UNIT I

1

THE ENVIRONMENTAL IMPACT OF GREEN REVOLUTION

Unit Structure

1.0 OBJECTIVES

- To understand the meaning of green revolution
- To learn about the background of emergence of green revolution and its positive and negative effects.

1.1 INTRODUCTION

This chapter is very important as students studying Environment and as a member of the society. One of the major concerns of the world today is that of the impact of Environment and Climate change. All of us consume wheat, rice every day but the process bringing about green revolution we are unaware of it, this chapter would introduce you to how the process began. Through this chapter we would be able to learn the social change that took place due to the green revolution and its impact of the lives of millions.

Meaning of Green Revolution:

The Merriam Webster dictionary points out that green revolution is the significant rise in food grain output (including rice and wheat) as a result of the use of herbicides, high-yielding cultivars, and improved management practices

According to the Britannica, Green Revolution began in the middle of the 20th century, new, high-yielding varieties were introduced into emerging nations, which led to a significant rise in the production of food grains (particularly wheat and rice). Mexico and the Indian subcontinent were the locations of its initial stunning achievements. In order to achieve their high yields, the new types need to use significant quantities of chemical fertilizers and pesticides, which raises worries about the expense and

potential negative impacts on the environment. Poor farmers have frequently had even lower yields with these grains than with the previous strains, which were better matched to local circumstances and had some resistance to pests and illnesses, because they cannot afford the fertilizers and pesticides. (Britannica).

Reason for bringing Green Revolution:

Despite being self-sufficient in food production, India's food production between 1947 and 1960 was so poor that famine concerns existed. As a result, the Green Revolution was started in the 1960s with the goal of increasing food production, reducing extreme poverty and malnutrition in the nation, and feeding millions of people. Despite these efforts, 195.9 million people in India are undernourished and lack access to enough food to meet their daily nutritional needs; 58.4% of children under the age of five have anaemia, while 53% of women and 22.7% of men in the age range of 15 to 49 have anaemia; 23% of women and 20% of men are thin; and 21% of women and 19% of men are obese.

1.2 ENVIRONMENTAL IMPACT OF GREEN REVOLUTION

In order to enhance food production and reduce hunger and poverty, high-yielding cultivars of rice and wheat were first introduced in India in the 1960s. Government measures led to a post-Green Revolution increase in the production of wheat and rice, but a decrease in the cultivation of other food crops including millets and native rice types. This resulted in the elimination of unique indigenous crops as well as their disappearance from cultivation. This review discusses how the Green Revolution affected the production of indigenous crops, as well as how it affected society, the environment, dietary intake, and the amount of food available per person. It also discusses strategies that can be used to bring back the cultivation of indigenous crops and spread knowledge to the local population.

Rice, millets, sorghum, wheat, maize, and barley were the main crops grown prior to the Green Revolution and the production of rice and millets was larger than that of wheat, barley, and maize taken as a whole. However, millets are no longer being produced as much, and in the decades after the Green Revolution, the crops that were formerly eaten in every home were transformed into fodder crops. While this is happening, many of the traditional rice kinds that were consumed before the Green Revolution are no longer available, and just 7000 of the native rice varieties are now being grown. As a result, more than 1 lakh indigenous rice varieties have been lost in India since the 1970s. As a result, after the 1970s, India lost more than 1 lakh kinds of its own rice, which took thousands of years to form. The government's concentration on monoculture and the creation of subsidized high-yielding hybrid crops are the major causes of this loss of biodiversity.

The government's initiatives enhanced the production of rice, wheat, pulses, and other crops, resulting in the nation's self-sufficiency in food.

However, it also eliminated the accessible gene pool's diversity. Utilizing groundwater supplies, herbicides, and fertilizers helped to boost crop yield. However, poor management and excessive use of chemical fertilizers, pesticides, and a lack of crop rotation led to the soil becoming infertile, and groundwater loss in agricultural regions started to become a regular occurrence. These effects made farmers' lives even more unhappy since they had to spend more money cultivating crops to make up for these flaws. India being one of the countries which exports large quantities of wheat even today.

A rising understanding of the need to switch to more sustainable agricultural methods that combine the cultivation of food with protecting the environment in recent years. As a result, new farming techniques and agricultural technologies have been created with the intention of increasing agricultural productivity while reducing adverse environmental effects. These innovative techniques include agroforestry, precision farming, conservation agriculture, and organic farming. These methods, which are being used in numerous nations, which offer the potential to increase agricultural productivity while minimizing the adverse environmental effects of the Green Revolution. Beginning in the 1960s, India's Green Revolution had both beneficial and detrimental effects on the environment.

Positive effects of green revolution:

- **Higher agricultural output:** The Green Revolution in India contributed to a rise in agricultural output, which helped the nation's food supply keep up with demand. As a result, less stress was placed on ecosystems that could have been used for agriculture.
- **Reduced demand on forests**: Through the green revolution as there was more produce in the agriculture, the pressure on forests reduced hence the forests were more preserved. As there was no necessity to clear more forest.
- **Chemical fertilisers** and high-yield crop varieties helped to improve soil fertility, which in turn increased the soil's ability for nourishing plant growth.
- **Modernization of agriculture:** The adoption of new technologies, including tractors, irrigation systems, and other farming equipment, was a result of the Green Revolution. This aided in boosting agricultural productivity and effectiveness and opened the door for further development. Due to the increased production the hunger reduced to a large extent.
- **Rural development:** The Green Revolution helped many rural areas around the world to develop. The creation of jobs and an improvement in the standard of living for small-scale farmers and rural communities were both aided by increased agricultural productivity and food production.

- **Only five crops were allowed under HYVP:** maize, wheat, rice, jowar, and bajra. Therefore, the new method did not apply to non-food grains. Over the years, wheat has remained the foundation of the Green Revolution. Tens of millions more tonnes of grain are being harvested annually as a result of the new seeds.
- **In 1978–1979, the Green Revolution** led to a record grain output of 131 million tonnes. India was now recognised as one of the top agricultural producers in the world. Between 1947 (the year India attained political independence) and 1979, the yield per unit of agricultural land increased by more than 30%. During the Green Revolution, there was a significant increase in the crop area planted with high yielding wheat and rice types.
- **Many jobs were also created by the Green Revolution**, including Through the construction of linked facilities like factories and hydroelectric power plants, the Green Revolution also generated a large number of jobs for industrial workers in addition to agricultural labourers.

Negative effects of Green Revolution

Groundwater depletion:

As a result of increased groundwater use during India's Green Revolution, several areas experienced groundwater depletion. This is a significant issue since groundwater is a limited resource and its depletion may have long-term effects on the environment and society.

Degradation of the soil:

In some locations, heavy use of chemical fertilisers and pesticides has caused soil degradation. Degradation of the soil decreases its capacity to support plant growth, which may have detrimental long-term effects on the environment.

Biodiversity loss:

The spread of monoculture farming techniques and the use of high-yielding crop varieties have resulted in a loss of biodiversity in some areas. This is a significant issue since biodiversity is crucial for preserving healthy ecosystems and guaranteeing food security.

However, repeated use of chemical pesticides and fertilisers over time resulted in soil erosion, water contamination, and a reduction in soil fertility. In addition, the monoculture of wheat and rice resulted in a decrease in biodiversity and an increase in pest and disease susceptibility.

The disappearance of native landraces in our country, the land races are the locally adaptable plants, animals who are us grown through the traditional method and are adaptable in terms of climatic and local environment. The depletion of soil nutrients rendering it unproductive. There is also increased rates of farmer suicide. Unable to handle rising

farming costs and debts, small farmers sold their lands to large commercial farmers, and the loss of landraces that were indigenous to our land and unable to handle the food inflation, financial burden led several farmers to leaving the farming occupation altogether. As well as discouraging their own children to become further farmers.

Check Your Progress

1. What were the main crops grown in the green revolution?

2. Explain the reasons behind emergence of green revolution.

Vandana Shiva:

Indian academic, environmental activist, and novelist Vandana Shiva has criticised the Green Revolution. She contends that the Green Revolution, which encouraged the use of chemical fertilisers and high-yielding crop varieties, had a harmful effect on the environment, farming, and society. The loss of traditional seed varieties and their replacement by high-yielding varieties that need a lot of water, chemical fertilisers, pesticides is one of Shiva's key complaints of the Green Revolution. Shiva claims that as a result, there is less genetic diversity in crops, which makes them more susceptible to pests, illnesses, and climate change, leading to agrarian crises and health crises as well as socio-political conflicts in states like Punjab. Shiva contends that small-scale farmers, who were compelled to depend on expensive seeds, fertilizers and pesticides, have suffered massively. As a result of the so-called Green Revolution the small farmers lives became more debt ridden and with very less independence in their lives. She also criticised how the chemicals further creates both negative effects on soil and water quality as well on human health. Shiva supports agroecology, as a strategy to agriculture that is founded on ecological principles and traditional knowledge, as an alternative to the Green Revolution. Agroecology includes, the use of conventional seed types, crop rotations, and natural pest management techniques. Shiva claims that agroecology may aid in fostering food sovereignty, safeguarding biodiversity, and minimizing the detrimental effects of farming on the environment and society.

1.3 LOSS OF INDIGENOUS CROPS

Due to the emphasis on mono-cropping that followed the Green Revolution, the traditional meals and cereal-based products that were formerly a staple of the typical Indian diet are being lost over time. Several types of rice, including coloured, fragrant, and medicinal kinds, as well as millets, wheat, barley, and maize, are among India's indigenous crops. The native rice and millet types can withstand floods, salinity, and drought. Eastern India's Dharical, Dular, and Tilak Kacheri, for instance, may adapt to various topologies, climatic conditions, and soil types. Sorghum, pearl millet, maize, barley, finger millet, and small millets such barnyard millet, foxtail millet, kodo millet, proso millet, and mini millets are some of the coarse cereals. Compared to hybrid rice variations, traditional rice cultivars are more nutrient-dense.

Compared to hybrid rice variations, traditional rice cultivars are more nutrient-dense. They have increased fibre content and are good sources of vitamins and minerals like niacin, thiamine, iron, riboflavin, vitamin D, and calcium. Additionally, these cultivars have a number of health advantages, including lowering glycaemic and insulin responses and decreasing the risk of type II diabetes, obesity, and cardiovascular illnesses. Kumbhar et al. report Tulshi tall and Vikram, two landraces from Maharashtra in India's Western Ghat zone and Konkan region, respectively, displayed significant similarity in distinct differences in allelic combinations from other contemporary types of modern varieties rice. Compared to hybrid rice variations, traditional rice cultivars are more nutrient-dense. The indigenous rice varieties have increased fibre content and are good sources of vitamins and minerals like niacin, thiamine, iron, riboflavin, vitamin D, and calcium. Additionally, these cultivars have a number of health advantages, including lowering the glycaemic and insulin response, which lowers the risk of type II diabetes, obesity, and cardiovascular illnesses.

Path ahead – Solution:

Indigenous crops have several advantages over newly introduced hybrid varieties (HYVs), including the following: (1) their cultivation can increase agriculture's genetic diversity and sustainability; (2) their consumption can decrease carbon footprints and imports; (3) their high climatic adaptation; and (4) their consumption can increase food diversity and the nutrient content of diets. The ability of farmers to propagate indigenous varieties, identifying farmers with traditional crop-cultivation knowledge, and encouraging farmers with large landholdings to cultivate indigenous species are potential obstacles to the revival of indigenous species.

Check Your Progress

1. What is the meaning of landraces?

2. Do you think millets and indigenous rices are healthy – comment.

1.4 SUMMARY

In conclusion, the Green Revolution had a tremendous impact on agriculture in many nations. A shift to farming methods that combine food production and environmental preservation is becoming more and more necessary. The consumption of the indigenous varities of food and the sustainable methods to produce the food will help both the environment and the human health. It would also help in reducing the carbon foot print via reducing the foreign imports.

1.5 QUESTIONS

1. Discuss the positive and negative effects of green revolution
2. Explain the meaning of green revolution and the solutions for solving it.
3. Discuss in brief the view points of Vandana Shiva on green revolution

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2

WESTERN GHATS ECOLOGY EXPERT PANEL REPORT (ECO-SENSITIVE ZONES)

Unit Structure

2.0 OBJECTIVES

- To understand the what ecologically sensitive areas are
- To familiarize students with the Western ghats ecology expert panel report

2.1 INTRODUCTION

The Western Ghats Ecology Expert Panel report advocates replacing the current pattern of exclusionary development and exclusionary conservation by an inclusive regime by respecting the existing, but currently sabotaged, constitutional, and legal provisions for environmental protection and democratic devolution of the decision-making process. The report's objective assessment of the prevailing situation and the recommendation that it should be taken to all the concerned Gram sabhas and appropriate regulatory as well as promotional measures be decided upon through a bottom-up democratic process were unacceptable to those currently benefiting from the perpetuation of an economy of violence. They attempted to first suppress and then subvert the report.

The Western Ghats Ecology Expert Panel (WGEEP) report, prepared over a 17-month period from March 2010 to August 2011, has sparked off a vigorous debate, even demonstrations, protests, violence. The saga of disturbances accompanying the debate on the WGEEP report, linked to control over the rich water, mineral, forest, and biodiversity resources of the Western Ghats, suggests a lopsided development. As the Nobel laureate Joseph Stiglitz emphasizes in his work on inequality, any nation must aim at a harmonious development of its four capital stocks, not just

the man-made capital that gross domestic product (GDP) highlights, but also the natural capital, human capital, and social capital.

The report embodies among other things (i) categorization of the Western Ghats into three zones of varied ecological sensitivity, based upon careful analysis done by WGEEP, (ii) broad sectoral guidelines for each of these zones, and (iii) a broad framework for establishment of the Western Ghats Ecology Authority.

2.2 WESTERN GHATS AND ITS ECOLOGICAL SIGNIFICANCE

The hill chain of the Western Ghats, a treasure trove of biodiversity and the water tower of Peninsular India, runs parallel to the West coast of India from the river Tapi in the north to Kanyakumari in the south. The Ghats descend steeply to the coastal plains on the west, but merge rather gently through a series of hills with the Deccan plateau. Geologically the Ghats fall into two sections. North of the river Kali is the Deccan trap country of relatively fragile rocks and flat hill tops. The hills do not rise much beyond 1500 m in this tract. South of Kali is the region of Precambrian archdean crystalline rocks which are much harder. The hills tend to be rounded and rise to 2000 m or more.

The Western Ghats are naturally an important focus of sustainable development efforts. Describing King Raghu's conquest of the four corners of India, Kalidasa likens the mountain range of Western Ghats to a comely young maiden, her head near Kanyakumari, Anaimalais and Nilgiris her breasts, Goa her hips, and her feet near river Tapi. All over the world, such mountains, endowed as they are with high levels of environmental heterogeneity, are treasure troves of natural diversity. Thus, in the Western Ghats the annual rainfall ranges from as much as 8000 mm in the southwestern corner of the upper Nilgiris to a mere 500 mm in the Moyar gorge just 30 km to its east. In contrast, the annual rainfall spans a range of no more than 1000 mm over hundreds of kilometers across the Deccan plateau. Mountains also create isolated habitats far away from other similar habitats, promoting local speciation.

This is why the Western Ghats and the Eastern Himalayas are today the most significant repositories of India's biodiversity. Amongst them, the Western Ghats scores over the Eastern Himalayas in harboring a larger number of species restricted to India alone. Not only are the Western Ghats and Eastern Himalayas biological treasure troves, they are also two of the world's biodiversity hot spots, a hot spot being a biodiversity-rich area that is also under a high degree of threat.

The most important forest produce of the Ghats in earlier times were cardamom, pepper and ivory although teak wood had been exported from the west coast ports even in medieval times. The earliest forest plantations recorded were the teakwood plantations raised by Maratha naval chiefs of Shivaji in the 17th Century. Exploitation of timber on a large scale, however, started only with the British. The demands on reserved forests

peaked between 1950–1980 with an explosion of forest based industries such as paper, plywood, poly-fibers and matchwood. Although these demands were expected to be met through sustainable harvests, this did not materialize and the forests were overexploited. The response was a switch to ,aggressive from ,conservation forestry with large-scale clear felling of natural forests and plantation of exotic species

Besides this, the Western Ghats region has some of the highest levels of literacy in the country, and a high level of environmental awareness. Democratic institutions are well entrenched, and Kerala leads the country in capacity building and empowering of Panchayat Raj Institutions. Goa has recently concluded a very interesting exercise, Regional Plan 2021, of taking inputs from Gram Sabhas in deciding on land use policies. Evidently, the Western Ghats constitutes an appropriate region of the country to attempt to make the transition towards an inclusive, caring and environment-friendly mode of development.

In view of the environmental sensitivity and ecological significance of the Western Ghats region and the complex interstate nature of its geography, as well as possible impacts of climate change on this region, the Ministry of Environment and Forests, Government of India, constituted, by an order dated 4 March 2010, a Western Ghats Ecology Expert Panel (WGEEP).

Check Your Progress:

1. Write the significance of Western Ghats.

2.3 ECOLOGICALLY SENSITIVE ZONES

Section 3 of the Environment (Protection) Act 1986 (EPA) gives power to the Union Ministry of Environment and Forests to take all measures that it feels is necessary for protecting and improving the quality of the environment and to prevent and control environmental pollution. To meet this objective the Central Government can restrict areas in which any industries, operations or processes, or class of industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards.

Section 5(I) of the Environment (Protection) Rules 1986 (EPR) states that the Central Government can prohibit or restrict the location of industries and carrying out certain operations or processes based on considerations like the biological diversity of an area (clause v), maximum allowable limits of concentration of pollutants for an area (clause ii), environmentally compatible land use (clause vi), or proximity to Protected Areas (clause viii).

These provisions were invoked in 1989 in the context of Murud-Janjira, a coastal village of Maharashtra. Subsequently, the term 'Ecologically Fragile Area' was used for the first time in 1991 in the context of Dahanu Taluka in coastal Maharashtra. This has been followed by declaration of several other areas such as the Mahabaleshwar- Panchgani and Matheran hills in the Maharashtra Western Ghats as Ecologically Sensitive Zones / Areas. So far, these Ecologically Sensitive Zones / Areas have been established either as a result of initiatives of some civil society organizations wishing to protect a particularly vulnerable and significant area, or as a consequence of a resolution of the Indian Board for Wildlife in 2002 to protect areas up to ten kilometers from the boundaries of Protected Areas, namely Wildlife Sanctuaries and National Parks.

Over the years, a variety of terms such as Ecologically Sensitive/ Ecologically Fragile/ Ecosensitive/ Ecofragile Zones/ Areas have been used in the context of programmes relating to Ecologically Sensitive Zones and Areas. WGEEP therefore used the term 'Ecologically Sensitive Area' while referring to extensive tracts and 'Ecologically Sensitive Zone' while referring to specific zones within the extended 'Ecologically Sensitive Area' for which a particular set of regulatory/ promotional activities have been proposed.

Check Your Progress:

1. What are 'Ecologically Sensitive Zones'?

2.4 WESTERN GHATS ECOLOGY EXPERT PANEL

The Western Ghats Ecology Expert Panel, headed by ecologist Madhav Gadgil, also known as the Gadgil Committee was an environmental research commission appointed by the government in 2011. It recommended that all of the Western Ghats be declared as the Ecological Sensitive Areas (ESA) with only limited development allowed in graded zones. The panel classified the Western Ghats into Ecologically Sensitive Areas (ESA) 1, 2 and 3 of which ESA-1 is high priority, almost all developmental activities (mining, thermal power plants etc.) were restricted in it.

It specified that the system of governance of the environment should be a bottom to top approach (right from Gram sabhas) rather than a top to bottom approach. It also recommended the constitution of a Western Ghats Ecology Authority (WGEA), as a statutory authority under the Ministry of Environment and Forests, with the powers under Section 3 of the Environment (Protection) Act, 1986. The report has been criticized for being more environment-friendly and not in tune with the ground realities.

Eventually, another committee was instigated to look into the recommendations. The Kasturirangan Commission sought to balance the development and environment protection in contrast to the system proposed by the Gadgil report.

Check Your Progress:

1. Write a brief note on the Western Ghats Ecology Expert Panel.

2.5 ITS RECOMMENDATIONS

The panel, chaired by Prof. Madhav Gadgil, studied the ecological status of the Western Ghats – it compiled information, analysed it and made several field visits. It also developed geospatial databases on the ecological sensitivity of the entire Western Ghats region. And it consulted government officials and people's representatives – from members of gram sabhas and zilla parishads to members of parliament and state legislative assemblies.

Based on its research, the panel designated the entire region as an 'Ecologically Sensitive Area' and divided the ghats into three zones: Ecologically Sensitive Zone 1 (very high sensitivity), Ecologically Sensitive Zone 2 (high sensitivity) and Ecologically Sensitive Zone 3 (moderate sensitivity).

The panel's report is divided into two parts. Part I (the main report) details the WGEEP's activities. Part II discusses the ecological status of the Western Ghats and has sections on land and water use, agriculture, livestock rearing, fisheries, forests and biodiversity, and human settlements. It also has chapters on industry, mining, power and energy, tourism, transport, science and technology, and nutrition and health.

The panel proposed that no new dams with large-scale storage be permitted in the Ecologically Sensitive Zone 1 (ESZ 1) or regions with very high ecological sensitivity. It also recommended that environmental clearances not be given to the Athirappilly and the Gundia hydel projects (in Kerala and Karnataka, respectively), which are in this zone.

The panel's investigations in the plains and coastal tracts of Ratnagiri and Sindhudurg districts in Maharashtra suggested that these areas were under severe environmental and social stress. The panel proposed a cumulative impact analysis of various developmental activities in these areas. The panel urged the Ministry of Environment and Forests to involve citizens in environmental governance. This would include implementation of the Forest Rights Act (especially the provisions related to community forest

resources); a radical reform of the environmental impact analysis and clearance processes; and the proactive disclosure of all information of public interest.

2.6 CONCLUSION

The purpose of declaring ESAs is to create "shock absorbers" to prevent ecological damage caused by developmental activities in such areas and protect then by minimizing the negative impact on the ecosystem. They also act as a transition zone from areas that require high protection to those that need lesser protection. n March 2010, the Western Ghats Ecology Expert Panel (WGEEP) was set up with ecologist Madhav Gadgil as its head. The panel submitted its report in September 2011. Later, in August 2012, the MoEF constituted a high-level working group (HLWG) under the chairmanship of K. Kasturirangan. The HLWG submitted its report on April 15, 2013.

Since then, the MoEF has issued draft notifications five times — in 2014, 2015, 2017, 2018 and 2022 — inviting objections. But whenever the issue is raked up, farmers have staged protests and registered their opposition by even boycotting local panchayat elections. The state governments, meanwhile, have opposed both the Madhav Gadgil report as well as the 'diluted' Kasturirangan report, calling them "unscientific." The Gadgil committee report was criticized for being inconsistent with developmental needs.

2.7 QUESTIONS

1. What are the recommendations of Western ghats ecology expert panel?

2. What can be the consequences of uncontrolled development in the Western Ghats?

3. Why are State governments loggerheads with the Western ghats ecology expert panel report?

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3

WATER SCARCITY AND WATER MANAGEMENT; RAINWATER HARVESTING – CASE STUDY OF JOHADS IN RAJASTHAN

Unit Structure

3.0 OBJECTIVES

- To understand the water and its associated problems and management
- To learn about rain water harvesting practices like johads.

3.1 ENVIRONMENTAL PROBLEMS

The term "environmental problems" covers a broad variety of challenges that have an adverse effect on the natural world and ecosystems as well as on people's well-being, health, and standard of life. Numerous things, including human activities, natural disasters, and climate change, can contribute to these issues. The following are some of the most serious environmental issues:

- **Climate change** is the collective term describing long-term modifications to the earth's temperatures, weather patterns, and sea levels brought on by human activities such as the burning of fossil fuels, clearing of forests, and industrial operations.
- **The combustion of fossil fuels,** industrial operations, and automobile emissions are only a few of the factors that contribute to air pollution. It can lead to a variety of health conditions, such as cancer, heart disease, and respiratory disorders.
- **Sewage, industrial waste,** and agricultural runoff all contribute to water contamination. It can cause a variety of health issues for both people and wildlife, as well as have an effect on aquatic ecosystems.

- **Deforestation:** Deforestation is the practise of removing forests for industrial, commercial, or agricultural use. It can have a variety of detrimental effects on climate change, biodiversity, and soil quality.
- **Waste management:** Poor waste management can result in pollution, environmental deterioration, human and animal health issues.
- **Loss of biodiversity:** This is the extinction of plant and animal species as a result of altering climatic conditions, pollution, and other factors. Numerous detrimental effects on ecosystems and human well-being may result from it.

3.2 WATER SCARCITY IN INDIA

A large number of Indians face high to extreme water stress, according to a recent report by the government's policy think tank, the NITI Aayog. India's dependence on an increasingly erratic monsoon for its water requirements increases this challenge. Climate change is likely to exacerbate this pressure on water resources, even as the frequency and intensity on floods and droughts in the country increases.

- In many places of India, including those with high rates of population growth, urbanisation, and agricultural activity, water scarcity is a significant issue. In India, a few of the major causes of water scarcity are as follows:
- Climate change: In many regions of India, it is now more challenging to forecast and manage water supplies due to changes in weather patterns and rainfall that are related to climate change.
- India is one of the world's greatest users of groundwater, and excessive use has resulted in the depletion of aquifers in several regions of the nation.
- water management systems are frequently insufficient or badly maintained, which causes inefficiencies and waste.
- Industrial waste, agricultural runoff, and sewage all add to water pollution, making it more difficult to clean.
- Urbanisation and population growth: As India's population rises and more people relocate to cities, there is a rising demand for water, placing stress on the country's limited water supplies.
- Many sections of India now experience widespread water scarcity as a result of these issues, notably rural areas and places with significant levels of poverty. Numerous negative effects result from this, including decreased crop yields, an increase in health issues brought on by waterborne illnesses, and financial difficulties for those whose livelihoods depend on agriculture.

3.3 WATER MANAGEMENT

Indian traditional communities featured a variety of water-saving norms and customs. For instance, they used copper and clay utensils for the purification of water. In order to maintain soil moisture, they also avoided overwatering their crops and practised crop rotation. Community wells are one of the crucial methods for storing and distributing water. People used to rely on neighbourhood wells in various areas of India for their water needs. Since these wells were constructed in low-lying locations, seepage and surface runoff were responsible for recharging the water table. The community members shared the water that was drawn using manual pumps or pulleys.

In the western Rajasthan region, the practise of "paar" is widespread. It is a typical location where rainwater percolates into the sandy soil as it runs from the agar (catchment). Kuis or beris are dug in the agor (storage area) to obtain the rajani pani (percolated water). Typically, kuis or beris range in depth from 5 to 12 metres. The building was built using conventional masonry techniques. Usually, a paar is made up of six to 10 of them. However, the number of kuis or beris is determined based on the size of the paar. According to Bhatti, there are paars in the Jaisalmer district where more than 20 kuis are running. This is the most common type. The rain water harvest through that of the PAAR technique is also known as Patali paani. There are other ways like Bandhis, Saza kua, Pat etc.

There are also modern methods like in rural India, drip irrigation is a contemporary irrigation method that is gaining popularity. Through the use of a system of pipes and emitters, water is slowly and precisely applied to plant roots. This method decreases water loss via evaporation and run-off, which conserves water and boosts crop yields.

3.4 RAIN WATER HARVESTING

The technique of gathering and storing rainwater for later use is known as rainwater harvesting. It is a traditional method of water management that has been practised for many years around the world, including India. The general procedures for collecting rainwater are as follows:

- **Rooftop Catchment:** Gathering rainwater from building rooftops is the first step in rainwater harvesting. Concrete, metal, or tile are just a few possible materials for the rooftop catchment area.
- **Rainwater collection system:** A gutter system collects rainwater from the rooftop and directs it to a storage tank. To avoid clogging, the gutter system should be kept clean and well-maintained.
- **Before the water is stored**, it must be filtered to get rid of any dirt or contaminants. To get rid of leaves, twigs, and other waste, people frequently use a mesh or screen filter. A more sophisticated filtering system is needed to get rid of bacteria, viruses, and other impurities before drinking.

- **Storage:** A storage tank is used to hold the filtered rainwater. The amount of rainfall and the water demand determine the tank's size. The tank may be constructed from a variety of materials, including metal, concrete, or plastic.
- **Distribution:** After being stored, rainwater can be used for a variety of tasks, including drinking, washing, and irrigation. The water that has been kept must be treated to get rid of any dangerous bacteria, viruses, or from any other contaminants.

A variety of methods are required to alleviate India's water scarcity, including improved water management systems, investments in water infrastructure, encouragement of water conservation, and initiatives to lower pollution and excessive groundwater use. One such method is the Johads. Let us look into in detail.

Check Your Progress

1. What is rain water harvesting?

2. Discuss traditional water harvesting systems.

3.5 CASE STUDY OF JOHADS

A johad is a typical water collection system. Johads are small earthen check dams built by individuals using their own abilities, resources, and traditional knowledge that trap and conserve rainwater while enhancing percolation and groundwater recharge. Traditionally used to collect rainwater, johads are located in India's semi-arid and arid regions, particularly in the state of Rajasthan. In order to collect and store rainwater, small earthen embankments or dams are constructed over shallow valleys or depressions. Johads are often constructed from natural resources found nearby, such as stone, clay, and soil. Johads are mainly found in Alwar district of Rajasthan there are roughly more than 3000 johads. It began through the efforts of Rajendra Singh and the locals. They are intended to slow down rainwater runoff so that it can seep into the ground and replenish nearby aquifers. They are frequently built by local people utilising traditional methods and knowledge, and they play a

significant role in the region's cultural history. Numerous advantages of johads include:

- **Increasing water availability:** Johads can supply a dependable source of water for drinking, agriculture, and other uses by collecting and storing rainwater.
- **Preventing soil erosion:** Johads can aid in preventing soil erosion and promoting soil fertility, which is crucial for agriculture and biodiversity. They achieve this by stopping the flow of precipitation.
- **Supporting biodiversity:** Johads can build little wetlands and ponds that serve as crucial wildlife habitat, especially during the dry season.
- **Building community resilience:** Johads, which are frequently constructed and maintained by local residents, can encourage participation and empowerment of the community in the management of natural resources.

The johads are very efficient and inexpensive; at 100 rupees per capita, they can increase economic output by up to 400 rupees year. In contrast, the neighbouring Sardar Sarovar Dam project cost 300 billion rupees, costing 100 times more to supply water to each person and 340 times more to irrigate each acre.

Johads have aided rural communities in their extraordinary transition from extreme poverty to prosperity under the guidance of Tarun Bharat Sangh and its leader Rajendra Singh, known as the Rajasthani Water Man (Frontline 2001). To stop the monsoon runoff, small mud barriers called johads are constructed across hill slopes, typically in semi-circular shapes. They are surrounded on three sides by the natural slopes of hills and constructed over a slope to catch rainfall. A mud wall, usually semi-circular in shape, on the fourth side prevents the

Depending on the site, water flow, topography, etc., the height of the embankment varies from one johad to another. In some instances, a masonry structure is also created for the outlet of extra water to reduce the water pressure. Between 2 and 100 hectares are used to store water. Per hectare of farmed land, 1000–1500 m3 of storage were produced optimally. With an average price of Rs.0.95/m3, the cost of the storage produced ranged from Indian Rupee (Rs) 0.2 to 1.50/m3.

The villagers shared the expense and contributed 70–90% of the entire cost by providing labour and locally accessible resources including stone, sand, and lime. These constructions stood out due to their low cost, straightforward design, simple construction. During the monsoon, water is collected in johads and used for irrigation, drinking, feeding animals, and other domestic uses. This water also permeates the subsoil. This helps the wide areas by recharging the groundwater and increasing soil moisture. Additionally, the land inside the johad itself becomes cultivable throughout the dry season as the water progressively recedes in the johad.

8600 johads total have been constructed across 1086 communities in the 6500 km2 Alwar district. As a result, groundwater recharge in the shallow aquifer has raised the water table from a depth of roughly 100–120 m to 3–13 m. The amount of land used for single- and double-cropping expanded from 11% and 3% to 70% and 50%, respectively, bringing wealth to the farmers. Through agroforestry and social forestry, the forest cover, which was previously only about 7%, expanded to 40%, producing enough fuel wood and removing carbon from the atmosphere. According to estimates, johads have improved the crop production with a per-capita investment of Rs. 100 in johad yields an annual benefit of Rs. 400. A significant source of livelihood has also evolved with fishing. With water availability the health of women has also enhanced as now they need not carry water from faraway places. Restoration of the Arvari and Ruparel Rivers through restoration is the most stunning accomplishment.

Dr. G. D. Agarwal, a former head of the civil engineering department at the Indian Institute of Technology, Kanpur, did a study (in Kavarana 2006) that revealed how cost-effective the buildings of johads were, with prices starting as low as Rs. 0.2 (US cents 0.4) per cubic metre of storage. capacity ranging from Rs. 0.95 (US cents 2.2) per cubic metre on average to Rs. 3 (US cents 7) on high. The annual per capita income in the study's sampled villages ranged from a low of Rs. 126 (US$2.95) to a high of Rs. 3585 (US$83.98). According to the study, an investment of Rs. 1000 in johads increased economic output by more than Rs. 4200 annually (Kavarana 2006)

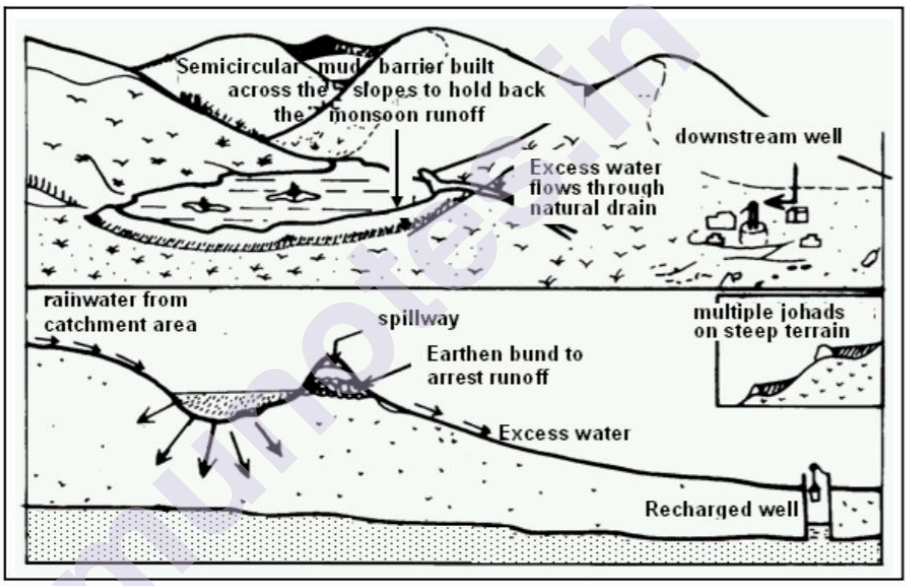
The johad has developed into a tool for energising the populace, enhancing social cohesion, fostering individualism and emotional ties within the community, and activating the latter for the benefit of all (Rajendra Singh 2005, Community Driven Decentralized Water Management). With johads the availability of water is now guaranteed throughout the year to suit the demands of both people and animals. Since livestock farming is essential to small towns, johads has led to more access to water and fodder.

A sample from one of the villages that benefited from the construction of johads is shown in Table 1.

The financial situation has improved as a result of availability. It has enhanced food production, aided in soil conservation, increased biomass productivity, and even transformed five seasonal rivers (Arvari, Ruparel, Sarsa, Bhagani-Teldeh, and Jahajwali) into perennials in addition to providing for basic necessities, drinking water, and household uses (Sharma 2006).

S. No.	Total depth of well	Depth of water level Before constriction of johad (1985)	After constriction of johad (1994)
1	24.68	Dry	11.12
2	22.25	Dry	10.98
3	20.40	19.40	8.05
4	17.00	15.7 (mostly dry)	8.80
5	24.68	21.68	4.57
6	21.00	15.00	5.76
7	25.30	19.30	7.63
8	20.25	Dry	12.63

Johads have experienced threats from a variety of sources, including land use changes, urbanisation, and neglect, despite the fact that they offer many advantages. As part of larger initiatives to advance resilient and sustainable water management practises in India, efforts needs to be taken to support the restoration and rebirth of johads.



Source - The design of water johads. Source: Anupma Sharma, National Institute of Hydrology

Check Your Progress

1. How does johads prevent soil erosion?

2. Johads are mainly found in which state in India.

3.6 SUMMARY

In this chapter, we learn about the importance of water management, the impact of water scarity on the lives of people and environment. As a way to handle the water crisis there are several traditional methods used like that of johads in Rajasthan. Johads is a community owned water management practice which is cheaper compared to a larger dam and is viable and adaptable to the locals. A johad is a typical water collection system. Johads are small earthen check dams built by individuals using their own abilities, resources, and traditional knowledge that trap and conserve rainwater while enhancing percolation and groundwater recharge. Traditionally used to collect rainwater, johads are located in India's semi-arid and arid regions, particularly in the state of Rajasthan. In order to collect and store rainwater, small earthen embankments or dams are constructed over shallow valleys or depressions. Johads are often constructed from natural resources found nearby, such as stone, clay, and soil.

3.7 QUESTIONS

1. Discuss the case study of Johads.
2. Explain traditional water management systems.
3. Discuss rain water harvesting
4. Explain in brief the water scarcity in India.

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UNIT II

4

WASTE MANAGEMENT; SOLID WASTE MANAGEMENT, BIO-MEDICAL WASTE; INDUSTRIAL WASTE; NUCLEAR WASTE AND E-WASTE

Unit Structure

4.0 OBJECTIVES

- To learn about the meaning of Waste management
- To understand the different types of waste and its management.

4.1 MEANING OF WASTE MANAGEMENT

Understanding the waste and its management is one of the important topic. As it not only effects the present but also the future population and nature. Everyday Mumbai generates nearly 7025 tonnes in a day. This shows the necessity to understand this problem and methods to manage it. In this chapter we will looking into waste management and the different types of it.

The meaning of Waste is any object or substance that has served its purpose and is now being wasted. Waste can be produced from a multitude of sources, including homes, businesses, industries, and construction sites. It can also take many different forms, such as solid, liquid, or gas. Depending on where it comes from, what it is made of, and how it could affect the environment and people's health, waste can be categorised in a variety of ways. Municipal solid waste (MSW), industrial waste, hazardous waste, biomedical waste, electronic trash (e-waste), and

construction and demolition waste are a few examples of the several types of waste that can be categorised. If waste is not managed appropriately, there are serious environmental and health problems. For instance, incorrect garbage disposal can result in land and water pollution, greenhouse gas emissions, and risks to the public's health.

While Waste management is the procedure for gathering, handling, and getting rid of waste in a safe and efficient way. Waste management seeks to minimize the harm that trash causes to the environment and to people's health while simultaneously fostering resource efficiency and sustainability. Waste generation, collection, transportation, sorting and separation, treatment, and disposal are some of the common steps in waste management. Utilising the proper technologies and procedures is essential for effective waste management because they reduce the volume and toxicity of trash while maximising the recovery and recycling of valuable resources. Municipal solid waste (such as home trash), industrial waste, hazardous waste (such as chemicals and medical waste), and electronic waste are a few typical waste kinds that need to be managed. It's crucial to handle waste properly for healthy environment, for the health of people, and natural resources.

4.2 SOLID WASTE MANAGEMENT

Any dumped material that is neither a liquid or a gas is considered solid waste. It may consist of a variety of things, including hazardous trash, industrial waste, and home garbage. Households, businesses, organisations, and industrial sources all produce solid trash. Solid waste management must be done correctly if environmental contamination, public health issues, and resource depletion are to be avoided.

Solid waste management is the procedure for gathering, moving, processing, recycling, and discarding solid waste in a way that doesn't harm the environment. The reduction of garbage's negative effects on the environment, the general public's health, and aesthetics is the main objective of solid waste management. This entails a number of actions, including waste minimization, waste reuse and recycling, energy recovery from waste, and proper disposal of any leftover trash. To guarantee that garbage is managed in a safe and sustainable way, solid waste management also entails developing and putting into effect policies, rules, and guidelines. For the sake of the environment, public health, and the preservation of natural resources, proper solid waste management is essential.

4.3 BIO MEDICAL WASTE

Any waste produced during the diagnosis, treatment, or immunisation of people or animals, as well as during biological research operations, is referred to as biomedical waste, sometimes known as healthcare waste. Sharps (needles, syringes, and scalpels), blood and blood products, human and animal tissues, body parts, cultures, and swabs that are potentially infectious objects that fall under this category. Non-infectious trash such

as wasted medications, chemicals, and pharmaceutical items is also categorised as biomedical waste.

Biomedical waste needs to be separated, collected, transported, treated, and disposed of according to strict rules and regulations due to its potentially hazardous nature in order to stop the spread of illness and safeguard the environment. The environment, animals, and the public's health will be at risk if there is improper biomedical waste handling.

In order to ensure the proper handling and disposal of potentially infectious materials, biomedical waste management comprises a number of stages. These are general recommendations for handling biological waste include:

Segregation:

The first step is to distinguish between different forms of trash and biomedical waste. Segregation takes place at hospitals, clinics, labs, and research facilities. Biomedical waste should be separated in accordance with national laws and World Health Organisation (WHO) norms.

Collection:

The separated waste should be picked up in the proper containers that are marked with the warning symbols and the waste category.

Transport:

Biomedical waste should be moved in a method that reduces the chance of contamination or environmental harm. This involves the use of specific vehicles which have labels over them and are also have even steps taken for safety in them.

Treatment:

The proper techniques, such as sterilization, destruction, or chemical treatment, should be used to deal with biomedical waste. The kind and volume of trash, as well as regional rules and regulations, will all affect the treatment technique selection. The safe disposal of processed biological waste is the last stage. Depending on the type of garbage and local laws, this can entail deep burial, landfilling, or other techniques. The management of biological waste necessitates specialised knowledge and experience. In order to avoid legal trouble, it is crucial to abide by the rules and regulations which are already in place or it is better to take professional help.

Check Your Progress

1. What does waste management means?

2. Do you think segregation of waste is needed = comment.

4.4 INDUSTRIAL WASTE

A sort of garbage produced by industrial activities like manufacturing, mining, construction, and agriculture is known as industrial waste. Chemicals, metals, construction debris, electronic waste, and other substances that are no longer required or superfluous to industrial processes are examples of industrial waste. If industrial waste is not adequately managed, it may contain poisonous or dangerous materials and could endanger both human health and the environment.

In order to safeguard human health and the environment, proper handling of industrial waste is crucial. Industrial trash can be handled safely and responsibly before being recycled, disposed of, or treated. Treatment techniques may involve neutralising or reducing the waste's harmful content through physical, chemical, or biological processes. While safe disposal could mean landfills, burning, or other techniques that adhere to environmental standards and norms, recycling may involve retrieving valuable elements from the garbage for reuse. In order to reduce the quantity of garbage produced by their operations and to effectively manage the waste that is produced, industries must adopt sustainable and environmentally friendly practises.

A variety of tasks are involved with handling industrial waste, including reducing trash generation, processing garbage, recycling or recovering valuable materials, and safely and responsibly disposing of waste. Some broad recommendations for handling industrial waste are as below:

Trash minimization:

Businesses can reduce the amount of trash they produce by using fewer raw materials, more effective production techniques, and efficient use of water and energy. Reusing or recycling items is another method of waste minimization that may be used to cut down on waste production.

Waste segregation is the process of segregating various waste types based on their traits and features. This could make it easier to dispose of waste safely in environmentally-friendly ways through recycling, treatment, or recycling.

Treatment:

Neutralising, detoxifying, or reducing the harmful content of industrial waste requires physical, chemical, or biological methods. Waste treatment

can lessen its negative environmental effects and make it safer to dispose of disposal.

Recycling and recovery:

Recovering valuable materials from garbage for use in industrial operations is the goal of recycling and recovery. This could lessen the quantity of waste that needs to be disposed of and help preserve natural resources.

Safe disposal:

It is necessary to dispose of industrial waste in a safe and responsible manner if it cannot be repurposed or reused. Landfilling, the burning process, and other disposal techniques that adhere to environmental norms and standards are all acceptable.

To manage industrial waste, it is crucial that industries implement sustainable and ecologically friendly practises. This can be beneficial for nature and human health too.

4.5 NUCLEAR WASTE

A category of hazardous waste known as nuclear waste is created during the functioning of nuclear power plants, the manufacture of nuclear weapons, and other nuclear applications. It is a byproduct of nuclear fission, a technique used to make nuclear weapons and the electricity utilised in nuclear power plants.

Nuclear waste is extremely radioactive and can be hazardous for a very long time. It may consist of a variety of substances, such as old fuel rods, contaminated instruments, and safety gear worn by personnel working in nuclear facilities. Radiation from nuclear waste has the potential to harm both people and the environment.

To safeguard the environment and the public's health, nuclear waste must be managed safely. There are numerous techniques used to manage nuclear waste, such as:

Storage: Until it is safe to dispose of it, nuclear waste can be maintained for many years in properly built facilities such dry casks or pools.

Transport:

Specialised containers that can survive radiation and physical damage are frequently used to transport nuclear waste.

Nuclear waste is disposed of by burying it far below in a geological repository, where it may be protected from the environment for a long time. The repository needs to be built with radioactive material discharge and it should be prevented from reaching groundwater.

To maintain public safety and environmental protection, the management of nuclear waste is a complicated and difficult subject that needs careful planning, monitoring, and regulatory oversight.

Check Your Progress

1. How is industrial waste harmful?

2. What do you understand by nuclear waste?

4.6 E WASTE

Electronic garbage, also known as e-waste, is the term for abandoned electronic equipment and gadgets such computers, smartphones, televisions, and other gadgets. If not correctly handled, dangerous substances like lead, mercury, cadmium, and brominated flame retardants may be present in e-waste, which could endanger both human health and the environment.

E-waste management is the process of processing and recycling e-waste, reducing the impact of e-waste on the environment, and disposing of e-waste safely and responsibly. Managing e-waste generally should follow the following principles:

Reduce: The greatest strategy for handling e-waste is to lower its production. In order to do this, one can select long-lasting electronic gadgets, repair broken ones rather than buying new ones, and donate or sell old electronic devices.

Reuse: By reusing electronic gadgets, you may increase their lifespan and cut down on the production of e-waste. This may entail repairing electronic equipment or giving it to charities, educational institutions, or other organisations.

Recycling:

Recycling e-waste entails collecting valuable materials for use in the creation of new electronic equipment, such as metals, plastics, and glass. Recycling can lessen the quantity of e-waste that needs to be disposed of while also helping to conserve natural resources.

E-waste that cannot be recycled or reused must be disposed of safely and responsibly. Landfilling, incineration, and other disposal techniques that adhere to environmental norms and standards are all acceptable. To manage e-waste, it is crucial for individuals, corporations, and governments to adopt sustainable and ecologically friendly practises. The state generated more than 10 lakh metric tonne (MT) of e waste but only 1 percent of the e waste has been recycled in the year 2019-20.

4.7 CASE STUDIES OF WASTE MANAGEMENT

1. Samarth Bharat Vyaspeeth (SBV) a non profit NGO hires rag pickers and have given them stable jobs in the Thane waste treatment centre with the Thane Municipal corporation as a result, both the rag pickers lives have improved as well as it has contributed in cleaning the city. The NGO also started redeveloping different places through the recycling process and even built scrap library with old musician instruments, e wastes etc (1).

2. There are several societies making compost through the waste generated within their societies. Out of the compost generated they sell it for other residents and in nurses. They dry out the wet waste in the terrace so that it doesn't stink and then put the waste in the boxes kept in the parking spaces for the compost to grow. Once final it is used within the building or packed and sold too. In a way, generating both the income and saving the environment.

3. There is a recent trend of using bio enzymes instead of big brands chemicals for all purpose right from shampoo to washing clothes, to floor cleaning, to washing utensils. Bio enzymes are made out of jaggery and wastes like – citrus skin. The use of bio enzymes can save the rivers. As they are made of out of plants or related material. While that of chemicals are creating pollution for both nature and environment. The method to make bio enzyme is that of 1:10: one-part jaggery 10 parts water, 3 parts the skin – like

   There are several videos showing how to use, how to make bio enzymes in details. Please refer to it. Bio enzymes would not only help from harmful chemicals but also the number of plastics used like the if you buy a shampoo bottle not just the shampoo has sodium lauryl sulphate which is harmful but also the plastic bottle is harmful for nature.

4. Cleanest village of India – The cleanest village of India is at Meghalaya known as Mawlynnong Village. To make the village clean is a collective effort. Once a week all the plastics are collected in the bamboo baskets kept on the specific street and thereafter, they are recycled in the nearest factory of the village. This resulted in lot of both tourists attraction, homestays being developed and giving income to the village.

4.8 SUMMARY

Waste management is the procedure for gathering, handling, and getting rid of waste in a safe and efficient way. Waste management seeks to minimize the harm that trash causes to the environment and to people's health. The solid waste management includes managing trash from homes, businesses, and building and demolition projects, is known as solid waste management. The safe treatment, transportation, and disposal of medical waste produced by healthcare facilities like hospitals, clinics, and laboratories is referred to as biomedical waste management. Managing trash produced by industrial processes including manufacturing, mining, and construction is known as industrial waste management. The management of hazardous waste produced by nuclear power plants, the development of nuclear weapons, and other nuclear uses is referred to as nuclear waste management. Nuclear waste is extremely radioactive and can be hazardous for a very long time. The treatment of garbage produced by electronic equipment, such as computers, smartphones, and televisions, is known as e-waste management. Electronic garbage should be disposed of safely and responsibly. We also saw some case studies from different parts of India.

4.9 QUESTIONS

1. Explain the meaning of waste and waste management
2. Discuss the nuclear waste and its management
3. Explain the solid waste management, e waste.

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5

EFFECTS OF DEVELOPMENT ACTIVITIES WITH REFERENCE TO LOSS OF MANGROVES, BUILDING OF METRO, SKYWALKS ETC.

Unit Structure

5.0 OBJECTIVES

- To learn about the development activities meaning
- To understand impact of development activities on environment.

5.1 MEANING OF DEVELOPMENT ACTIVITIES

Programs, initiatives, and projects aiming at enhancing the standard of living, employment prospects, and social wellbeing of urban communities are referred to as development activities in cities. These initiatives, which can target a variety of concerns like education, healthcare, transportation, housing, and the environment, are frequently carried out by governments, nonprofit organizations, community groups, and other stakeholders.

Developmental activities in cities include, for instance:

- **Urban renewal projects:** These involve reviving urban neighborhoods, frequently by renovating old structures and enhancing the streetscape and other infrastructure.
- Parks, playgrounds, and other green space development are included in this because they offer recreational activities, encourage physical activity, and enhance air quality.
- **Community development programmes:** This category consists of projects meant to encourage economic growth, such as programmes for workforce development, job training, and entrepreneurial support for smaller business units.

- **Transportation Improvements:** These include the creation of bike lanes, pedestrian-friendly streets, and public transportation networks, all of which help to ease traffic congestion, support environmentally friendly modes of transportation, and enhance public health.
- After-school programmes, museums, and cultural centres are examples of programmes in this category that work to increase access to high-quality educational and cultural opportunities.
- Overall, urban development initiatives are essential for fostering social inclusiveness, economic expansion, and environmental sustainability.

Development activities are important for:

Cities need development activities for a number of reasons.

- **Enhancing Quality of Life:** By giving city people access to better infrastructure, services, and facilities, development efforts can enhance the quality of life in cities. This entails the creation of public areas like playgrounds and parks, the provision of dependable public transit, and the development of facilities for healthcare and education.
- **Economic Growth:** By generating new jobs, luring investment, and aiding small enterprises, development initiatives can stimulate economic growth in urban areas. For city dwellers, this may result in higher incomes and greater prosperity.
- **Social Inclusion:** By giving people from different backgrounds the chance to take part in community activities and access services and resources, development initiatives can assist to foster social inclusion. This may lessen societal tensions.
- **Environmental Sustainability:** By encouraging the use of renewable energy, lowering greenhouse gas emissions, and promoting sustainable transportation options, development activities and it can also enhance environmental sustainability. In addition to enhancing the health and well-being of city dwellers, this can help alleviate the effects of climate change.
- **Enhancing the City's Image:** Development projects can improve a city's perception, making it more appealing to citizens, businesses, and tourists. This could assist promote tourism, boost investment, and improve the city's reputation.
- Overall, development activities are essential for increasing the livability and inclusivity of cities for all citizens, as well as their economic, social, and environmental sustainability.

5.2 LOSS OF MANGROVES

A variety of ecosystem services are provided by mangroves, Mangroves are tropical trees that grow in coastal areas. These mangroves help in a variety of ways like stabilizing shorelines, defending coastal communities from storms and erosion, filtering pollutants from water, and providing habitat for numerous marine and terrestrial species. However, development activities including land reclamation, aquaculture, agriculture, and urbanisation frequently result in the loss of mangroves. Mangroves have evolved around 114 million years ago. In the last ten years or so, Mumbai has probably lost 40% of all of its mangroves, primarily due to land reclamation for slums, sewage treatment and rubbish dumps. Pollution in these places is caused by expanding industrial zones along the coastlines and the discharge of home and industrial sewage. Fortunately, the Godrej family has preserved an outstanding mangrove forest in Vikroli link. On the Maharashtra coast, about 20 of the 35 species of true mangroves have been identified, while Mumbai is home to 15 of these species (sarkar, 2017).

Reason behind loss of mangroves:

- A number of things, including natural disasters and human activity, contribute to the disappearance of mangroves. Storms, sea level rise, and coastal erosion are some natural factors that contribute to mangrove destruction. However, human activities, which include the following, are the primary cause of mangrove decline worldwide:
- **Land Reclamation:** Land reclamation entails converting mangrove forests and other coastal ecosystems into land for farming, aquaculture, or urban development. Dredging and filling are frequently used in this, which can devastate mangrove environments.
- **Logging and deforestation:** Wood from mangrove trees is frequently taken for use in construction, fuel, and other products. Mangrove forests may be completely lost as a result of logging and deforestation.
- **Aquaculture**: In coastal locations, fish, prawns, and other aquatic species are grown for food. This frequently entails the destruction of the different mangroves and their dependent habitats.
- **Agriculture:** Mangrove forests may be lost as a result of agriculture, notably rice production. This is frequently brought on by the development of irrigation channels and the application of fertilizers and pesticides, which can contaminate the water and harm mangrove habitats.
- **Urbanization:** Mangrove forests may be lost as a result of urbanization, which also includes the establishment of buildings, roads, and other infrastructure. This is frequently caused by habitat degradation and land change.

Impact of loss of Mangroves on environment:

- Mangrove habitat loss brought on by development activities can have a big influence on the environment, society, and economy
- **Increased Coastal Erosion:** Mangroves are crucial for stabilizing shorelines and reducing erosion along the coast. Mangrove removal makes the coast more susceptible to erosion, which increases the risk of losing critical infrastructure and property.
- **Reduced Biodiversity:** Fish, crabs, birds, and reptiles are just a few of the many marine and terrestrial species that depend on mangroves as a habitat. Loss of mangroves results in the extinction of these species and a consequent decline in biodiversity.
- **Enhanced Storm Vulnerability:** Mangroves serve as natural barriers to storms and hurricanes, minimizing the effects of strong winds and waves. Loss of mangroves makes coastal towns more susceptible to storm damage, which can result in casualties and property loss.
- **Reduced Water Quality:** Mangroves function as natural filters that improve water quality by filtering out pollutants. When mangroves are destroyed, water quality may suffer, which could have negative effects on human health and the ecosystem.
- Mangroves provide a variety of positive economic effects, including fisheries, ecotourism, and the retention of carbon. When the mangroves are lost then the benefits which the nature receives through them is reduced as a result both the local community as well as the larger economy and the water base is affected.

Check Your Progress

1. List out some of the developmental activities.

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2. Are mangroves natural water filters – comment.

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5.3 METROS AND IMPACT OF DEVELOPMENT

Although the word metro is used with different context like metropolitan city etc. Here we are restricting to understanding it with trains.

Urban rapid transit or metros systems offer quick and effective transportation both within and between cities. These systems, which are frequently employed to reduce traffic congestion in highly populated urban areas, typically incorporate underground, elevated, or at-grade rail lines and stations. Metro railroads are frequently utilised to relieve traffic congestion in densely populated urban areas, and by serving as an alternative to private automobiles, they can also assist reduce air pollution and greenhouse gas emissions. Metro train systems can also improve society and economy by connecting people to cultural, educational, and employment possibilities. Electric-powered trains that travel on lines that are normally isolated from other types of traffic are used by numerous metro systems across the world. Many of these systems have features like air conditioning, accessibility for individuals with impairments, and real-time information displays. Some systems also use automated trains that do not require a human driver. Metro railroads play a significant role in helping cities satisfy the mobility needs of its citizens and visitors in a safe, sustainable, and effective way. They are a significant component of urban transportation infrastructure.

Negative Impact of Metro on Environment:

- By serving as an alternative to private vehicles, metro trains can help reduce air pollution and greenhouse gas emissions; nonetheless, the development and maintenance of these systems can have a negative influence on the environment. Here are a few illustrations:

- Loss of Green Space and animals Habitats: Building new metro lines and stations frequently necessitates a sizable piece of land, which can cause habitat loss for animals. In some circumstances, building metro systems can also result in wetlands, forests, or other significant ecosystems being destroyed.

- Energy Consumption: Although metro trains are often powered by electricity, the generation and delivery of that electricity can have an adverse effect on the environment, especially if it is produced using fossil fuels. Additionally, escalators, lighting, ventilation, and other energy-intensive components of metro systems' construction and operation can increase greenhouse gas emissions.

- Metro trains can produce a lot of noise and vibration when they are in service, especially in metropolitan locations where the tracks are situated close to homes or other buildings. Both the health and well-being of people as well as the wildlife in neighbouring ecosystems may suffer as a result of this.

- Waste Production: The building and running of metro systems can produce a lot of trash, including construction waste, materials left

over from maintenance and repair work, and trash left over from passengers such food containers and newspapers.

- Even during the construction process of metro there are lot of trees chopped which has stood for more than decades. Places have also been cleared for building car shed. While the construction process constant use of instruments, banging, drilling leads to lot of noise pollution.
- Though the cost of metro has been huge, some lines are not used as much as expected due to the expensive fare, or lack of willingness or there aren't much people moving on that specific route hence the investment cost vs the cost of utility is very less.

5.4 SKY WALKS

Skywalks are elevated walkways that connect a variety of strongly targeted locations to either other high-density commercial areas or to railway stations. According to the MMRDA website, the goal of the skywalks is the effective distribution of commuters from crowded regions to key destinations, such as bus terminals, taxi stands, shopping districts, etc.

In the city of Mumbai there are around 37 skywalks. The cost involved in the construction is around 600 crores. But according to a study carried out by the MMRDA in 2013, only 250,000 people use the skywalks - a tiny fraction of Mumbai's population of 12 million (guardian).

Many of the skywalks are not used by people even though there is a sizeable amount which has been spent on them. Understanding the habits and undertaking a study prior to the construction of sky walk would have helped. As sky walks have stairs and especially senior citizens find it difficult to climb, hence they prefer the old method of crossing by the road or using an auto to get to the other side as quicker and safer. As well as due to the general behavior of human beings were many do not prefer to use the stair case there is not much use as expected unless there is a functioning elevator or sky walk is the only option left to cross the roads. In some places, there are police standing to enforce the using of sky walk behavior as people generally still tend to avoid it. Skywalks in today's time is also used by footpath dwellers, beggars to sleep at night as its empty at night or late evening. As the place is secluded many women even find it hesitant to use out of fear. There are also other problems like maintenance and lack of cleanliness in skywalks due to which people use it less.

Advantages of Sky walks:

Reduced carbon emissions: Skywalks can aid in lowering air pollution levels if they are made to promote cycling and walking over driving. Skywalks can aid in the reduction of automobile traffic by giving walkers a convenient and safe means of transportation.

Impact on aesthetics: Skywalks can significantly alter the landscape's appearance, and some individuals may find them invasive or unsightly. However, well-thought-out skywalk integration can improve the attractiveness and usefulness of urban environments.
It can save lives of people and develop good habits. It can save accidents of both the riders and the walkers.

Disadvantages of Sky walks:

Impacts on wildlife: If skywalks are constructed in parks or across waterways, they may change the habitats and migratory routes of wildlife. Before building skywalks here, it's crucial to thoroughly assess the potential effects on the local ecosystems.

Increased energy use: Lighting, heating, and cooling are frequently needed for skywalks, which can result in an increase in energy use and greenhouse gas emissions. However, skywalks can lessen these effects if they are built with energy-efficient components, like solar panels or effective lighting.

The Mumbai Metropolitan Region Development Authority (MMRDA) invested Rs 897 crores towards the construction of 20 skywalks in Mumbai city, making up the total of 36 skywalks that stretch 17 km. According to data released by the MMRDA, this also includes money for six skywalks constructed by the Maharashtra State Road Development Corporation (MSRDC). However, some argue that there already exists roads and clearance of the encroached part of the road could have given enough space for the people who walk, instead of making expensive skywalks. There are other problems like even the skywalks are encroached by the hawkers, leaving to little space for people to walk, specially around the railway stations.

Check Your Progress

1. Discuss about the mangroves in Mumbai.

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2. Do you think skywalks are useful – comment

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5.6 SUMMARY

In this chapter we discussed about the meaning of developmental activities like Programs, initiatives, and projects aiming at enhancing the standard of living, employment prospects, and social wellbeing of urban communities. These initiatives, which can target a variety of concerns like education, healthcare, transportation, housing, and the environment, are frequently carried out by governments, nonprofit organizations, community groups, and other stakeholders. Several topics are discussed in the chapter like mangroves and its role and present condition, skywalks and its uses and impact, metro rails and its impact on environment.

5.7 QUESTIONS

1. Discuss the meaning of development activities and why it is important.
2. Write a note on skywalks
3. Discuss the mangroves loss and its impact.
4. Explain in brief the metros and environmental impact.

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6

DEPLETION OF SOIL, AIR AND WATER AS A RESOURCE

Unit Structure

6.0 OBJECTIVES

- To understand the importance of environmental conservation
- To familiarize students with the issue of soil, air and water depletion

6.1 INTRODUCTION

Water, air, and soil are three natural resources that we cannot live without. Water is one of the most important natural resources essential for life. Soil provides nutrients, water, oxygen and heat to natural land areas. Understanding the ability and capacity of soil to support an ecosystem plays an important role in land management decisions. Air is a third critical resource for humans, plants, animals, and all other organisms within a natural area.

Despite being the most essential elements on the earth, water, air, and soil are subjected to various harmful practices by humans. Some of them are listed below: The use of fertilizers and pesticides on soil has severely affected the natural content of soil and is degrading the soil quality. The loss of fertility of the soil is degrading the quality of the food. The mining and deforestation practices also cause the loss of fertility of the soil. Improper disposal of chemical waste by industries into the water bodies pollutes water and affects the marine life of the water body. The release of hazardous chemicals into natural air causes air pollution and poses a threat to all living organisms breathing it.

All these harmful effects cause a simultaneous effect on the entire ecosystem and affect the survival of life on earth.

6.2 DEVELOPMENT AND ENVIRONMENT

People have long been concerned with the health of the environment. It was not until the 1960s, however, that conceptual frameworks focusing on the environment and development began to emerge. The argument for sustainable development holds that economic growth at the expense of uncontrolled depletion of natural resources is, by definition, not "sustainable." Present ecological conditions must be protected, in order to support a specific level of human well-being and for the benefit of future generations.

Development can be defined as growth, progress, positive change, or the addition of physical, economic, environmental, social, and demographic components. The purpose of development is to raise people's living standards and quality of life while maintaining the environment's resources. It also aims to produce or grow regional social and economic benefits. Environment versus Development has been put under the microscope for quite some time now. With development, humans seek to raise the living standards and amenities to make life easier, but these developments do cost environmental degradation.

Global warming is already a cause of concern, the world is already observing climate change and its effects. Natural resources form a crucial part in forming the provisioning services for humans, these provisioning services refer to Food, Water, and Irrigation requirements. In the early stages of development, the demand for environmental resources was lower than the supply. Today, the world is confronted with an increased demand for natural resources, but their availability is limited by overuse and misuse. Sustainable development is the type of development that helps reduce environmental impacts and fulfills the demands of the current generation without jeopardizing the capacity of the next generation in meeting their requirements.

The economy and environment are interdependent and require each other. Therefore, any development that does not consider its impact on the environment can destroy the ecosystem that supports living things. This has been the situation with soil, air and water depletion in India.

Check Your Progress:

1. Why are development and environment dependent on each other?

6.3 SOIL, AIR AND WATER DEPLETION IN INDIA

The majority of economists have never been taught that ecosystems provide humanity with an absolutely indispensable array of services, including maintenance of the gaseous quality of the atmosphere, amelioration of climate, operation of the hydrologic cycle (including the control of floods and the provision of fresh water to agriculture, industry, and homes) disposal of wastes, recycling of the nutrients essential to agriculture and forestry, generation of soils, pollination of crops, provision of food from the sea, and maintenance of a vast genetic library from which humanity has already withdrawn the very basis of its civilization.

While these services are "free", they would, of course, be infinitely costly to replace. Since they are unaware of the stress that natural systems are now under, most economists believe that the scale of economic activity can be increased indefinitely. Biologists, on the other hand, unfamiliar with economic ideas are often shocked when they discover that an industry appears to be deliberately destroying its resource base.

Declining soil moisture related to climate change can greatly affect social, economic, environmental, and hydrological processes, as well as extreme weather events. Soil moisture is generally referred to as the amount of water in the unsaturated zone and is a fundamental variable in atmospheric and hydrological sciences as it significantly influences the energy balance at the land surface. It plays an important role in controlling the fluxes of water and energy between land and atmosphere interactions, with consequent impacts on climatic, ecological, and hydrological systems. Soil moisture drying can heat the land surface and near-surface air by increasing the portion of sensible heat in the surface energy budget, intensifying heatwaves under global warming.

As human-induced global warming intensifies, terrestrial water availability decreases, this has a significant impact on land ecosystems as well as human society. Soil erosion is major environmental problem in India. Healthy soil is extremely important for agriculture and is the foundation of the food system. The concept of soil health is based on soil properties and the critical functions it performs and supports. The soil functions related to crop production include infiltration and storage of water, retention and cycling of nutrients, pest and weed suppression, detoxification of harmful chemicals, carbon sequestration and production of food and fiber.

Soil erosion is the process of detachment and transportation of soil particles from the soil mass due to natural factors such as strong winds, heavy rains, flowing rivers, glaciers as well as human activities like deforestation, over grazing, shifting cultivation, over-ploughing of land and other faulty agricultural practices and removal of top soil for industrial or infrastructural purposes.

Human interventions such as deforestation, overgrazing, extension of agriculture to marginal areas, road construction, land use changes and

unscientific cultivation practices have also been identified as major factors leading to accelerated water and wind erosion. Apart from this, air pollution has emerged as one of India's gravest social and environmental problems in recent years. At the same time, the country is experiencing signs of a warming climate with potentially devastating effects in the long term. Energy-related fuel combustion is at the heart of both crises. It is a main source of three major air pollutants, NOX, SO2 and PM2.5, and the largest contributor to India's CO2 emissions. In many locations, concentrations of particulate matter persistently exceed recommended national and international standards with severe implications for public health.

The main sources of ambient particulate matter pollution in India are residential and commercial biomass burning, windblown mineral dust, coal burning for energy generation, industrial emissions, agricultural stubble burning, waste burning, construction activities, brick kilns, transport vehicles, and diesel generators. Household air pollution is caused mainly using solid fuels for cooking, such as wood, dung, agricultural residues, coal, and charcoal. Ground-level ambient ozone is produced when pollutants emitted from transport vehicles, power plants, factories, and other sources react in the presence of sunlight with hydrocarbons emitted from diverse sources. Diseases attributable to air pollution adversely affect economic growth through reduced productivity and decreased labour supply, and via health-care expenditures and lost welfare.

Not only is water scarce in India, but the extraction of groundwater has been on the rise for decades. Since the 1960s, the government's support for the "green revolution" to ensure food security has increased the demand for groundwater for agriculture. Rapid rural electrification combined with the availability of modern pump technologies has led to an increase in the number of borewells to meet that demand. Over the last 50 years, the number of borewells has grown from 1 million to 20 million, making India the world's largest user of groundwater.

Groundwater pollution and the effects of climate change, including erratic rainfall in the drier areas, put additional stress on groundwater resources which serve about 85% of domestic water supply in rural areas, 45% in urban areas, and over 60% of irrigated agriculture. Current overexploitation rates pose threats to livelihoods, food security, climate-driven migration, sustainable poverty reduction and urban development. Significant groundwater depletion in regions where grains are procured for public distribution is also a primary sustainability challenge in India.

Check Your Progress:

1. What is soil erosion and what are the factors affecting it?

6.4 CONCLUSION

Today's level of overpopulation can only be maintained by rapid depletion of Earth's irreplaceable capital-not just mineral resources, but rich agricultural soils, groundwater, and the diversity of other organisms that are working parts of ecosystems. Monitoring the natural capital is important and should be one of the determiners for sustainable development. The natural capital are those elements of the nature that provide valuable goods and services to humans, such as the stock of forests, food, clean air, water, land, minerals, etc.

6.5 QUESTIONS

- Can we achieve the desired level of development without the destruction of the ecosystem?
- What is healthy soil and why is it important for agriculture?
- What is ground water depletion? Why is it so grave in India?

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UNIT III

7

ECO-FEMINISM AND FEMINIST ENVIRONMENTALISM- BINA AGARWAL

Unit Structure

7.0 OBJECTIVES

- To understand the meaning of Eco Feminism
- To learn about Feminist Environmentalism

7.1 INTRODUCTION

One of the crucial topics of today's time is that of the problems of climate change and its impact over the different population. Climate change is going to effect large set of people irrespective of their location, status and age. Hence, discussing about it and knowing different works and ways to solve this problem is very much helpful. Hence, given this background a topic which discusses about the consequences of environmental degradation and marginalization is that of eco feminism and that of feminist environmentalism. Eco feminism is a broader topic and emergence in India is through that of Chipko Movement there are also Scholars like Vandana Shiva who have contributed and worked in this domain about whom we will learn in this chapter. We would also learn about Feminist Environmentalism which is associated with that of Bina Agarwal. Learning about these topics would be useful both from academic view point to learn about different perspectives as well as this if you wish to work in the future with NGOs working on the domain of environment, gender.

7.2 MEANING OF ECO FEMINISM

Ecofeminism, also known as ecological feminism, is a subset of feminism that looks at how women and nature interact. French feminist Françoise d'Eaubonne used ecofeminism in the year 1974. The fundamental feminist ideas of gender equality, revaluing non-patriarchal or nonlinear structures,

and a worldview that respects biological processes, holistic connections, and the value of intuition and cooperation are all used by ecofeminism. Ecofeminism brings a commitment to the environment as well as knowledge of the linkages created between women and nature. This worldview specifically emphasizes how patriarchal (or male-centered) society treats both nature and women. Ecofeminists look at how gender categories affect people in order to show how social conventions unfairly dominate women and nature. Eco-feminism argues a different way of looking at things that view the earth as sacred, acknowledges humans are dependent on nature, and values all life as precious.

Origins of Ecofeminism:

A coalition of academic and professional women organised a number of conferences and workshops in the US throughout the late 1970s and early 1980s, which led to the creation of the current ecofeminist movement. They got together to talk about how feminism and ecology should work together to advance respect for both women and the natural world, and they were inspired by the idea that long-standing historical associations between women and nature. According to ecofeminists, this system leads to an oppressive structure where men have power and through that, they continue to exploit both women and nature. Hence women and nature are related to each other.

Eco Feminism in India:

Vandana Shiva has spoken about the parallels between women and the natural world. She refers to prakriti as a living thing like a woman who has both nature and nuture qualities. She also founded Navdanya, a movement for the preservation of biological and cultural diversity that is Earth-centered, women-centric, and farmer-led. As one Earth Family (Vasudhaiva Kutumbakam), without distinctions between nature and humans and without hierarchies between different species, cultures, genders, races, or religious beliefs, we live and practise the principles of Earth Democracy. More than 150 community seed banks, has preserved extensive seed legacy of nutrient-dense, climate-resilient foods by saving, exchanging, and breeding our indigenous variety through navdhanya. It is also cultivating real live food from Desi living seed in 22 states of India. These food is free from artificial chemicals, colors and helpful for both environment and soil, water, biodiversity and humans.

In India, a movement known as ecofeminism that blends feminist and ecological concerns first appeared in the 1970s and 1980s. The interconnections of gender, caste, class, and the environment are discussed, emphasising the connections between these problems. Indian ecofeminists contend that a patriarchal, capitalist system that prioritises power and profit over social justice and sustainability is to blame for the abuse of women and the environment.

Vandana Shiva notes patriarchal systems of dominance are at the foundation of both environmental destruction and the exploitation of women. The exploitation of natural resources and the marginalisation of

women and other vulnerable groups, in her opinion, are results of this system's emphasis on dominance, control, and extraction. The Chipko movement has also been a famous movement led by females in India. She has also criticised large-scale industrial agriculture and genetic engineering, contending that they aggravate socioeconomic inequality and harm the environment.

Indian ecofeminists have been active in a number of campaigns for social and environmental justice, including those against industrial pollution, opposition to homelessness and land confiscation, and support for sustainable farming and rural lives. They also criticise conventional development paradigms, which they claim are influenced by corporate interests and result in the exclusion and exploitation of women, indigenous peoples, and the environment.

India's unique cultural, social, and environmental circumstances have influenced ecofeminism there. While some ecofeminists criticise the patriarchal elements of these practises, others depend on the traditional ecological knowledge and practises of indigenous people. The legacy of colonialism and globalisation, which have resulted in the exploitation and dispossession of both people and nature, has also had an impact on the movement.

Perspectives in Eco feminism:

As ecofeminism evolved, it experienced several splits. In the late 1980s, ecofeminism divided into two distinct schools of thought: radical ecofeminism and cultural ecofeminism. Radical ecofeminists argue that the dominant patriarchal society uses the association of women and nature to diminish them both. Therefore, radical ecofeminism builds on the idea of early ecofeminists that patriarchal domination must be studied to end the connections between women and nature. These theorists are particularly interested in how women and nature have been linked to negative or commodifiable characteristics, while men have been viewed as capable of creating order. This separation of attributes encourages the exploitation of women and nature for cheap labor and resources.

On the other hand, cultural ecofeminism focuses more on the cultural and symbolic aspects of the relationship between women and nature. This school of thought asserts that women have historically been associated with nature due to their roles as nurturers and caretakers. However, this association has been exploited to justify the domination and oppression of women and the exploitation of nature. Cultural ecofeminists aim to challenge these cultural beliefs and promote a more equitable and sustainable relationship between humans and nature.

Despite the differences between the two schools of thought, both radical and cultural ecofeminism share a commitment to social and environmental justice. They recognize the interconnectedness of gender, race, class, and the environment, and advocate for a holistic approach to social change. By addressing the root causes of social and environmental problems,

ecofeminists aim to create a more just and sustainable world for all beings (Britannica).

Eco feminism and Feminist Environmentalism has one point in common, i.e. it is trying to understand the environment and its interaction with different genders, specially that of the impact of females. Understanding and learning about these topics is very helpful to know about the current issues

Check Your Progress

1. Explain origin of Eco feminism.

2. What is meaning of Eco feminism.

7.3 FEMINIST ENVIRONMENTALISM

Bina Agarwal is a well-known feminist and economist from India who has written extensively on property rights, gender and agriculture, and environmental sustainability. She teaches environmental and development economics at the University of Manchester in the UK and collaborates with an Indian organisation called the Foundation for Ecological Security.

The interaction of gender, poverty, and the environment in rural India has been the focus of Agarwal's study. She disputed the notion that women's lack of land ownership was merely a result of cultural norms in her famous book "A Field of One's Own: Gender and Land Rights in South Asia" (1994) and instead underlined the impact of legal and institutional hurdles. She has also written extensively about the connections between agriculture, sustainable development, and gender. She also points out that women farmers can live a sustainable and equitable life through different agricultural practices.

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The significance of identifying and opposing patriarchal power systems that support gender inequality and environmental degradation is also emphasised by feminist environmentalism. In addition to fighting the marginalisation of other groups like indigenous peoples and people of colour, this also entails opposing the unequal distribution of power and resources between men and women.

The "feminist environmental" approach of Bina Agarwal is grounded in the material world and sees the relationship between women and nature as being shaped by the organisation of production, reproduction, and distribution based on gender and class (caste/race). Women's relationships to the environment are socially and historically changeable, according to Bina Agarwal (1992). Women are both active participants in movements for environmental protection and regeneration as well as victims of environmental degradation, particularly in impoverished rural homes. They interact with the environment in both constructive and destructive ways. It is consequently inappropriate to accept without inquiry the relationship between women and nature, as well as the notion that because women suffer the most from environmental destruction, they are "naturally" inclined to value environmental preservation. It can be seen that it is the females many a times who are victims of environmental degradation yet they are the ones who are also preserving it and even fighting for saving it. The privatization of community resources has also effected the lives of females immensely specially in the developing countries.

For tribal and rural households in India, the forests and village commons provide a variety of necessities like food, fuel, fodder, manure, building materials, medicinal herbs, resin, gum, honey, and so forth. The heightened class-gender effect of environmental degradation has been principally caused by the growing degradation of natural resources, in both quantitative and qualitative terms, and due to the increasing appropriation, the state and by private persons, as well as the loss in communally owned property. This has directly led to lower revenues by reducing the amount of products that women may harvest from forests and village commons. The amount of time available to women for crop production has decreased due to the additional time spent gathering. Due to deforestation, the meagre income that women make from selling firewood is also diminished. This directly affects the diets of families in lower income brackets.

Inadequate "community resource management systems, the increase in population, and the mechanisation of agriculture, has resulted in the erosion of local knowledge systems" (Agarwal 1992) In addition there is class and gender implications of environmental degradation. Women's work has increased as a result of issues like diminishing forests, diminished village commons, a shortage of good drinking water, and others since they must now spend more time and travel farther to gather fuel, fodder, food, and water. Because the wells that are accessible to lower-caste women are drying up or becoming polluted, they are more dependent on upper-caste women to provide them with water. Forest deterioration, historical and present misbehaviour, official regulations, and other factors have made it difficult for villagers to use the woods and village commons.

People in low-income homes have been compelled to switch to less nutrient-dense food, eat half-cooked meals, or even cut back on the number of meals they consume each day due to the drop in the availability of fruits, berries, and other fresh produce as well as firewood. Women and female children receive less attention when it comes to food and medical care as a result of the gender biases that exist within the family. (Rao, 2012:132). Social support networks inside and between communities have been hampered by the eviction of residents due to major dams, extensive deforestation, etc.

Women are negatively impacted, especially those from low-income rural households who rely heavily on these networks for social and economic support. (1980, Sharma). Additionally, it has destroyed an entire way of life, leading to alienation and powerlessness (Fernandes-Menon, 1987). The dominant development paradigms have resulted in the marginalisation and devaluation of indigenous knowledge and skills that women have gained through regular contact with nature. In addition, they are not included in the planning process and are not educated to use the new technologies. The tangible foundation of women's knowledge is eroding as a result of the degradation and privatisation of natural resources.

Agarwal also points out that many a times the females are no where included in the decision process of environment. Neither the contribution of females work in agriculture is acknowledged.

Check Your Progress

1. Which are the perspectives in eco feminism list them?

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2. What concept did Bina Agarwal made on environment.

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7.4 SUMMARY

In this chapter we tried to understand the meaning of Eco feminism. Ecofeminism brings a commitment to the environment as well as knowledge of the linkages created between women and nature. Further, we also learnt about feminist environmentalism with reference to Bina Agarwal. She notes that the females have been further marginalized with more work, and lack of recognition due to the changing environment. She talks about the problems women faced with the climate crisis at day to day lifes. She documents several points which one would have not thought before. According to Agarwal, traditional approaches to environmental policy and development frequently disregard the demands and viewpoints of women and other marginalised groups, which results in social inequity and environmental damage. She supports a more inclusive and participatory approach to development that gives women and other marginalised groups the ability to take part in decision-making and influence environmental policy.

7.5 QUESTIONS

1. Discuss Eco feminism in India
2. Explain in brief the discussion on Feminist Environmentalism
3. Discuss the perspective in eco feminism.

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8

NEW ENVIRONMENTAL MOVEMENTS: SAVE GANGA MOVEMENT, SILENT VALLEY MOVEMENT, WARLI MOVEMENT

Unit Structure

8.0 OBJECTIVES

- To understand the significance of new environmental movements
- To familiarize students with some of the new environmental movements in India

8.1 INTRODUCTION

The contemporary environmental movement arose primarily from concerns in the late 19th century about the protection of the countryside in Europe and the wilderness in the United States and the health consequences of pollution during the Industrial Revolution. Environmental organizations established from the late 19th to the mid-20th century were primarily middle-class lobbying groups concerned with nature conservation, wildlife protection, and the pollution that arose from industrial development and urbanization. There were also scientific organizations concerned with natural history and with biological aspects of conservation efforts.

Beginning in the 1960s, the various philosophical strands of environmentalism were given political expression through the establishment of “green” political movements in the form of activist nongovernmental organizations and environmentalist political parties. Despite the diversity of the environmental movement, four pillars provided a unifying theme to the broad goals of political ecology: protection of the environment, grassroots democracy, social justice, and

nonviolence. By the late 1980s environmentalism had become a global as well as a national political force.

The changing nature of public debate on the environment was reflected also in the organization of the 1992 United Nations Conference on Environment and Development (the Earth Summit) in Rio de Janeiro, Brazil, which was attended by some 180 countries and various business groups, nongovernmental organizations, and the media. In the 21st century the environmental movement has combined the traditional concerns of conservation, preservation, and pollution with more contemporary concerns with the environmental consequences of economic practices as diverse as tourism, trade, financial investment, and the conduct of war. Environmentalists have intensified the trends of the late 20th century, during which some environmental groups increasingly worked in coalition not just with other emancipatory organizations, such as human rights and indigenous-peoples groups, but also with corporations and other businesses.

8.2 NEW ENVIRONMENTAL MOVEMENTS

Across the region and the world, civil society movements are becoming stronger and ensuring their voices are heard in important decision-making spaces. India has witnessed a plethora of social movements— those that meant to fight for our freedom, those to bring about change in the face of caste discrimination, protests corruption and the ones that highlight the safety of women. Many have been successful, while others continue with people fighting for their rights. Amid this all, India has also hosted a fair share of environmental movements, wherein people have been determined to protect the flora and fauna around them. The Chipko Movement, Save Silent Valley Movement, and Narmada Bachao Aandolan are among various others that shaped the future of environmental movements in the country. Every single movement, whether it gained remarkable attention or was a valiant attempt, has shown that there are people willing to fight for India's nature and wildlife.

The Chipko movement of the early 1970s was a non-violent and silent protest led by the rural women in Uttarakhand. Their mission was to fight against the merciless cutting down of trees for commercial purposes. The Chipko movement kick-started many environmental movements in India. Further down south, in the Palakkad district of Kerala, an environmental movement by the name of Save Silent Valley Movement unfolded as the Planning Commission approved the building of a dam across the Kunthipuzha River in 1973. The Silent Valley is a moist, evergreen forest that is home to various rare birds, reptiles and mammals. The Kerala People's Science Movement, a group of school teachers and locals who aimed at spreading environmental conservation awareness, brought to light the fact that this dam would only minutely impact the development of the region, and would lead to the loss of various species that thrive there. They questioned if the sacrifice of thousands of years of evolution was worth the minimal benefits it would bring.

The increasing number of environmental movements owes itself to the spread of education. At a global level, some events contributed greatly to environmental awareness, such as the report of the Brundtland Commission titled 'Our Common Future' and the United Nations Conference on Environment and Development, also known as Earth Summit 1992. These put forth the topic of the environment in a space that had been purely political, and even brought it to mainstream conversation.

Nowadays, voices of the youth and tribal activists are challenging policy decisions that threaten our environment. Greta Thunberg is arguably one of the most well-known child activists, who started a movement at the age of 15 by protesting outside the Swedish parliament every Friday to initiate climate action. Soon, various other students joined in to organize a climate strike movement called "Fridays for Future". This youth movement has now spread across more than 120 countries. Major reasons of the emergence of environmental movements in India include reasons such as i) control over natural resources, ii) false developmental policies of the government, iii) socioeconomic reasons, iv) environmental degradation/ destruction and, v) spread of environmental awareness and media.

Check Your Progress:

1. What are new environmental movements?

8.3 SAVE GANGA MOVEMENT

Ganga symbolizes all rivers, water bodies and aquatic life. The Ganga River is both incredibly sacred and exceedingly polluted. A lifeline to hundreds of millions of Hindus and worshipped as a god, the sacred river is ecologically dead in stretches over 600 kilometres, and the receptacle of tonnes of human and industrial waste. The government has been assuring that work is being done to reduce pollution in the Ganga and that several projects have been completed. Indeed, the Namami Gange Project—announced in 2014—spent around US$460 million in two years in various efforts to clean the Ganga.

Main Points of Save Ganga Movement:

1. The Ganga must be constitutionally declared as the National River with statutory provisions that ensure due respect and protection to her.
2. An adequate flow of clean water must be allowed to flow on the Ganga bed and the Yamuna bed throughout the stretch of the rivers throughout the year not only to protect and preserve their ecology but also to meet the basic water needs of the cities, towns and villages situated on their banks.

3. Since our rivers are the source of drinking water for crores of our common people and also for the animals and STPs cannot convert sewage into potable water, we must adopt throughout the country the following policy of zero discharge: (A) In place of the present policy of allowing treated sewage into our rivers, we must adopt the policy of zero discharge into the river, and promote Reuse and Recycle of wastewater after proper treatment (tertiary–level treatment); (B) Industrial effluents, hospital wastes, treated or untreated, must never be allowed to enter into the rivers and must not also be allowed to mix with the sewage, and (C) Organic/natural farming should be promoted in a massive way for decreasing the non-point sources of pollution of rivers such as hazardous chemicals from agricultural run-off into the rivers, and also for maintaining soil fertility, checking the groundwater degradation, reducing water requirement of crops, producing health-friendly food, etc.

4. The highly earthquake-prone, eco-fragile and ecologically, aesthetically and religiously invaluable Uttarakhand region of the Ganga Basin must be declared "Ecologically Fragile, a Sanctuary for Himalayan Flora and Fauna" and also "our national Spiritual Heritage Zone", and its rivers "wild rivers".

5. Dependence on rivers for irrigation could be substantially reduced by making our villages self-dependent as far as possible for their water needs through storing rainwater in traditional ways in tanks, ponds, etc. and rejuvenating/preserving/creating wetlands, grasslands, forests wherever possible which would function as natural water tanks.

6. Eco-hostile river-front development activities in the name of beautification of river-fronts must not be allowed. Construction of permanent structures for residential, commercial, or industrial purposes in the active flood plains of a river must be prohibited throughout the country.

Check Your Progress:

1. What is Save Ganga Movement?

8.4 SILENT VALLEY MOVEMENT

Silent Valley in Kerala has a rich 89 sq. km biological treasure drove in the vast expanse of tropical virgin forests on the green rolling hills. In 1980s, a 200 MW hydroelectric dam on the crystal-clear river Kunthipuzha under the Kundremukh project was to come up. The proposed project was not ecologically viable, as it would drown a chunk

of the valuable rainforest of the valley and threaten the life of a host of endangered species of both flora and fauna.

The Kerala Sastra Sahitya Parishad (KSSP) an NGO, was working for three decades among masses of Kerala for growing environmental awareness. The campaign to save Silent Valley turned out to be a public education programme in many respects. The movement in many ways saves the ecosystem of Silent Valley area. The central issue of the Silent Valley protests included: The protection of the tropical rainforest, maintenance of the ecological balance. The campaigns and petitions were the main strategies adopted by the activists in the movement, basing it on the non-violent, Gandhian ideological orientation, the protest the destruction of forest, an opposition to ecologically unsustainable development, and above all, maintenance of the ecological balance.

Check Your Progress:

1. Why did Silent Valley Movement start?

8.5 WARLI MOVEMENT

The most substantive documentation of women's role in Indian peasant struggles only occurred after the launch of three major communist struggles, namely the Telangana Armed Struggle in undivided Andhra Pradesh on the southeastern coast, the Tebhaga Movement in undivided Bengal in the eastern part, and the Warli struggle in Maharashtra of Western India. While the Telangana and Warli struggles were mobilizations against slavery, forced labor, and landlordism, the Tebhaga movement focused on the rights of sharecroppers and cultivators.

The provisioning of wives for sexual pleasures of the landlord was often a way of paying off the 'debts' that had been taken from the landlord by the family. Godavari Parulekar was one of the most significant leaders of the Warli movement. At present, there is no memorial at the banyan tree around which the Warli Adivasi Revolt of 1945 began in Talasari taluka's Zari village. Nearly 5,000 indentured tribals who gathered here from Thane, Vikramgad, Dahanu and Palghar had refused to work on landlords' fields until they received 12 annas a day in wages, their resistance sowing the first seeds of rights-based movements among the region's indigenous communities.

There was sheer economic exploitation, sexual oppression, and bondage by the landlord-moneylender-trader class that the Adivasis referred to as seth-saukar. By the 1940s, most of the region's Adivasis, who had been small cultivators and food gatherers at a low level of subsistence but

independent, had been reduced to the position of tenants and agricultural labourers. They were bonded to the seth-saukar in one way or the other. This was the result of the commercialization of agriculture and the implementation of forest laws by the British government after 1818.

The restriction of rights to the forest produces and the extraction of forced labour for little or no wages created the conditions for them to be completely dependent on the seth-saukar for survival. Physical violence, humiliation and fear were the weapons used to silence the Adivasis. Many Tribals pledged their labour to the seth in return for a small loan of either grain or cash. The meagre amount paid to the lagnagadis and the dishonesty of the landlords made it impossible, in most cases, for the debtors to repay their loans and free themselves from bondage. The lagnagadi's wife and children naturally became the slaves of the seth.

The Kisan Sabha and political organizations like Kashtakari Sanghatana and several others continue to organize Adivasis around issues of land, forest, wages, with varying degrees of success. The restoration of forest rights to Adivasis by Forest Act of 2006 has been a major achievement of these organizations in recent times.

Besides this, The Save Aarey Movement has been fighting the good fight for forest conservation for over 10 years now. The Aarey forest, located in the Northern suburbs of Mumbai, is the only green cover in the region. It is known for its diverse flora and fauna. Aarey is home to, members of the Warli tribe, who have been living in 27 hamlets for generations. Naturally, they have a staunch opinion against the construction of the Metro shed.

In May 2019, these residents of Aarey hit the streets demanding rights to their traditional land, access to facilities and the implementation of Forest Rights Act 2006. Around 500 Adivasis were present at the protest where they expressed their stand using traditional songs, dancing, and placards.

8.6 SUMMARY

The contemporary environmental movement arose primarily from concerns in the late 19th century about the protection of the countryside in Europe and the wilderness in the United States and the health consequences of pollution during the Industrial Revolution. Environmental organizations established from the late 19th to the mid-20th century were primarily middle-class lobbying groups concerned with nature conservation, wildlife protection, and the pollution that arose from industrial development and urbanization. There were also scientific organizations concerned with natural history and with biological aspects of conservation efforts.

The environmental movements in India continue to gather momentum as there are continuous threats to the environment and local, indigenous populations whose livelihoods depend upon these.

8.6 QUESTIONS

1. What are the main points of Save Ganga Movement?
2. What was the strategy of the Silent Valley Movement?
3. What was background of Warli revolt?
4. What do these environmental

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9

NIYAMGIRI AND THE FOREST RIGHTS ACT

Unit Structure

9.0 OBJECTIVES

- To understand the forests rights of the indigenous people
- To familiarize students with successful protests of tribes such as Niyamgiri

9.1 INTRODUCTION

India is witness to a highly diverse tribal population. Each tribe has its own character and nature, consequently requiring a different treatment. For example, the life and circumstances of indigenous people in central India or western India are in contrast with the condition of tribes in northeast India and the Andamans. The Constitution of India seeks to protect tribal interests, especially their autonomy and rights over their land. It provides a comprehensive scheme with directions to protect the indigenous groups from exploitation and to secure their rights over their land. Most of the indigenous groups in India are collectively referred to as Scheduled Tribes and are guaranteed a right to self-determination under the Indian Constitution.

The Scheduled Tribes in India have been amongst the most marginalised and deprived population. To protect and conserve the land rights of Scheduled Tribes in India, numerous rights have been vested in them by way of this new laws. Rights for the Scheduled Tribes and other indigenous groups are not limited to their land rights and extend to other constitutional guarantees like that of reservation, prevention of discrimination and atrocities, etc. However, forest dwelling tribals were substantially exploited in post-independence India, and their cause has often been overlooked due to their lack of association with modern day society.

Consequently, it was crucial to provide such tribes with additional protection to sustain their lives in their habitat and without the risk of facing exploitation by the administration or private individuals. The Forest Rights Act serves as a crucial measure to keep checks and balances on treatment of such groups and to secure their entitlement over their land and the resources therein. The Act is administered by Gram Sabha on the village level, thereby ensuring a smooth and accessible protection regime for their day-to-day sustenance and livelihood.

9.2 NIYAMGIRI MOVEMENT: BACKGROUND AND COURSE

The Niyamgiri Movement is a grassroots people's movement against exploitative corporation. It is a tale of resistance against neo-colonialism, nation-building, cultural discrimination, and environmental racism. For centuries, the Niyamgiri Mountains have been the home of the Dongria Kondh tribe. They are a small community of about 8000 Adivasis, residing in the Eastern Ghats of the Indian state of Odisha. Their symbiotic relationship with nature involves sustainable agriculture and traditional systems of kinship. However, state-industry nexus threatened this peaceful fabric of existence.

The Niyamgiri hills, situated in the state of Odisha, are rich in bauxite. In 2003, the Government of Odisha signed a Memorandum of Understanding (MoU) with Vedanta Aluminum Limited (VAL). For the state's industrial growth, an alumina refinery and a bauxite mining plant held enormous profits. On the other hand, the project endangered the livelihood and habitat of the Dongria Kondh tribe. Thus, the guise of development displaced tribals and destroyed environment.

The tribals worship Orissa's bauxite-capped mountains as their lives are dependent on the forest produce. Environmentally diverse and mineral-rich areas have always been a target for industrial capitalists. According to neo-colonialists, these bauxite-capped mountains are unutilized resources.

Tribal lands like Niyamgiri, are portrayed by the mainstream as places of "stark poverty." They are time and again misrepresented as jungles that must be developed by the encroachment of industries. Their resources, lands, even their culture and religion are being controlled by exploiters. The Niyamgiri hills have a reserve of 73 lakh tons of bauxite. In order to manufacture consent, Vedanta's mining project claimed to have "zero harm". Bauxite refining produces 'red mud', a toxic solid waste that is indisposable. Additionally, mining renders the water reserves dry, as sponge-like properties of bauxite help in water-retention.

The Movement was a revolt against cutting down of trees and destruction of forests. Their protest was to protect wildlife and their natural habitat. They fought against a corporate giant that wanted to have their mountains mined for minerals, leaving this ecological haven dry and infertile. For Adivasis, the mountains are the source of life, nourishment, and fertility. The Dongria Kondh's religious and cultural tenets follow sustainable

living and self-sufficiency. Their religion is based on respect for nature and their supreme deity, the 'Niyam Raja.'

Check Your Progress:

1. Write a note on the Niyamgiri movement.

9.3 THE FOREST RIGHTS ACT (FRA), 2006

The Forest Rights Act (FRA), 2006 recognizes the rights of the forest dwelling tribal communities and other traditional forest dwellers to forest resources, on which these communities were dependent for a variety of needs, including livelihood, habitation, and other socio-cultural needs. The forest management policies, including the Acts, Rules and Forest Policies of Participatory Forest Management policies in both colonial and post-colonial India, did not, till the enactment of this Act, recognize the symbiotic relationship of the STs with the forests, reflected in their dependence on the forest as well as in their traditional wisdom regarding conservation of the forests.

The Act encompasses Rights of Self-cultivation and Habitation which are usually regarded as Individual rights; and Community Rights as Grazing, Fishing and access to Water bodies in forests, Habitat Rights for PVTGs, Traditional Seasonal Resource access of Nomadic and Pastoral community, access to biodiversity, community right to intellectual property and traditional knowledge, recognition of traditional customary rights and right to protect, regenerate or conserve or manage any community forest resource for sustainable use. It also provides rights to allocation of forest land for developmental purposes to fulfil basic infrastructural needs of the community. In conjunction with the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Settlement Act, 2013 FRA protects the tribal population from eviction without rehabilitation and settlement.

The Act further enjoins upon the Gram Sabha and rights holders the responsibility of conservation and protection of bio-diversity, wildlife, forests, adjoining catchment areas, water sources and other ecologically sensitive areas as well as to stop any destructive practices affecting these resources or cultural and natural heritage of the tribals. The Gram Sabha is also a highly empowered body under the Act, enabling the tribal population to have a decisive say in the determination of local policies and schemes impacting them.

Thus, the Act empowers the forest dwellers to access and use the forest resources in the manner that they were traditionally accustomed, to

protect, conserve and manage forests, protect forest dwellers from unlawful evictions and provides for basic development facilities for the community of forest dwellers to access facilities of education, health, nutrition, infrastructure etc. The rejection of forest clearance for mining Niyamgiri is indeed a historic decision. It has vindicated the historical injustice done, in this case to Dongria and Kutia Kondh tribal communities, due to the non-recognition of their forest rights on ancestral lands and their habitat in the consolidation of state forests stated in the preamble of the Forest Rights Act (FRA), 2006.

Check Your Progress

1. What is FRA, 2006?

9.4 SIGNIFICANCE OF FRA, 2006 FOR NIYAMGIRI

The following objectives of the FRA were found relevant to the Niyamgiri case:

First, it recognizes that forest dwellers have got labeled as encroachers in their own ancestral lands; and this denial of their customary rights was an act of historical injustice. The Act therefore is a corrective measure that recognizes (NOT settles) pre-existing rights. As a result, it is applicable in retrospect.

Second, despite the massive misinformation campaign that the FRA would privatize tribal community lands through distribution to individuals, at least 8 out of the 13 listed rights are community rights. It is the non-recognition of the Dongaria and Kutia Kondhs' habitat and community forest rights which saved Niyamgiri from destruction. As Jairam Ramesh's order on Vedanta states, "Simply because they did not live on the hills does not mean they have no rights there. The Forest Rights Act specifically provides for such rights but these were not recognized and sought to be denied". It is for the first time that the economic, religious and cultural rights of local communities have been used as a basis for rejecting forest clearance.

Third, the Act authorizes the transparent forum of the village assembly (Gram Sabha) to receive, verify and recommend claims for forest rights. Section 5 of the Act also empowers the holders of any forest rights and their gram sabhas to protect wildlife, forests and biodiversity and their habitat from any form of destructive practices affecting their cultural and natural heritage.

Fourth, the Act provides that no claimant shall be evicted or removed from forest land till the recognition and verification procedure is complete.

It is these provisions of the FRA which, for the first time, now bind MoEF and the Forest Advisory Committee to ensure the following before granting permission for diversion of forest land for non-forest activities:

1. The process of recognition of forest rights is complete in the area concerned
2. The concerned forest dwellers have given their consent to such diversion
3. The completion of the process and the grant of consent are certified by the gram sabhas concerned.

In terms of land tenure security, forest dwellers in India, who own and manage less than 3% of forested land nationwide, are among the worst off in the world. Vulnerable to forced eviction at any point, they stand at risk of losing their homes and means of survival with little legal redress. The Forest Rights Act of 2006, an attempt to increase their security, recognizes both individual and community land claims and mandates a uniform process for granting legal title. Greater recognition of forest rights, however, implicates the interests of powerful extractive industries also seeking control over forest land. In the *Niyamgiri* case, the Indian Supreme Court defended an indigenous claim against a multinational corporation by tying cultural rights to land. This reasoning pushed Indian jurisprudence closer to developing international law on indigenous land rights, particularly that of the Interamerican system, which can offer guidance for building on this precedent.

Check Your Progress:

1. Explain the significance of FRA, 2006 for the Niyamgiri tribes.

9.5 SUMMARY

The decade long struggle of the Dongria Kondh, a small adivasi1 community of about 8000 people who reside in the Eastern Ghats of Odisha, India has been held as an organic, grassroots resistance movement, of a people and their way of life pitted against a model of exploitative development in the form of a major multi-national extractive corporation. There is no doubt that the current demand for industrial growth and development, based primarily on the extraction of minerals, water and forest resources is obliterating indigenous communities and their habitats.

9.6 QUESTIONS

1. How are tribal habitat and natural resources meant for development interconnected?
2. How are tribes of the Niyamgiri hills unique in their own ways?
3. Can acts like FRA, 2006 make inclusiveness possible? Explain.

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UNIT IV

10

SAVE AAREY CAMPAIGN

Unit Structure

10.0 OBJECTIVES

- To understand the importance of forests for cities
- To familiarize students with context and nature of Save Aarey Movement

10.1 INTRODUCTION

According to the latest report by India State of Forest report 2019, 25% of land area of India is under forest cover, however, a rapid decrease was observed in the forest cover of northeast region of India. Multiple studies and researches show that the actual forest cover of India is decreasing contrary to government claims. Forest Survey of India report claims that there has been a significant increase in the forest cover of India from 2015 to 2017 however the survey includes plantations that are very different from natural forests and therefore should not be included. Natural forest covers include a diversity of flora and fauna are which is essential for maintaining the ecosystem which is not the case in plantations.

A report published in 2017 by a team of scientists from University of Hyderabad, JNU and Indian Institute of Meteorology, studied land-use changes across the Eastern Ghats, over a period of 95 years and found that there was 15% reduction in forest cover because of activities like mining, agriculture, and urbanization. This loss of forest resulted in habitat loss for a variety of species of plants and animals and even pushed some rare species to extinction. The decline in forest cover affects global CO2 concentrations leading to more warming as CO2 traps the sun's radiation and does not allow it to escape. Deforestation can result in watersheds that are no longer able to sustain and regulate water flows from rivers to steams making them vulnerable to erosion. Erosion will cause siltation in downstream areas which will result in flooding. Trees are highly effective

in absorbing water quantities, keeping the amount of water in watersheds to a manageable level.

The World Health Organization states that the traditional people, almost 80% of them, rely on the local biodiversity for their sustenance. In India, more than a fifth of the population and especially the forest-dwelling communities, depend on forests for food and livelihoods. These people already suffer from limited access to health and educational services and benefit little from the government's economic development programs. Destroying forests has devastating consequences for them.

Over a period, there has been an increase in civil society action on the environmental impacts of its current model of urbanization, demanding political accountability, cleaner air, a reduction in deforestation, and protection of the coast and waterways. Campaigns such as "Let me Breathe" and "Save the Aarey" forest have drawn attention to air pollution and forest restoration, and have gained momentum following the state's felling of trees in the ecologically sensitive Aarey forest to make way for metro rail parking. The Aarey forest is the one of the last remaining substantial green spaces in Mumbai

10.2 AAREY AND THE MUMBAI METRO RAIL CORPORATION LIMITED (MMRCL)

The 1200 Ha Aarey Milk Colony is a biodiversity hub and a catchment area for the Mithi River that flows through the city of Mumbai. The Aarey forest is home to around 10,000 tribals - some of whom have already lost their homes, their lands, and their livelihoods due to increasing encroachment by the State on forest land. The ones who have not been displaced already are under pressure to move into the SRA buildings or move out of the forest entirely.

The Mumbai Metro Rail Corporation Limited (MMRCL) wanted to locate its metro car shed within the forest. They had demanded the denotification of 165 Ha of forest land for this purpose. Despite citizens' outrage and the availability of 7 other alternate locations, the government of Maharashtra seemed adamant on locating its car shed here. There have been allegations that the zoning of Aarey forest (From NDZ to Commercial) in the new Development Plan has been changed to benefit the builder lobbies in the city. The government has further denied in open court that Aarey is a forest even though government records clearly show the land having been declared as a forest as far back as 1969.

Aarey Colony is located adjacent to the Sanjay Gandhi National Park, the only national park in the world within the city limits of a metropolis. Not only is this forest rich in biodiversity, but it is also home to the Adivasi community who have been living here for generations. This community has borne the brunt of development projects which ended up displacing them and packing them into matchbox-sized, inconvenient Slum Rehabilitation Authority buildings. First came the Aarey Dairy, established in the 1950s- it eventually ran into losses. Subsequently, parts

of the land were given to the State Reserve Police Force (SRPF), Force One (Mumbai Police) and Film City, among others, leading to the division of forest land into smaller fragments. The latest in this series of onslaughts is the Metro car- shed project.

Check Your Progress:

1. Write a brief note on Aarey forest.

10.3 PROTESTS SINCE 2019

In 2019, the BJP led Maharashtra government had planned to build the car shed by cutting down the Aarey Forest, the final decision was then taken by the Tree Authority which falls under the ambit of the Brihan Mumbai Municipal Corporation (BMC). The tree authority said in its statement that out of the 4 lakh trees in Aarey forest, around 2,400 would be cut and 3 times of the deforested trees would be planted at some other location. While the decision seemed to be a legitimate one, controversy arose when certain environmentalists, who were a part of the tree authority's meeting to make such a decision, claimed foul play saying that their vote of 'yes' to such a decision in the meeting was deliberately misconstrued.

Many environmental activists and local people moved to court challenging the Tree Authority's decision, however the Bombay High Court dismissed the pleas of the petitioners and within 24 hours of the decision, the Mumbai Metro Rail Corporation Limited which is executing the project, fell 2000 trees in the forest of Aarey. This sparked a widespread protest in several parts of Mumbai, under the banner of the 'Save Aarey Campaign.' The Fadnavis Government had to invoke Section 144 of the Code of Criminal Procedure (CRPC) and certain protestors were also arrested, who were later released on bail.

As soon as Uddhav Thackeray assumed office post being elected as CM in 2019, he ordered for the scrapping of the Aarey project and said that the shed would be constructed at the salt pan land at Kanjurmarg instead. As of the present situation, the very first decision taken by Devendra Fadnavis, after being newly elected as the Deputy Chief Minister of Maharashtra, in the Eknath Shinde government, was to order the government's legal team to inform the Bombay High Court that the state would relocate the building of the metro car shed to Aarey Colony, resulting in a protest by several environmental as well as political activists, including the party workers of AAP and the Shiv Sena.

The battle to save Mumbai's green lungs had grown into one of the most prominent environmental campaigns in urban India in recent times. The

movement saw the involvement of city dwellers, environmentalists, students and even political parties. After the Bombay High Court dismissed several petitions, Brihanmumbai Municipal Corporation (BMC) authorities, in an inexplicable haste, started felling trees on the night of 4 October. This was countered by strong protests during which officials of the Mumbai Police lathi-charged protestors and detained many of them for several hours in various police stations across Mumbai over the weekend. The protestors were charged with serious sections of the IPC such as Sections 353, 332, 143, 149, etc.

Check Your Progress:

1. What is the Save Aarey Movement?

10.4 SUMMARY

Forests are essential for life on earth. Three hundred million people worldwide live in forests and 1.6 billion depend on them for their livelihoods. Forests also provide habitat for a vast array of plants and animals, many of which are still undiscovered. Forests are so much more than a collection of trees. Forests are home to 80% of the world's terrestrial biodiversity. These ecosystems are complex webs of organisms that include plants, animals, fungi and bacteria. Forests take many forms, depending on their latitude, local soil, rainfall and prevailing temperatures.

Forests also play a critical role in mitigating climate change because they act as a carbon sink- soaking up carbon dioxide and other greenhouse gases that would otherwise be free in the atmosphere and contribute to ongoing changes in climate patterns. But forests are being destroyed and degraded at alarming rates. Deforestation comes in many forms, including fires, clear-cutting for agriculture, ranching and development, unsustainable logging for timber, and degradation due to climate change. This impacts people's livelihoods and threatens a wide range of plant and animal species.

A report by the World Health Organization (WHO) suggested that air pollution can affect people's health. While the air purifier cannot reach every house, the oxygen delivered by the trees does. The forests of Aarey are known as the 'lungs' of Mumbai. Therefore, cutting down these trees only means depriving Mumbai of an important organ which is protecting it from increasing air pollution.

10.5 QUESTIONS

1. Why are forests important for ecology? Give the extent of deforestation in the world.
2. Explain the correlation between deforestation and development.
3. Why did Save Aarey Movement start?

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11

PROTEST AGAINST NEW DEVELOPMENT PLAN FOR MUMBAI AND PRIVATIZATION OF OPEN SPACES

Unit Structure

11.0. OBJECTIVES

- To understand the concept of Development Plan (DP)
- To familiarize students with the impact of DP on the open spaces through privatization

11.1 INTRODUCTION

Open space is a space within an urban environment which is readily available to the community regardless of its size, design or physical features and which is primarily intended for amenities and physical recreation, whether active or passive. Open spaces cover a broad range of sizes and types of areas from small pockets of parks, children's play areas, urban squares, sports fields to extensive green areas. The evidence indicates that these fulfil a range of functions in respect to physical activity, from active sports to passive seating, picnicking and as a venue for socializing for a range of age groups.

The connection between public spaces and the provision of free, accessible, open green space – in terms of above-mentioned open spaces, particularly in towns and cities – is obvious to most people. However, awareness in these connections have been muted if not entirely suppressed in terms of the public policy agenda, disguised as Development Plans and policy guidelines for several decades. Recent decades have seen a gradual development from industrial society's necessary public life to the optional public life of a leisure and consumer society. Where city life was once a necessity and taken for granted, today it is to a high degree optional. For that very reason, this period has also seen a transition from a time when the "quantity" of city's open space did not play much of a role in its use, to a new situation where its "quality" is a crucial parameter.

It is within the context of this understanding of public spaces, that we will attempt to understand the New Development Plan (DP) and the protests that followed.

11.2 THE NEW DEVELOPMENT PLAN: 2014-2034

On 24 February 2015, the draft of the 2014–2034 Development Plan for Mumbai (MDP 2034) was released for public consultation. An unprecedented public outcry and a deluge of complaints (over 78,000 objections raised), both by experts and civil society, pushed the then Maharashtra's chief minister, on 21 April, to scrap the plan and order a four-month overhaul and screening of all objections to be undertaken by a newly constituted Review Committee appointed by the State government. This event is highly representative of the tensions and conflicts pervading the development and regulation of contemporary cities. Throughout the various street-level and professional mobilizations, formal and informal consultations, press articles or yet civil society publications, urban planning temporarily became a "public problem".

The controversy around the plan did not appear suddenly on 24 February; it is rooted in a much broader process involving various arenas and political moments. While several threads led to initiate the process of producing a new DP, 20 October 2008 could be understood as the official starting date. With Resolution No.767, the MCGM formally declared its intention to revise the development plan of Mumbai for the third time since independence. The declaration of intent to prepare the MDP was made in accordance with the MRTP Act, 1966, which stipulates that a development plan is prepared and revised every twenty years. As the 1991 DP was sanctioned in parts and its last part came into force in 1994, the revised DP would require to be submitted by 2014. Although October 2008 marked the actual start of the process of drafting the MDP 2014–2034, this event went largely unnoticed by the general public. Indeed, at that time there was no mobilization from local organizations that would articulate needs and priorities or that seek to take part in planning. Most of the population was completely unaware of the existence of a development plan.

In the past, Mumbai had witnessed very tardy implementation of green space reservations in the Development Plans (DP) of 1964 and 1991.

Check Your Progress:

1. What was the New DP, 2034?

11.3 PROTESTS AGAINST THE NEW DEVELOPMENT PLAN

One of the major political catalysts of the mobilization against the MDP was the "Our Mumbai Campaign" (HSMA), assembling dozens of grassroots associations in order to produce an alternative vision of the city development. The use of the common and possessive idea of "Our Mumbai" is a potent illustration of the political stakes in urban planning. Indeed, the challenge here is not to secure an ordered city, delivering various qualities, but also to express whose city it is and what common order is produced.

Several NGOs and citizens' groups wrote to the Chief Minister to put a stop to the commercial and discriminatory use of public open spaces and urged the government to come out with an open space policy for the city. Nagar, a leading NGO for open spaces, proposed a plan of action for restoring, managing, and maintaining all spaces to ensure that they are accessible to all and not compromised by construction. The opposition by the people to the proposals in the DP, including the reduction of open space standards, was so strong that Government of Maharashtra was compelled to scrap the draft plan. The team doing the plan was disbanded and a new team was put in place to freshly craft a new development plan. The redone plan respected the citizen's voice, retained the standards, and sought to improve upon them. Additionally, it forbade any construction within parks and gardens, except very basic amenities such as toilets. The observance of complete permeability and no concretization was built into the city development control rules.

Check Your Progress:

1. Why did the civil society protest against the New DP, 2034?

11.4 PRIVATIZATION OF OPEN SPACES

A public space will validate itself as one only when it is open-to-all, free from coercive forces, neutral in its territory and which is inclusive and pluralist (accepting and accommodating differences) to people from all walks of life. Public space is symbolic and representative of the collective and of sociability rather than individuality and privacy. Therefore, it is important to introduce sites that offer universal access and a chance to prevail and grow sociability without any exclusive policy.

In the last 20 years, public spaces have acquired a renewal visibility in the Indian urban planning and designing world. Briefly put, the general opinion is that public spaces are an essential ingredient to the

sustainability of cities for political, social, economic, public health and bio-diversity reasons. However, the dominating trend observed by many is one of shrinking rather than expanding. By conventional standards, Mumbai has, perhaps, the least amount of open space per person with 0.9 sq. m per person including open spaces like parks, gardens etc. as opposed to 2 sq. m per person. Out of a total of 4,355 sq. km area of Mumbai, only 6% is open spaces and out of which only 10% is accessible to general public.

Few years ago, the state of Maharashtra, decided to build fifty flyovers (road over bridges flying over congested junctions) at different points in the Mumbai city. This was ten times as many built in the previous fifty years and they were meant to be completed in five years. This project costing the equivalent of 300 million dollars, conceived as a major contribution to the transportation needs of a fast-growing city, was wrongheaded for many reasons, especially in a cash strapped state. The main problem, of course, was that it encouraged private automobile ownership in a city where the majority commuted using a robust but unduly stretched public transport system. However, of greater interest here is what the flyovers did to the configuration of the city's system of public space, as well as to the unacknowledged impact it had on many private spaces that happened to line the arterial roads.

This event revealed very clearly that in the matter of control over public space, in fact of ownership of it, when the state is determined, any conflict of interest with the public (or significant parts of it) is really a mismatch. The public almost does not have a chance in deciding the fate of what nominally is its space. In recent times, new citizens' groups from the middle and upper classes of society have emerged in the city, effectively laying claim to public space as their space, and insisting on the removal of all those who would occupy it for functions which urban traditions in India have sanctioned but the law has not. This has usually meant the removal of the marginalized who, lacking access to expensive private spaces, need to use public space for private activities of dwelling, production, and economic exchange.

Thus, the argument against the street vendors, or hawkers, is that they encroach on public space for conducting private business. In essence, they are criticized for blocking access to public space, while pursuing private ends. Strangely, however, when public open spaces in the city are cordoned off to develop joggers' parks or ticketed gardens, the quiet exclusion of large numbers of the underprivileged from these spaces is not seen to be a cornering of public spaces for inadequately public purposes. This "privatization" of entire public gardens ¯where they become the preserve of those who can afford visiting them¯ is seen as a reasonable step by the state and the elite, even when it does not serve a life-and-death purpose. On the other hand, the ephemeral occupation of small bits of pavements by hawkers who have only that space for earning their livelihood even as they provide a genuine service to the city at large, is considered deeply objectionable.

Check Your Progress:

1. Explain the meaning of 'privatization of open spaces'.

11.5 SUMMARY

Public space has always been first and foremost, the object of conflict over claims to its control and over the rights of occupation. These conflicts usually are about: a) what uses and activities are acceptable in public space; b) who (that is which sector of the "public") has the greater right of occupation over different public spaces; c) who should control, or make decisions about (and on what basis) the fate of public spaces and access to them.

Evidently, it is believed that some members of the public have a greater right to occupy public space for private ends than others. This has obvious implications for the imagination of citizenship. Thus, the circle is completed with the conflict over physical space, resulting in a political conflict over the definition of citizenship as well as of the rights of the private individual vis-à-vis public goods.

11.6 QUESTIONS

1. Why are open spaces important for everyone?
2. How does privatization of open spaces affect everyone's right to city?

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12

NEW AIRPORT AT NAVI MUMBAI

Unit Structure

12.0. OBJECTIVES

- To know about the Navi Mumbai International Airport
- To familiarize students with the environmental impact of the new airport

12.1 INTRODUCTION

The Navi Mumbai International Airport, now known as DB Patil Navi Mumbai International Airport is an under-construction project developed by the Navi Mumbai International Airport Limited (NMIAL). The mega project is planned in four phases to handle over 60 million passengers annually. India's Prime Minister Narendra Modi laid the foundation stone of the long overdue Greenfield project, Navi Mumbai International Airport on February 18, 2018. As of early 2021, site preparation involving hill levelling and diversion works for Ulwe River were executed after several challenges. The project site is located east of Mumbai, about 18 km from Ulwe and Panvel in Raigad District. It will be linked to the existing Chhatrapati Shivaji Maharaj International Airport via the 767 km-long Mumbai-Hyderabad High-Speed Rail Line, which is currently under construction.

Adani Group, the developer and operator of the Navi Mumbai International Airport, has selected ADB Safegate to implement Airfield 4.0 technology through the EPC (Engineering, Procurement, and Construction) contractor Larsen and Toubro. ADB Safegate provides integrated solutions for airports that increases efficiency, safety, and environmental sustainability, and reduces operating costs. The airport will use ADB Safegate's advanced airfield lighting solutions- the AXON EQ LED lights and the LINC 360 Individual Control and Monitoring System (ILCMS). With this advanced lighting solution, the Greenfield will be ready for integration with the Level 4 Advanced Surface Guidance and Control System (A-SMGCS).

12.2 NAVI MUMBAI INTERNATIONAL AIRPORT: PROJECT DETAILS

The City and Industrial Development Corporation of Maharashtra (CIDCO) was appointed as the nodal agency for the execution of the Navi Mumbai International Airport in 2018. To implement the project, the authority adopted the DBFOT Model– design, build, finance, operate and transfer agreement, under public-private partnership. The airport has been planned in four phases to be completed by 2032. The idea of a second airport was proposed to reduce the burden on the current international airport in Mumbai. Navi Mumbai is a place where there is plenty of land available and it is also one of the most well-planned cities in India.

The total land area for the airport is estimated to be around 2,860 acres. The first phase of the project will see the construction of two runways, handling 80 flights per hour. The project was supposed to begin its operation in December 2020. Nevertheless, it got delayed because of multiple reasons, such as COVID-19-induced lockdowns, protests by locals, and delays in land acquisitions and financial closure.

The Adani Group acquired a controlling stake in the Navi Mumbai International Airport in 2021. Following this, in June 2022, the nodal agency handed over the land to Adani Group to kick-start the construction of the terminal and runway. The construction contract for Phase 1 was awarded to Larsen and Toubro. The contract includes cut and fill works, terminal construction work, such as departure and arrival forecourts, airfield development that includes a 3,700-metre-long runway, apron systems, taxiway systems, airfield ground lighting and other facilities, like multilevel car parking, utilities and supporting infrastructure.

The project is on track to meet its December 2024 deadline for the completion of Phase one. The entire greenfield project is estimated to cost around Rs 16,700 crore. Located on National Highway 4B, the airport will be linked to Mumbai through the 21 km six-lane Mumbai Trans Harbour Link (MTHL) project, which is under construction by Larsen and Toubro – IHI Consortium and Tata Projects Ltd. Divided into four phases the Navi Mumbai International Airport facility will handle more than 10 million passengers a year upon the completion of the first phase, 25 million passengers a year in the second phase, and finally, 60 million passengers a year by 2032 with two 3,700 meters-long and 60 meters-wide runways spaced 1.55 km apart. The Navi Mumbai International Airport will also be connected to Pune. This will further bolster the connectivity and the real estate market in Navi Mumbai.

Check Your Progress:

1. Write a brief note on the new airport at Navi Mumbai.

12.3 SOCIAL & ENVIRONMENTAL IMPACT

The proposed greenfield airport in Navi Mumbai has flown into more controversies than any other aerodrome in India. Beginning with the choice of site to its contentious environmental impact assessment report, the land acquisition issues, and, more recently, the protests over its naming, the list is long.

Some of the concerns of the environmentalists are:

- The Navi Mumbai International Airport site is a low-lying land, with about 477 acres of mangroves, about 1,000 acres of mud flats, and another 250 acres of forest land. There are five rivers flowing through the site, thus making it the most unsuitable for an airport.

- Even if it is completed, it is doubtful that the airlines would use this airport because of its unsafe location in terms of its proximity to the Karnala bird sanctuary, Thane creek wetlands, Panje wetlands and the associated bird hazards. A study carried out by the Bombay Natural History Society (BNHS) for CIDCO deals with this aspect in detail.

- The site selected for Navi Mumbai International Airport is more suited for a port than an airport. It is extremely vulnerable to flooding since the entire site is being reclaimed. The reclamation that has been carried out so far has already led to the flooding of some of the surrounding villages, and even Panvel.

- A couple of sites were explored before the Navi Mumbai International Airport was finalized but those were rejected without adequate reasons.

- The new airport site encompasses mangroves and mudflats in addition to a vast number of villages and farms. One cannot even begin to comprehend the extent of damage to wildlife in that region.

- Rehabilitation of residents has forced them into areas where they cannot practice their traditional livelihoods, there has been no attempt at enhancing their skills. In fact, even the basic schooling facilities have not been provided to the displaced communities. The development has risked such widespread damage to people, economy, and ecology.

- More than 3,500 families are going to be affected by the airport project. However, at present, they are a divided lot. While some have been rehabilitated and received compensation for their land and houses, others are unhappy with the compensation package and have refused to vacate their land.

- There are still several project-affected families who have not been compensated even though the airport work has already begun. Where compensation has been given, several basic amenities like drinking

water, cremation ground, bus depot, schools have not been provided yet.

- From an environmental point of view, the project is destroying 400 acres of mangroves, 1,000 acres of mud-flats, 300 acres of forest area, they have to divert five rivers, they will have to reclaim that land by filling it up to 11 meters for that they have to demolish hills.

Check Your Progress:

1. What are the environmental hazards of the new airport at Navi Mumbai?

12.4 SUMMARY

Along the way, it gathered many failed deadlines to become the most delayed airport project in India. But once it is commissioned, the airlines will be able to add more flights to meet the Mumbai metropolitan region's voracious demand for air travel. The question though is, with numerous red flags raised by environmentalists, will the airport's journey be turbulent?

12.5 QUESTIONS

1. Who are the stakeholders in the construction and execution of the new airport at Navi Mumbai?

2. How are the local people getting affected in the course of this new project?

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Faculty of Humanities

TYBA

(Choice Based Credit System, CBCS) Semester V and Semester VI Question Paper Pattern for T.Y.B.A (CBCS) applicable to all the papers from Paper IV to Paper IX.

As per University rules and guidelines With Effect From 2018-2019 (Time: 3 Hours)

Note: 1. Attempt all questions
2. All questions carry equal marks

(Total = 100 marks)

Q.1 (Based on Module I) (20 marks)

a.

or

b.

Q.2 (Based on Module II) (20 marks)

a.

or

b.

Q.3 (Based on Module III) (20 marks)

a.

or

b.

Q.4 (Based on Module IV) (20 marks)

a.

or

b.

Q.5 Attempt any two short notes. (Based on Module I, II, III and IV)

(20 marks)

a.

b.

c.

d.

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