the desert ecosystem are the insects, reptiles, birds and camels which are adapted to living in unsuitable conditions. Cropland is an

artificial, man-managed ecosystem. Often, a single crop of one's choice is grown in order to obtain useful products, like food grains, fibre, timber, herbs and paper. In order to increase yield, crops are provided with manure and fertilizers and sprayed with pesticides.

In the ecosystem, insects, like aphids and beetles feed on leaves. These insects are eaten by frogs and some birds which, in turn, are eaten up by snakes and hawks. Decomposers, like bacteria and fungi present in the soil as well as in air act on dead organic matter of plants and animals and help in the cycling of minerals. Earthworms are an important nutrient provider to the soil. They take all kinds of organic debris from the surface of the ground deep into their burrows. When they eat the debris, they excrete soil containing concentrated nitrate, phosphorus, magnesium, potassium, etc. These minerals help in the growth of plants. Aquatic ecosystem is the largest because the oceans of the world like, Atlantic, Pacific, Indian, Arctic and Antarctic cover about 70 per cent of the earth's surface. Estuary is a part of aquatic ecosystem. An estuary is a body of water where fresh water and sea water meet and mix. A river brings fresh water into the estuary and the sea brings salt water. Lagoon is a body of water separated from the sea by a narrow strip of land. It is also a kind of estuary.

Development and Ecosystem

Development over the last fifty years has put a major stress on the ecosystem. Development due to technological innovations in industrial, commercial, residential, agricultural and transportation related activities has led to a cumulative impact on the natural environment. Many would argue that population growth is one significant cause of destruction of natural ecosystems. There has been a humongous increase in the rate of species extinction, soil erosion, falling water tables and depletion of aquifers, pollution of rivers, seas and coastal waters, and increase of harmful emissions of pollutants to the atmosphere, etc.

Population growth has no doubt taken the human population beyond the planet's capacity to shoulder the burden. As a result, the natural balance of ecosystem is disturbed. In a nutshell, significant changes in the natural environment are occurring due to human being's intervention and the rapid progress of colonisation, urbanisation, industrialisation, agriculture, mining, transportation and technology. While human population is growing at a rapid pace, the per capita consumption of resources is also increasing due to the change in our lifestyle and consumerism. Thus, the ecosystem is being constantly altered and destroyed. For instance, deforestation is being done for more wood, more cultivable land for agriculture and human settlements. Rural land is being converted into urban settlement and open spaces are vanishing. The mass scale destruction of flora and fauna has disturbed

the ecological balance. It has now been established that it is leading to global warming and subsequent climate change. Thus, apart from the population growth, the prime author of the script, there are other factors responsible for the degradation of ecosystem. These include: migration, deforestation, overgrazing, agriculture, mining for obtaining minerals, urbanisation, building of towns, cities, roads, transport; construction of dams on rivers; facilities for tourism, recreation and adventure, pilgrimage, radioactivity, pollution and water crisis.

Depletion of water resources is also one of the prime concerns worldwide. With rapidly increasing urban human population and limited resources, it is becoming increasingly difficult to meet the water requirements through the municipal water supply system. Due to extensive construction, the local ground water recharging has declined and the cities have to draw water from outside. Many a time it leads to conflicts among the nations and the states for distribution and control of natural water flow and could prove to be the crux of all the future conflicts around the world.

Pollution has also caused a lot of environmental problems and is in fact the reason for many of the contemporary diseases, like asthma and cancer. The causes of air pollution include: discharge of sulphur dioxide, oxides of nitrogen, hydrogen sulphide, and suspended particles coming from automobiles, industries and other sources which cause damage to the ecosystem. The discharge of untreated sewerage and industrial wastes into rivers affects the quality of drinking water supplied from the rivers. These also pollute groundwater which is difficult to treat. Similarly, oil pollution can have devastating effects on the wildlife and ecosystems because oil is toxic and directly kills small animals, such as fish, shrimp, crabs and shellfishes. Sea birds and other large animals are harmed by oil when it forms a coating over their feathers or fur. Because of it, oil-contaminated animals develop hypothermia and often leads to death. Every year we hear of oil spills in the sea water due to ship breakage. Recently in 2010, there was a major oil spill in the Gulf of Mexico when deepwater oilrig exploded accidentally. Water pollution also affects the fish which form part of the main diet in the coastal region.

Is the Culture of Consumerism the Main Culprit?

There is no denying the fact that all the above factors have contributed in their own way in the degradation of ecosystem. But the main culprit seems to be the new culture of consumerism which got popularised over the last 200 years after the industrial revolution. We have destroyed much of our natural ecosystem because of the new culture. In other words, we can still save much of it by changing this consumerist culture. By 'intentional and voluntary reduction of consumption' (Hartmann, 2004), we can save the humanity and the planet earth from destruction.

BEGINNING OF ENVIRONMENTALISM IN INDIA

Environmentalism in the North

The industrialized and developed nations of the world are known as 'North'. It is here that environmentalism grew first. By environmentalism, we mean a thought or academic discourse on subjects related to environment. The beginning of environmentalism could be traced to the early twentieth century in Europe, when in 1904 a scholar named Friedrich coined the term 'Raubwirtschaft' (meaning Robber Economy) for the first time. By this, Friedrich meant economic plunder and devastation of the resources of earth. He argued that the destructive exploitation of resources leads to ruthless exploitation, resulting in deprivation. He indicated towards a larger issue of the role of humans in changing the face of the earth. But this issue received relatively little attention from geographers in the early decades of the twentieth century.

This is not to suggest that people in general were unaware of the degradation taking place due to exploitation of resources. After a century of industrial revolution, a lot of people became skeptical about the after effects of the rapid industrial growth. Many of them got nostalgic about the freshness of air before the industrial growth. In many European countries nature conservation societies were formed. Poets, philosophers and novelists began expressing people's concern in their writings. But the number of people taking up such environmental concerns was still very low.

In the academic world, people believed that it is the environment which determines the human activities, and therefore, people should not be worried about the future. But the works of two contemporary scholars, Harlan Barrows and Carl Sauer in the early decades of the twentieth century challenged this notion. Their emphasis on human activity determining the environment drew attention among the academic circles. Carl Sauer started an effective campaign against destructive exploitation of nature. He wrote about the ecological virtues of some primitive people and the domestication of cattle. He also highlighted the landscape changes that resulted from human action, and gave logical and clear warnings about the need for conservation.

The two world wars fought in the years 1914-18 and 1939-45 had huge impact on the future of the world economic order. At the end of these conflicts, few nations emerged to become very powerful and got a huge area with its resources under their control. This augmented an era of unprecedented growth of such nations, mainly concentrated in Europe and the United States. One of the leading environmental historians, John McNeill in his study *Something New Under the Sun* has calculated that the energy used by humans in that 100-year run was more than

that used by all our ancestors in the past 10,000 years. The huge advances forced these nations to overlook the adverse impact of economic progress on the environment. To them, all problems looked solvable by means of newer technology. It is also called the concept of 'economic optimism', that has contiguous and disastrous results as these progress have proved to be parasitical and non-sustainable in the long run. Soon other nations of the world followed the suit.

In the 1960s, few scholars began to question the way the earth was being overexploited. One of the first books which caused ripples within the academic circles was *Silent Spring* by the American Biologist, Rachel Carson. She wrote at a time when, '...in post-war America, science was god, and science was male.' (Lear, 2002) She warned of the unintended impacts and slow poisoning due to the overuse of pesticides, like DDT, to increase food production. She explained that such pesticides and chemicals when applied to crops slowly leaches into the soil and ground water and thus enters the food chain and then into the bodies of humans, birds and animals. Carson's writings initiated a debate on the transformation in the relationship between humans and the natural environment. The chemical industry was one of the main beneficiaries of the post-world war technology and also one of the main authors of a nation's prosperity. According to her, the post-war culture of science arrogantly claimed dominion over nature and has contaminated man's total environment. To say the least, with *Silent Spring* grew an environmental movement led by public that demanded that science and government should be held accountable.

Barry Commoner was another leading environmentalist of the time. He was a Biologist, who initiated a kind of modern environmental movement in United States. In the early 1950s, he became concerned about radioactive fallout spreading from nuclear-weapons tests in the Nevada desert region. He saw the need for citizen access to information about the results and their implications on the environment. This led to the formation of the St. Louis Committee for Nuclear Information (CNI). Disputing the official government position that nuclear testing posed little health risk to humans, a CNI analysis of children's baby teeth demonstrated that such testing caused radioactive build up in humans. Thus, he challenged the dominant perception that technology could solve all ecological problems. He argued that the real and more dangerous impact of nuclear testing is not in the area of testing but beyond that area and this could have a lasting impact on human life.

The decades of 1960s and 1970s was dominated by the fear of the possibilities of resource depletion. Scholars all around the globe were apprehensive about the fact that the resources we have been using in the economic growth process would deplete and then the growth process would come to a halt. In fact, the 1970s was marked by two major oil-shocks and there were huge oil price hike. All the countries

of the world felt that all is not well on the natural resource front. After this, many green groups emerged and started awareness campaigns to save the earth. But all these movements were largely confined to the western world or what is known as the 'North'.

Environmentalism in the South

In 'South' or the countries where colonies were established by the European powers, including India, we do not have any reference of organised environmental movements. In these countries environmental movements began only after 1970, led by social activist and later on by scientists and academicians. In the early 1970s in India, people from grassroots, like Chandi Prasad Bhatt, Suderalal Bahuguna initiated the environmental movement in India. However, it is pertinent to mention at the same time that many years ago Mahatma Gandhi had emphasised on less resource-intensive ways of living, although during his days environmentalism had not evolved as a force in India.

With the emergence of environmental movements in India, scholarly debates were initiated during the last quarter of the twentieth century, particularly in the 1980s in the context of India. Ramachandra Guha argued that the British Colonial Government's policy led to the unprecedented denudation of the vast forest cover to meet commercial as well as strategic needs of the empire. This was in utter disregard to the rights of forest-dwellers and users (Guha, 1983). The colonial forest policy had not only destroyed subsistence farming, but also made the traditional methods of managing forests as ineffective and redundant. In effect, the customary rights of the forest-dwellers were ignored. The colonial government also pushed forward commercialisation of forests and its resources very rapidly, leading to huge deforestation. Many historians, apart from Guha, have written about the deforestation in different parts of the country under Colonial Rule.² There is no denying the fact that even before the colonial regime the exploitation of forest resources was being done, but it was largely restricted to the collection of spices, such as pepper and cardamom, and ivory. All this, however, did not pose a serious threat to the ecology as these resources were renewed in a short span of time. For the first time under the colonial control, fencing of forests was done and commercialisation of forest resources started on huge scale without a concern for long-term consequences.

² Neeladri Bhattacharya. 1995. 'Pastoralists in a Colonial World'. In David Arnold and Ramachandra Guha, eds, *Nature, Culture, Imperialism: Essays on the Environmental History of South Asia*, Delhi, pp. 49-85; Chetan Singh 1995. Forests, Pastoralists and Agrarian Society in Mughal India'. In David Arnold and Ramachandra Guha, eds, *Nature, Culture, Imperialism. Essays on the Environmental History of South Asia*, Delhi, 1995, pp. 21-48.

Contrary to such well accepted arguments, Richard Grove came up with a different interpretation and says that 'as Mughal control collapsed, the ascendancy of successor states and their attendant commercial elites caused dramatic rise in timber demand and the growing commodification forests for revenue and state needs long before the East India Company became a significant power in the land. These processes of forest annexation by pre-colonial states frequently involved the forced removal of peasant populations and the destruction of pre-existing customary forest-utilisation arrangements' (Grove, 1995). To Grove, colonial rule was rather concerned about forest conservation, and therefore, the idea for environmental protection was concretely shaped in Madras and Bombay Presidencies during the first half of the nineteenth century. Many Indian historians have questioned Grove's thesis on pre-colonial deforestation. They argue that the equilibrium of resources was maintained during that period and it was later, under colonial rule that was maximised commercialization was maximised with no concern for long-term ecological implication. Mahesh Rangarajan argues that no ruler prior to colonial intervention had ever had a sustained policy of intrusive exploitation for the forest tracts of the Central Provinces (Rangarajan, 1996). He says that during the early colonial rule, emphasis was laid on extending the area of cultivation into the forests, which led to the 'marginalisation of tribes'. The worst casualties of colonial forest policy were subsistence farming and the traditional methods of managing forests. Ajay Skaria has also shown in his study as to how the tribal-managed forests were taken over by the colonial administration. Checks were imposed on all those who were traditionally using the forest resources (Sakaria, 1999).

Unlike in the West, where modern environmentalism was given birth by scientists, in India it began through the protests of rural communities led by the people from grassroots. They belonged to the first and second generation of population directly affected by the colonial forest policy. Since its origins, the environmental movement in India has passed through four stages during the decades of 1970, 1980, 1990 and 2000. In the 1970s, it was seen as something of a gatecrasher. It tried to disturb the consensus shared among politicians and intellectuals that concern for nature was only for the developed and the rich countries of the world. In India, environmentalists, like Chandi Prasad Bhatt gradually created an academic atmosphere showing that there was something called 'environmentalism of the poor'. A marked difference that we witness in the approach of the Western and Indian environmentalists was that while in the West the Green Movement was motivated by the desire to keep beautiful places unpolluted to walk through, in India, environmentalism began as a move to survival. In India, there was an unequal competition over resources such as forests, fish,

water and pasture. On the one hand, there were local communities who depended on these resources for subsistence, on the other hand, there were urban and industrial interests who exploited the resources to the maximum for their profit. Government policies during those years tended to favour the industrialist, which sometimes led to reaction from the local communities. There were few episodes of protests for a fairer and more sustainable use of natural resources. The 1980s saw an upsurge of such protests and the Indian environmentalists began receiving massive and positive media attention. There was legitimate reportage on environmental issues in most of the national dailies. As a result, in 1980, a new Department of the Environment was established. Five years later, this was upgraded into a full-fledged Ministry of Environment and Forests. State governments also followed the trend by setting up environment ministries of their own. The third phase of Indian environmentalism began in 1990s. During this phase, real 'professionalisation' of environmental movement was seen. Both the scientists and social scientists realised the problem and they began to systematically analyse the roots of the environmental conflicts. Many researchers for Ecological studies were started to resolve the environmental issues. In social sciences, new studies related to environment and its social implications began to be targeted by the researchers. In higher education, students started writing thesis in the emerging fields of 'ecological economics' and 'environmental history'.

The Green activists, through their writings showed the negative implications of the modern technology. But suddenly when India experienced high rates of economic growth for the first time in the 1990s, the Green activists' views were overlooked and their opinion were ignored. Perceiving the mood of the people towards consumerism and fast economic growth, the Indian press virtually stopped running stories on the degradation of the environment and the marginalisation of the rural communities that it caused. This was one of the bleak and reverse phases of Indian environment since independence, when with no media fear, the Ministry of Environment and Forests dismantled the existing safeguards and made the clearance of even the most destructive projects a mere formality. All this was done under the garb of economic liberalisation. The economic boom and the resultant consumerism has come at a very huge cost. The impact of this dark phase could be seen in the first decade of the twenty first century. Air pollution levels in Indian cities such as Delhi, Bangalore, Kolkata, etc., increased to an alarming level and are among the highest in the world. Many of our rivers are being declared dead and many are badly polluted with industrial wastes or untreated sewage. Intensive cultivation and commercial farming with massive use of fertilizers have massively depleted groundwater aquifers. In states, like Orissa and Chhattisgarh, the governments have handed over huge areas of forests and hillside to bauxite and iron

ore mining companies. Recent examples of mining rights to the Reddy brothers in Karnataka is now known to the commoners as well. Through illegal mining, they have not only destroyed the ecology of the region but have rather exported huge amount of iron ore wealth of India to China. We have many other similar examples of illegal mining in Odisha (Orissa), Jharkhand and Chattisgarh. They are destroying fields and farms and polluting rivers. One of the worst implications is related to social problem, specially of the tribals. They have been fighting for their survival with little government support to improve their lot and as a result they have gone into the arms of the Naxalites.

The fourth stage of environmental movement that we are witnessing in India could be termed as 'revivalist'. We are still in a transition phase to achieve the fourth stage completely. There is growing global concern among the Indian environmentalists, media, bureaucrats and to some extent in the politicians. The issue of climate change has led to major policy decisions by Indian states and it has brought the question of sustainable development into centre-stage. Indian scientists and environmentalists have started giving serious thought to generate growth and employment while keeping intact the nature. Indian environmentalists have suggested ways to the governments to sustainably manage our water and forest resources, to build better transport and energy policies, and to protect the health of our citizens. The beginning of formal environmental education in the form of environmental studies and issues could prove to be a powerful medium of change and sustainable development.

STUDY QUESTIONS

1. Why has the study of environment become so important for us today?
2. How will you justify that multi-disciplinarity is in the very nature of environmental studies?
3. Describe the various types of ecosystems? What are the factors responsible for the degradation of ecosystem?
4. How far is the environmentalism in India different from that of the West?