# UNIT 10: ENVIRONMENT, DEVELOPMENT AND MODERNISATION

## UNIT STRUCTURE

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## 10.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- understand the implications of developmental activities on environment
- discuss how developmental activities such as the construction of roads, bridges, dams are hampering the ecosystem
- analyse how Development and Modernisation are posing threat to the environment.

## 10.2 INTRODUCTION

In the previous units, we have discussed about various environmental problems. Most of these problems are caused due to exploitation of nature

by man. In this unit, we shall get to know in greater details how developmental activities of modern society have been hampering the environment. Development is a continuous and constant process. But, every development has some positive and negative results. While development is carried out for the benefits of the inhabitants, the environment is equally important. If development is carried out without considering the environment, it may have a negative impact on the environment. This, in turn, will cause harmful effects to the people.

In order to fully enjoy the benefits of development, protection of the environment is necessary. Though this fact has been neglected in prioritizing development, there has been an increase in awareness among human beings in recent times. By giving adequate significance to the environment, we all will be able to enjoy the benefits of development for a long time.

This unit presents the associated problems that arise due to various human activities along with the solution that can be used to realize a harmonic sustainable development that provides for the co-existence of man and natural life. It will offer a range of information regarding the relationship between the environment and development activities.

## 10.3 DEVELOPMENT AND ITS IMPLICATIONS ON THE ENVIRONMENT

Development has been the buzzword in the modern society. However various studies have revealed the negative side of the development activities and how it has led to the destrcution of the environment. In the subsections below, we shall get a better understanding of this .

### 10.3.1 Construction of Roads, Buildings and Destruction of Greenery

A road cuts over rainforest to give a community access to the city. A dam produces a reservoir to provide freshwater to a growing town. A platform that is miles from the shoreline provides access to oil reserves deep below the ocean floor. These are all instances of infrastructure-physical structures that offer the underpinnings for modern society. Infrastructure is an essential part of the development associated with a growing human population, but it

can also have shocking impacts on the environment. The road through the rainforest may fragment habitat or cut off the migration course for an endangered species. The dam may have sidetracked water from freshwater habitats already struggling through a drought. A spill from the oil platform may have destroyed marine organisms and left the shoreline polluted.

With the drive for economic growth, new roads are being made and older ones widened within ominously shrinking wild lands-including national parks and wildlife sanctuaries. A pervasive argument posited in favour of bullish road-building is that emerging economies such as India cannot afford to argue ecological concerns. We must inevitably push ahead with development; costs can be paid later. In fact, though negative fallouts of ill-conceived roads have misled several developed countries, which can financially afford damage control, to adopt more holistic evaluations of current and past road building, India would do well to learn from the infrastructure blunders of richer countries, revealed only in the long-term.

Although we limit the scope of this topic to ecological concerns, it is relevant to note that road building incorporates a range of issues ranging from health, to socio-economic inequality. It is essential therefore that the Indian government integrate expertise from interconnected fields such as conservation biology, sociology, and public health when planning road networks.

In the conservation topic, roads are "linear intrusions". Although appearing benign compared to large mines or dams, the total habitat lost or degradation over the total stretch of linear intrusions can be significant. Not surprisingly roads are a vital feature contributing to habitat loss and land-use change. A large global body of research on "road ecology" has studied the detrimental aspects of road-building on animals, plants and entire ecosystems.

From elephants to insects, the most obvious concern of roads is the wildlife killed by vehicular traffic, often compounded by human casualness and lack of compliance with prescribed speed limits. Nocturnal animals including tigers and leopards are mostly vulnerable. While some animals are attracted to openings-making them vulnerable to roadkill-other

animals entirely avoid roads. Roads through wildlife corridors can pose obstacles for animal movement, sometimes leading to population drops or localized extinctions even over short time scales.

Edges shaped by felling trees are a dominant process altering plant communities over much wider areas of forest than is apparent to the untrained eye. "Edge effects" sometimes spread over half a kilometer into forests, drastically eroding plant diversity. Edges also promote weeds and exotic species that out-compete native floras and alter animals' use of habitats.

Forests fragmented by edges additionally suffer deviations in ecological and ecosystem process such as pollination, seed dispersal, and carbon storage. Such forests are vulnerable to soil erosion and landslides, degradation of soil quality, and depletion of aquatic reservoirs and water catchments of rivers. A seemingly simple road can lead to multifaceted changes in natural habitats.

Importantly, roads make otherwise remote habitats easily reachable. Consequently, increased human settlement and fractal increases in grids of secondary roads can in turn increase illegal activities like poaching or logging, especially in regions where monitoring or enforcement is scarce or absent. In India, such occurrences will surely stretch an already overburdened Forest Department's field staff.

- **Considering alternatives:** The ill-effects of roads we outlined are neither novel nor inaccessible in the public domain. Much of this data has been submitted to the government as comprehensive guidelines by the National Board for Wildlife. Moreover, these topics have been raised during several project appraisals. Pointedly, the Wildlife (Protection) Act, 1972, Forest (Conservation) Act, 1980 and Environment (Protection) Act, 1995 evidently place limitations on roads through Protected Areas (hereafter PA) and other forests. Any road that could harm wildlife or its habitat needs clearance from the NBWL if within 10 km of PA, National Tiger Conservation Authority (NTCA) for Tiger Reserves, or Forest Advisory Committee (FAC) for other forests.

A few finest practices can go a long way in merging roads, indeed development in general, with conservation. Advocates of road-building must portray why the suggested location is the only possible place for the project not just from financial positions but also keeping the ecological perspectives in cosideration. Here, it is vital to have objective, well-researched and clear Environment Impact Assessments (EIA) that detail environmental and ecological consequences of the proposed road. Alternative sites and alignments should be provided, and inappropriately conceived projects shifted.

If it turns out very challenging to reorganize the road after due consideration, then the placement should be designed to cut through the minimum length of natural habitat, shifted to margins or already disturbed areas. A drop in canopy cover should be kept to a minimum-a good ballpark might be to guarantee that no unnatural canopy gap is created. Such projects will also have to mandatorily incorporate wildlife-friendly designs such as flyovers or underpasses suitable for local wildlife movement. Existing CAMPA funds could be utilized to provide additional finances for such design modifications.

With respect to PAs-covering a mere 5% of India's land, they hold the majority of the nation's remaining wildlife. Thus, the conservation implications of road projects through PA are more profound and extreme caution regarding the same is advisable. Placing new highways or expansion of existing roads within PA is best completely avoided.

- **The road to sustainable development:** For all this to be efficiently executed, it is important that government officials, ecologists, conservationists, and engineers have productive deliberations to arrive at win-win solutions. Elsewhere, such deliberations have resulted in accomplishment stories with near-zero ecological costs even in biodiversity hotspots. However, it currently seems that suggestions of any kind to modify structure or alignment are construed as roadblocks to progress.

Project advocates complain over recommended changes, complaining about cost acceleration. Simply put, developers have chosen convenience over compliance, still succeeded in gathering tremendous support for such a view. Profit-maximizing behaviour of private players is predictable. What is more worrisome is that our government is seemingly stepping down from its responsibility towards conserving biodiversity. While the data and know-how to search for alternative development paths exists, the political will to listen seems lacking or absent.

To say that India can only afford limited consideration of ecological implications seems a decidedly myopic way of thinking. Rather, we can forge new and novel development models where sustainable environment and wildlife conservation are given as much weight and importance as economic growth. Building an ethos of ecological sensitivity will allow for sustainable use of natural resources and help keep spaces for biodiversity.

## 10.3.2 Development, Modernisation and Threat to the Environment

### 10.3.2.1 Issues Pertaining to Air

Air pollution happens as a result of gases, dust particles, fumes (or smoke) or odour being brought into the atmosphere in a way that makes it injurious to humans, animals and plants. It is because the air becomes filthy (contaminated or unclean) as a result of certain manmade ativities. The Earth is surrounded by a blanket of air, made up of various gases, called the atmosphere. This atmosphere helps in protecting the Earth and allowing life to exist. Without it, the intense heat of the sun would burn us during the day and freeze us by the very low temperatures during night time. Any addition to this natural balance, be it gas, particles or odours that are introduced into the air (either by nature or human activity) can destroy this balance and can be called air pollution. That which pollute the air are called pollutants. Examples of pollutants include hydrocarbons, carbon monoxides, nitrogen oxides, sulphur oxides (usually from factories), sand

or dust particles, and organic compounds that can evaporate and enter the atmosphere.

Air pollution can result from both human and natural actions. Natural events that pollute the air include forest fires, volcanic eruptions, wind erosion, pollen dispersal, evaporation of organic compounds and natural radioactivity. Pollution from natural occurrences are not very often. Emissions from industries and manufacturing activities are human causes of air pollution. There are long chimneys erected high into the air, with lots of smoke and fumes coming out of it. Waste incinerators, manufacturing industries and power plants discharge high levels of carbon monoxide, organic compounds, and chemicals into the air. Lots of hydrocarbons are released into the air by petroleum refineries.

Post the industrial age, transportation has become an integral part of our lives. Cars, trains, heavy duty trucks, shipping vessels and airplanes, all burn a lot of fossil fuel to work. Emissions from automobile engines is a major cause of pollution, and one that is very difficult to manage. This is because humans depend heavily on vehicles and engines for moving people, goods and services. Fumes from cars' exhaust comprise of hazardous gases such as carbon monoxide, hydrocarbons, oxides of nitrogen and other particulates. They cause excessive health damage to people who breathe them. Moreover, they mix with environmental gases to generate further toxic gases. Crop dusting, household cleaning products or painting supplies, fumigating homes, over the counter insect/pest killers, fertilizer dust emit harmful chemicals into the air and cause pollution.

Chemical reactions involving air pollutants can create acidic compounds which can be harmful to plants/trees and buildings/architectures. Occasionally, when an air pollutant like sulphuric acid mixes with the water droplets which make up clouds, the water droplets turn acidic, leading to acid rain. When acid rain falls over a place, it can destroy trees and effect animals, fish, and other wildlife. Acid rain destroys the leaves. When acid rain enters into soil, it changes the chemistry of the soil turning it unfit for many living things that depend on soil as a habitat or as a source of nutrition.

Acid rain also alters the chemistry of the lakes and streams that the rainwater flows into, destroying fish and other aquatic life.

Air pollutants can be in the form of particulate matter which can prove to be detrimental to our health. The level of effect usually depend on the length of time of exposure, as well the type and concentration of particles and chemicals we are exposed to. Short-term effects include irritation to the eyes, throat and nose, and upper respiratory infections such as pneumonia and bronchitis. Others include nausea, headaches, and allergic reactions. Short-term air pollution can heighten the medical situations of individuals with emphysema and asthma. Long-term health effects can include chronic respiratory disease, heart disease, lung cancer, and even damage to the brain, nerves, liver, or kidneys. Continual exposure to air pollution affects the lungs of growing children and may aggravate or complicate medical conditions in the elder.

### 10.3.2.2 Construction Of Dams and its Effects

The ongoing process of development is victimizing millions of people under the heavy costs of development; landless labourers and millions of small farmers, are growingly becoming the victims of pauperization; with their land being taken away for the construction of big dams millions have become homeless. The destructiveness of the big dams is not being increasingly recognized in the development discourse. Even more and more investments are being made in them. Today all the major rivers are dammed in the process. This shows that in the next two or three decades, dam construction is going to be a key developmental activity. Construction of dams in India is not a new phenomenon, nor is scientific irrigation. Large dams were reflected as technological innovations in modern times with twin objectives: 1. As a measure to control devastating flood. 2. To capture run off water from unnecessarily going to sea.

- **POLICY IMPERATIVE :** The government will have to decide on what its policy towards big dams should be if it does not want to confirm the impression that it is running in different directions. This is not a matter of public relations but hard economics. The benefits of big

dams can be subjected to scrutiny. Take generation of power and electricity for example. Two- thirds of it is consumed by industry since independence on one hand and in relation to employment its record is abysmal. Whatever the other benefits of technological advances, increased employment is certainly not one of them.

Chipko movement leader Chandi Prasad Bhatt had initiated a campaign against the vishnuprayag hydroelectric project because of the risks it posed to the unique ecosystem of the valley of flowers and the general geographical havoc that it could create. Such Movements are capable of organizing strong support among the local population though a section of the workers who have found jobs on the project. Another instance of intervention at the highest levels was that of a large dam in Lalpur in Gujarat. It raised two issues- destruction of forests and displacement of tribals. Large dams are generallyconstructed in areas which have so far not been touched by modern development. Many people in these areas look at such projects as symbols of hope. They even accept the argument that someone has to pay the cost for the benefits to society, even if they are the ones who have to pay. As things are today, people are not likely to oppose dam constructions. But they are definitely getting ready to agitate for better rehabilitation terms. A comprehensive rehabilitation policy can spread out only when development is assumed as a process which benefits the people. The major goals of the rehabilitation programme are that the people displaced should get a suitable and appropriate share in the fruits of development. They should be rehabilitated by creating new settlements. Removal of poverty should also be a goal of the rehabilitation policy and therefore some land should be assigned to all. Tribals should develop along the lines of their own genius and we should avoid imposing anything on them. Resettlement should be in the neighbourhood of their own environment.

## 10.3.2.3 The Role of MNCs

Multinational corporations can offer developing countries with critical financial infrastructure for social and economic development. However, these institutions may also bring in with them relaxed codes of ethical conduct that aid to exploit the need of developing nations, rather than to help them with critical support necessary for countrywide economic and social development. When a multinational invests in a host country, the measure of the investment (given the huge size of the firms) is likely to be substantial. The likely disadvantages of a multinational investing in a country may include:

- **Environmental effect -** multinationals will want to produce in ways that are as efficient and as cheap as possible and this may not always be best for the environment. They will often try to lobby governments to ensure that they can profit from regulations being as lax as possible and given their economic significance to the host country, this lobbying will often be reasonably effective.
- **Access to natural resources -** multinationals will sometimes invest in countries just to get right to use a plentiful supply of raw materials and host nations are often more concerned about the short-term economic gains than the long-term costs to their country in terms of the exhaustion of natural resources.
- **Uncertainty -** multinational firms are increasingly 'footloose'. This means that they can change and move at very short notice and often will. This creates insecurity for the host country.
- **Increased competition -** the effect on the local industries can be severe, because the presence of newly arrived multinationals upsurges the competition in the economy and because multinationals should be able to produce more, taking less time, at a lower cost.
- **Crowding out -** if overseas firms borrow in the domestic economy this may reduce availibility of funds and increase interest rates.
- **Health and Safety -** multinationals have been accused of cutting corners on health and safety in countries where regulation and laws are not as rigorous.

- **Cultural and Social impact -** enormous numbers of foreign businesses can weaken local customs and traditional cultures. For example, the sociologist George Ritzer coined the term McDonaldization to describe the process by which more and more sectors of American society as well as of the rest of the world take on the features of a fast-food restaurant, such as increasing standardization and homogenisation and the movement away from traditional business approaches.

### 10.3.2.4 Issues Pertaining to Soil

The foundation of agriculture is soil. All crops for human food, as well as animal fodder, depend upon it. Huge quantities of man-made waste products are released into the soil. In vicinities of cities, it is regarded as a future receiver of sludge and other products from new waste treatment plants. Polluted water also causes soil pollution. Soil pollution is usually a consequence of insanitary habits. Various agricultural practices and incorrect methods of disposal of solid and liquid but can also result from fallout from atmospheric pollution. Soil pollution is associated with:

- The use of chemicals, such as fertilizers and growth resulting agents in agriculture.
- Dumping on land of large masses of waste materials from the mining of coal and minerals and the smelting of metals. Toxic and harmful substances can be leached out of such materials and enter the soil.
- The dumping on land of domestic refuse and solid resulting from the treatment of sewage and industrial wastes. Sources of pollution can be divided basically into two groups: natural and cultural.

### 10.3.2.5 Bio-Diversity Conservation

Biodiversity is used to define the variations of life forms in ecosystems, biomes or on the Earth. It can be used to measure health of biological systems. The continued health of human societies depends upon a natural environment that is productive and contains a wide diversity of plant, animal, and microbe species. Life on the earth includes at least 10

million species of plants and animals. Biodiversity is the multiplicity of species of plants and animals that live in a particular area (ecosystem) or the entire Earth. The greater the number of species, the more diverse the ecosystem is. Biodiversity, or biological diversity, is the variety of all species on earth. It is the different plants, animals and micro-organisms, their genes, and the terrestrial, marine and freshwater ecosystems of which they are a part. Biodiversity is both crucial for our existence and fundamentally valuable in its own right. This is because biodiversity offers the fundamental building blocks for the many goods and services that a healthy environment provides. These include things that are vital to our health, like fresh water, clean air and food products, as well as the many other products such as timber and fiber. Other important services provided by our biodiversity include recreational, cultural and spiritual nourishment that maintain our personal and social wellbeing. Looking after our biodiversity is, therefore, an important task for all people. The main threats to our biodiversity are: " loss, fragmentation and degradation of habitat

- the spread of invasive species
- unsustainable use of natural resources
- climate change
- inappropriate fire regimes
- changes to the aquatic environment and water flows

Biodiversity is the incredible, dizzying variety of life that surrounds us, including all of the earth's plants, animals, their habitats, and the natural processes that they are a part of.

It has become clear that biodiversity is the cornerstone for the existence of life on Earth. It is also important to preserve and conserve biodiversity for the sake of our own curiosity and aesthetic appreciation. Medicines originating from wild species, including aspirin, penicillin, taxol, and quinine have saved millions of lives and healed tremendous suffering. 40% of all prescriptions are for medicines originating from plants and animals. There are 80,000 species of edible plants known on Earth, but 90% of the world's food comes from a mere 20 of these species. Edible plant species, both those we know of and those we don't, offer a tremendous possibility of

resources that could greatly add to our food security. Breeding cultivars with their wild counterparts can also confer resistance to diseases and increase crop yield. Biodiversity is the life support system of our planet- we depend on it for the air we breathe, the food we eat, and the water we drink. Wetlands filter pollutants from water; trees and plants reduce global warming by absorbing carbon; bacteria and fungi break down organic material and fertilize the soil. It has been empirically shown that richness of native species is linked to the health of ecosystems, as is the quality of life for humans. The more we look at it, the connections between biodiversity and our sustainable future appear closer and closer. We literally need to conserve biodiversity as our lives depend on it. Life on Earth faces a crisis of historical and planetary proportions. Unsustainable consumption in many northern countries and crushing poverty in the tropics are destroying wild nature. Biodiversity is besieged. Extinction is the gravest aspect of the biodiversity crisis: it is irreversible. While extinction is a natural process, human impacts have elevated the rate of extinction by at least a thousand, possibly several thousand times the natural rate. Mass extinctions of this magnitude have only occurred five times in the history of our planet; the last brought the end of the dinosaur age.



**Check your progress**

**Q1:** What are some of the acts which put restrictions on roads through protected areas?

**Q2:** What is the link between vehicular traffic, roads and wildlife?

**Q3:** What are primary and secondary pollutants, which cause air pollution?

**Q4:** What do you mean by biodiversity?

**Q5:** What is gravest aspect of biodiversity crisis?



## 10.4 LET US SUM UP

- While development is carried out to benefit the inhabitants, the environment is equally important. If development is carried out without considering the environment and ecology factor, it may have a negative impact on the environment.
- With the increased focus for economic expansion, new roads are being made and older ones widened within ominously dwindling and shrinking wild lands-including national parks and wildlife sanctuaries.
- The most obvious consequence of roads is the wildlife killed by vehicular traffic, often resulting from human negligence and lack of compliance with prescribed speed limits. Nocturnal animals including tigers and leopards are particularly vulnerable.
- "Edge effects" sometimes extend half a kilometer into forests, drastically eroding plant diversity. Edges also promote weeds and exotic species that out-compete native plants and further alter animals' use of habitats. Forests fragmented by edges additionally suffer changes in ecological and ecosystem process such as pollination, seed dispersal, and carbon storage.
- Advocates of road-building must show why the proposed location is the only possible location for the project not just from financial standpoints but also from ecological angles.
- Profit-maximizing behaviour of private players is predictable. Government should stand up to its responsibility towards conserving biodiversity. While the data, knowledge and expertise to explore alternative development ways exist, the political will to listen seems lacking.
- Those which pollute the air are called pollutants. Examples of pollutants include nitrogen oxides, sulphur oxides (usually from factories), carbon monoxides, hydrocarbons, sand or dust particles, and organic compounds that can evaporate and enter the atmosphere.

- After the industrial age, transportation has become an integral part of our lives. Cars and heavy duty trucks, trains, shipping vessels and airplanes are all burn plenty of fossil fuels to work.
- The process of development is crushing millions of people under the heavy costs of development; millions of small farmers, landless labourers are growingly becoming the victims of pauperization, millions becoming homeless with their lands being taken away for constructing big dams.
- Multinational corporations can aid developing countries with critical financial infrastructure for economic and social development. However, these institutions may also bring with them relaxed codes of ethical conduct that serve to abuse the neediness of developing nations.
- Soil pollution is related to- use of chemicals, dumping of waste materials from the mining of coal and minerals and the smelting of metals, the dumping on land of domestic refuse and solid resulting from the treatment of sewage and industrial wastes, etc.
- The main threats to our biodiversity are: " loss, fragmentation and degradation of habitat " the spread of invasive species " unsustainable use of natural resources " climate change "inappropriate fire regimes " changes to the aquatic environment and water flows Biodiversity is the incredible, dizzying variety of life that surrounds us, including all of the earth's plants, animals, their habitats, and the natural processes that they are a part of.



## 10.5 FURTHER READING

1) Ament, R, Clevenger, A P, Yu, O, and Hardy, A (2008): "An assessment of road impacts on wildlife populations in US National Parks." Environmental Management, vol 42, issue 3, pp 480-496.

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