F.Y.B.Com.

ENVIRONMENTAL STUDIES

SEMESTER - II

SUBJECT CODE :UBCOMFSII.5

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SEMESTER - II

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Map filling of Konkan and Mumbai (Environmentally significant features)

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Unit -1

SOLID WASTE MANAGEMENT FOR SUSTAINABLE SOCIETY

After going through this chapter, you will be able to understand the following features:

1.1 OBJECTIVES

By the end of this unit you will be able to –

- Understand the definition and classification of solid waste
- Understand the importance of solid waste management in modern world
- Understand the citizen role in waste management
- Know the different Rules and Regulations that govern Solid Waste Handling in Maharashtra.

1.2 INTRODUCTION

The study of environment is incomplete without understanding the relevance of waste and how to manage it. Ever since man started exploring the planet and built a livelihood he has been generating waste. The wastes in the olden days were mostly degradable and hence we saw a lot less problem in handling them.

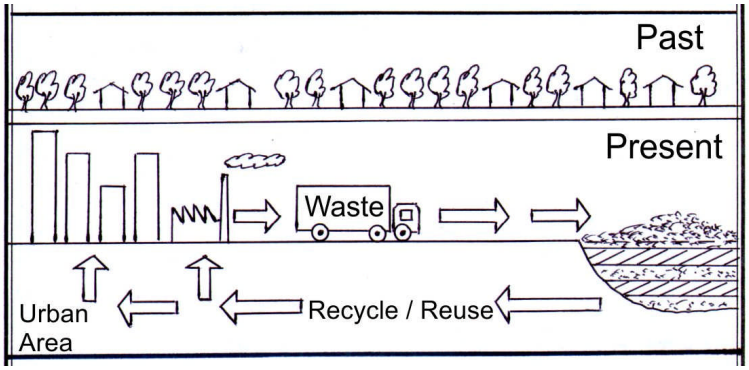


Fig. 1.1 Water - Sustainability

As society became urban and industrial the volumes of waste increased and began the problems of disposal and management of the waste. Today globally there is immense attention being given to manage the waste sustainably. Waste have also been identified as a major resource source with the ability to recycle and reuse most of the throwaways. India is one of the leading waste generators and hence needs to ensure its waste management is efficient and effective.

1.3 SUBJECT DISCUSSION

Waste has emerged an important part of the study of environment. This is due to increase in the population in the country, which has reached over a billion people. Second the increase in production and the consumption of goods has resulted in greater volumes of waste. Urbanisation has also resulted in increase in quantity of waste and reduction of space to dispose the garbage.

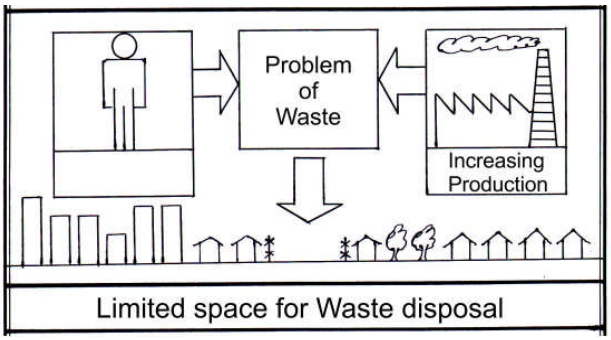


Fig. 1.2 Problem of Waste

Proper waste management is an essential part of society's public and environmental health. It ensures that the waste is handled scientifically with all regulations in place put by the governing authorities. Indian wastes are handled on the basis of some regulations made by the Ministry of Environment and need to be followed in the country. In order to manage waste in India and particularly in Mega cities which contribute immensely to the volume of waste production, the Government has ensured several regulations for its efficient handling and disposal. The Municipal Solid Waste (Management and Handling) Rules, 1999, the 2006 National Environment Policy, the Plastic Waste (Management and Handling) Rules, 2011, Hazardous Waste (Management Handling) Rules, Electronic Waste (Management and Handling) Rules 2011, the Biomedical Waste (Management and Handling) Rules.

1.4 SOLID WASTE

a. Definition of Solid Waste

The term solid waste means material such as household garbage, food wastes, and demolition or construction debris. It also includes discarded items like household appliances, furniture, scrap metal, machinery, car parts and other throwable items.

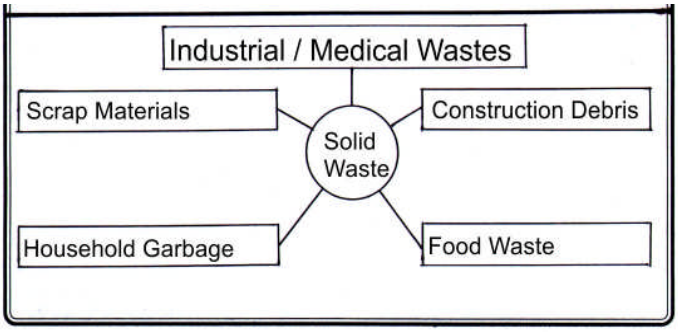


Fig. 1.3 Types of Solid Waste

According to the Municipal Solid Wastes (Management and Handling) Rules 2000, prescribed under the Environment Protection Act 1986 by the Government of India municipal waste is defined as, "commercial and residential wastes generated in a municipal or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes."

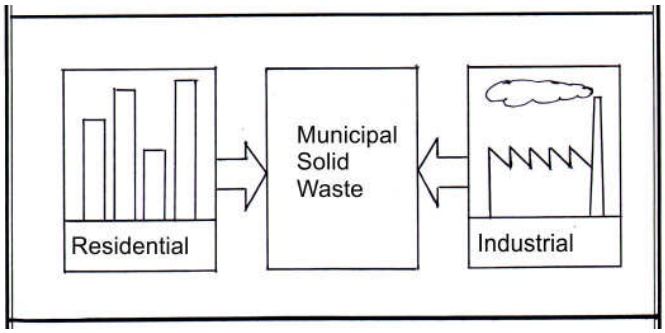


Fig. 1.4 Municipal Solid Waste

Maharashtra Pollution Control Board, “solid wastes are those undesirable useless and unwanted materials and substances that arise from animal and human activities”.

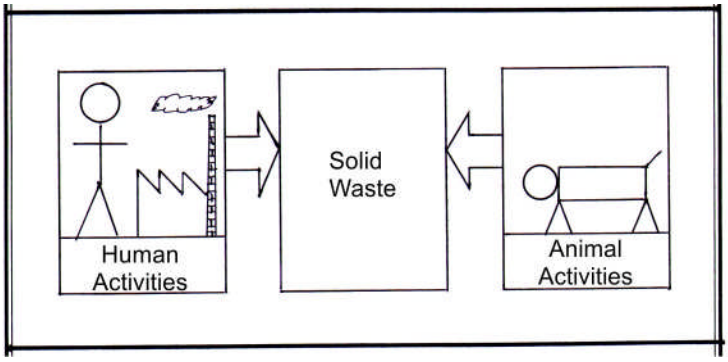


Fig. 1.5 Solid Waste Types Pollution Control Board

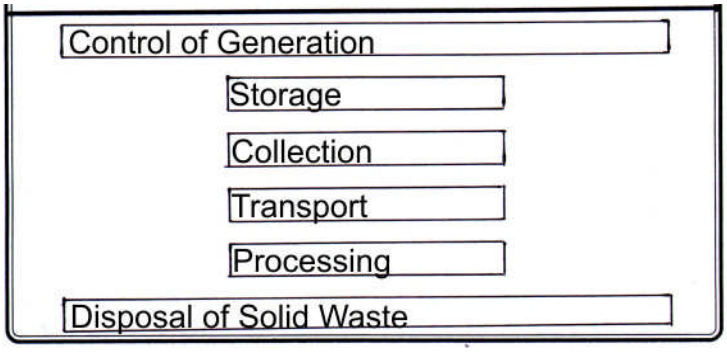
The OECD, defines Solid waste “as useless and sometimes hazardous material with low liquid content. Solid wastes include municipal garbage, industrial and commercial waste, sewage sludge, wastes resulting from agricultural and animal husbandry operations and other connected activities, demolition wastes and mining residues.”

The Resource Conservation and Recovery Act (RCRA), passed in 1976,defined , "solid waste" as “any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities.”

From the above definitions, we learn that:

- Solid waste is loosely called garbage
- Includes commercial and residential waste
- It is generated in a municipal or notified area
- It could be solid or semi solid too and includes treated biomedical waste.

The generation of solid waste can be from residential and commercial establishments. The items that are thrown away such as food waste, packaging material, construction waste are the core of the waste. Generally organic and compostable materials form more than half of the municipal solid waste in Indian cities. The management of solid waste is associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid wastes with the best methods to enable better public health, economics, engineering, conservation, aesthetics, and other environmental considerations..



b. Importance of Solid Waste Study

The waste study is important for the following reasons

a. Growing population which in turn generates more waste

b. Increasing use of materials and products that are difficult to naturally dispose

c. International and national level consciousness and responsibility to manage waste through reduction and recycling

d.To identify cleaner and more efficient methods of disposal of the waste

e. To have cleaner cities

Solid waste or municipal solid waste is a growing problem at global, regional and local levels. These are created from human and animal activities and result in discarding useless or unwanted products. Due to increased demands for goods and services, there is an increase in production and consumption creating more waste. There are domestic wastes, commercial wastes, institutional wastes and industrial wastes and medical waste under solid waste defined by the Indian government.

c. Classification of Waste

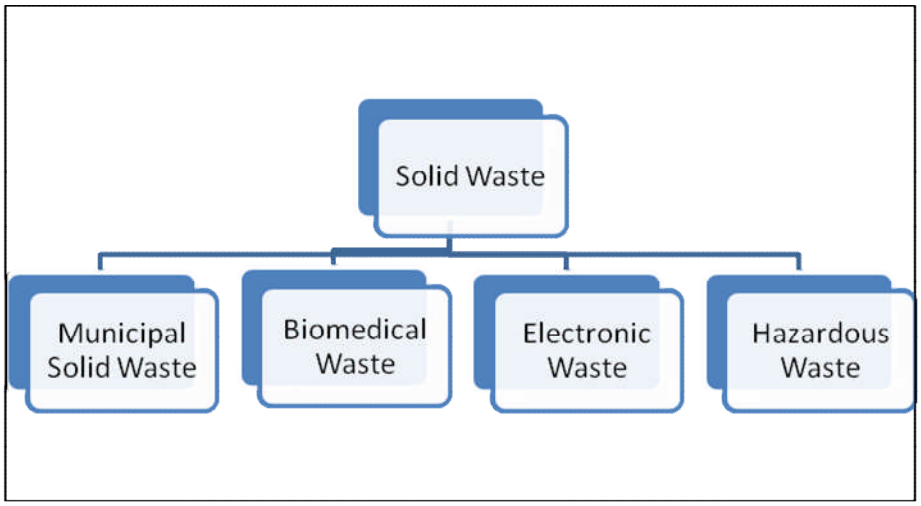


Fig. 1.7 Classification of Waste

1. Municipal Solid Waste

- Municipal solid waste consists of household waste, construction and demolition debris, sanitation residue, and waste from streets.

- This garbage is generated mainly from residential and commercial complexes. With rising urbanization and change in lifestyle and food habits, the amount of municipal solid waste has been increasing rapidly and its composition changing.

2. Hazardous wastes

- These are the toxic, corrosive, poisonous, inflammable and explosive due to the presence of chemicals in it.
- Hazardous Wastes (Management and Handling) Amendment Draft Rules, 2002, defines it as, " any waste which can by reason of its physical ,chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances"
- These wastes therefore require special care in handling, storing, transporting and disposing.

3. E Waste

- E wastes are electronic waste, which need to be handled carefully and in a specific manner.
- Metals like lead, BFR, Chromium, Mercury, Berrylium, non metals and trace elements all of which can cause immense health hazard.
- The e waste in the country is governed by the E waste (Management and Handling) Rules, 2010, which looks into

handling, transportation, storing, recycling and disposal of waste.

4. Biomedical

- Hospital waste contaminated by chemicals used in hospitals is considered hazardous.
- These chemicals include formaldehyde and phenols, which are used as disinfectants, and mercury, which is used in thermometers or equipment that measure blood pressure.
- Hospital waste is generated during the diagnosis, treatment, or immunization of human beings or animals or in research activities in these fields or in the production or testing of biological products.
- It may include wastes like sharps, soiled waste, disposables, anatomical waste, cultures, discarded medicines, chemical wastes, etc. These are in the form of disposable syringes, swabs, bandages, body fluids, human excreta, etc.
- This waste is highly infectious and can be a serious threat to human health if not managed in a scientific and discriminate manner.

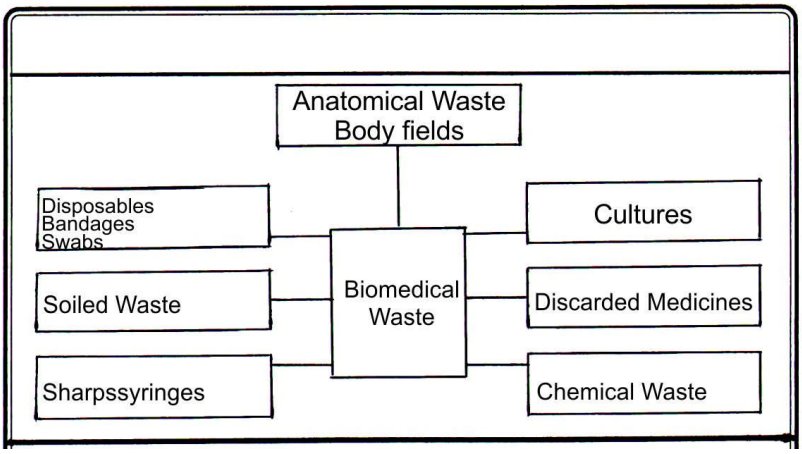


Fig.1.8 Biomedical Waste

5 Industrial Waste

- Industrial waste is considered hazardous as they may contain toxic substances.
- Hazardous wastes could be highly toxic to humans, animals, and plants; are corrosive, highly inflammable, or explosive; and react when exposed to certain things e.g. gases.
- India generates around 7 million tonnes of hazardous wastes every year, most of which is concentrated in four states: Andhra Pradesh, Bihar, Uttar Pradesh, and Tamil Nadu (CPCB,2006).

- In the industrial sector, the major generators of hazardous waste are the metal, chemical, paper, pesticide, dye, refining, and rubber goods industries. Direct exposure to chemicals in hazardous waste such as mercury and cyanide can be fatal.

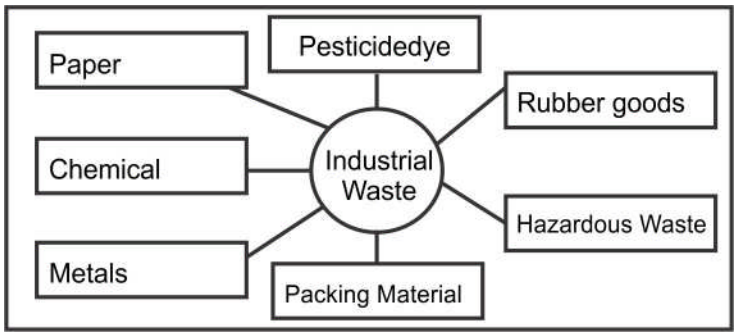
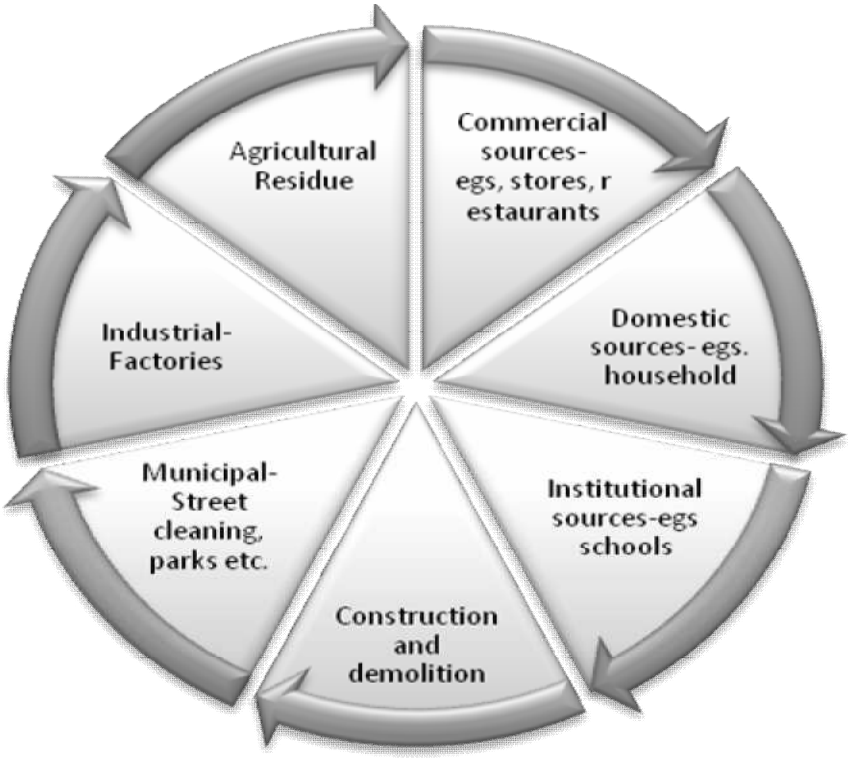


Fig. 1.9 Industrial Waste

d. Sources of Waste

The concept of wastes is incomplete without the idea to locate the different sources of wastes from which they are found. These are the places from where the waste is generated. For the proper understanding of the waste management, the study of the source is important. It also ensures that the pollution source can be understood and tackled.

Some of these sources are:-



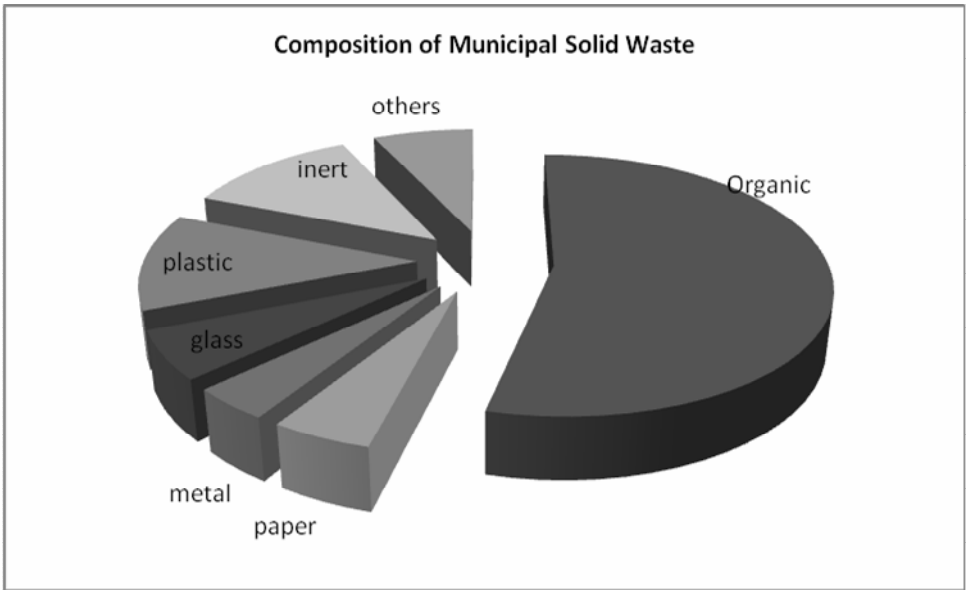
i. Domestic sources- eg. household
ii. Commercial sources- eg, stores, restaurants
iii. Institutional sources- eg, schools
iv. Construction and demolition-
v. Municipal-street cleaning, parks cleaning,
vi. Industrial-factories,
vii. Agricultural-crop residue, straw
viii. Sewage-post treatment

Table given below shows the types of wastes and their sources, (compiled from MPCB and World Bank)

Type	**Sources**
Organic	Kitchen waste, yard wastes, food process, residue
Paper	Paper scrap, newspapers, magazines, shredded paper, paper cups and plates
Plastics	Bottles, cups, packaging, lods, containers, cups
Glass	Broken bottles, plates, bulbs
Metal	Container, vessels, scrap
Inerts	Construction Wastes
Others	Textile form old cloth, e waste, appliances

Composition of Waste

The composition of MSW depends on a large number of factors like food habit, culture, tradition, lifestyle, climate, and income. In a study conducted by the World Bank, it has been shown that developing and underdeveloped nations have a higher amount of compostable organic waste compared to developed nations. India shows about 50 % of its wastes to be organic and compostable. The standard composition of waste is organic, paper, plastic, metals, inerts, glass and others. According to the Ministry of Urban Development, " biodegradables make up 47.4% of the MSW stream, followed by Metals and glass make up only about 1% each of the MSW stream because of their high potential for recycling. The inerts—street sweepings, drain silt, and construction and demolition (C&D) debris—make up 25% of the MSW stream as the street sweepings, drain silt, and construction and demolition debris eventually find their way into municipal solid waste"



1.5 EFFECTS OF SOLID WASTE POLLUTION

Extensive dumping over a long period can cause environmental pollution. Toxic releases from the wastes into air, water and land will cause the contamination of the environment and damage them beyond repair. Pollutants are found in the dumping of the unsegregated and untreated wastes which are disposed into nature. It harms the plants and animals that live in the dumpyard ecosystem. Also it harms the humans who may suffer from multiple forms of ailments both long term and short term.

a. Health Hazards

Emission of the toxic gases like methane, carbon dioxide, sulphur gases from the waste may cause respiratory ailments like breathing problems, asthma, bronchial disorders and in the long term even clinical respiratory defects. The seepage of the toxic elements into the water table and to the adjoining surface waters like rivers, seas cause a widespread health impacts. Gastroenteritis, liver infection, dysentery, diarrhea can be rampant in the area. Skin infections and allergy to the elements may also be seen in the vicinity of the polluted waters. Spread of diseases from vectors like rats and rodents, mosquitoes may also be a threat to the health of the citizens living in the vicinity of the dumpyards. Handling of waste too needs to be hygienic or else the people tend to be carriers of infectious diseases by coming in contact with the waste.

b. Environmental Impacts

Impacts on Land	Impacts on Water	Impacts on Air
Degradation of the land due to direct contamination from dumping of waste Contamination of the food chain	Underground Water: may affect the water table due to the basin effect Surface Water: adjacent water bodies become carriers like rivers and seas Rain: Major cause of the seepage of toxic material into the soil	Release of Gases like:- - Methane - Sulphur dioxide - Carbon dioxide Highly combustible and may result in open fires Stench and foul odour

The collection and dumping of waste cause major environmental consequences. Land on which waste is dumped tend to remain contaminated and may over a period of time become degraded and unusable.Improper SWM in India has caused the introduction of heavy metals into the food chain. Compost from mixed waste composting plants is highly contaminated with heavy metals. This used on agricultural fields result in contamination of the agricultural soil with heavy metals. Food crops grown on them when consumed introduce the heavy metals into the food chain and lead to a phenomenon called “biomaginification”.

Biomaginification is defined by United States Geological Survey (USGS) as “ the process whereby the tissue concentrations of a contaminant (heavy metals) increases as it passes up the food chain through two or more trophic levels (plants and humans or plants, cattle and humans)“

Unsanitary landfills can contaminate ground and surface water resources too, when the leachate produced from the untreated waste percolates through the soil strata into the groundwater or is washed as runoff during rains. This leachate is generally a strong reducing liquid formed under methanogenic (anaerobic) conditions. The characteristics of leachate depend on the content of various constituents in the dumped waste.

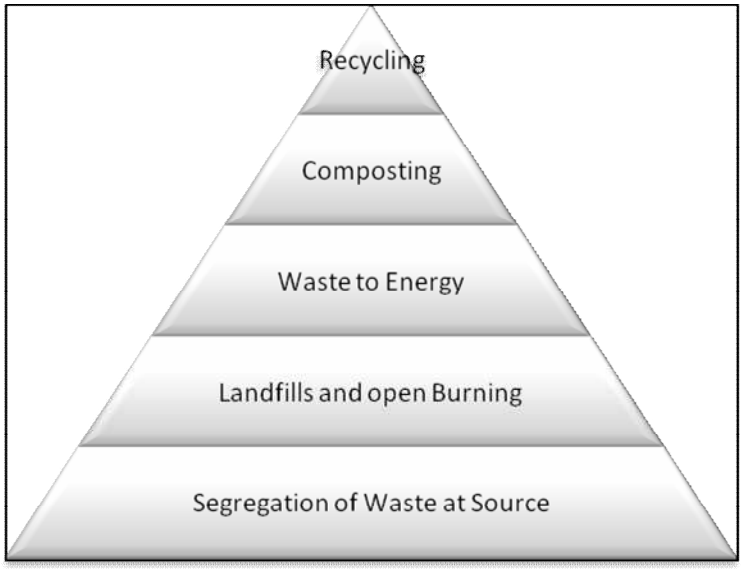
Dioxins and Furans are known carcinogenic agents i.e. they can cause cancer in case of long term exposure. This is released when open burning of waste take place or even when accidental fires start due to methane releases in the dumpyards. The Deonar fire in Mumbai was an incident in which the fire was unstoppable

and caused health and environmental disorders in the city suburbs. Odour and stench is also a problem in the areas where waste is collected or disposed.

1.6. SOLID WASTE MANAGEMENT

Management of solid waste may be defined as that discipline associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid wastes in a manner that is in best for public health, economics, engineering, conservation.The study of solid waste management includes all administrative, financial, legal, planning, and engineering functions involved in the handling and management . Solid wastes have the potential to pollute all the components of living environment (i.e., air, land and water) both at local and at global levels. The problem is compounded by trends in consumption and production patterns and by continuing urbanization of the world. The problem is more acute in developing nations than in developed nations as the economic growth as well as urbanization is more rapid.

This issue has now received the attention by international authorities and the national policy makers including the governments at the state and national level. Today involvement of the citizens is the manner in which most waste management techniques have become successful. At the international level the awareness regarding waste began in 1992 with the Rio Conference, for the global fraternity even though the developed nations had already introduced the concept of hierarchy of waste management and inversion of the waste pyramid.



The hierarchy of waste management stresses on:-

a. Source Reduction –which includes:-
-- segregation at source
-- reducing the use of materials and --reusing them
--preventing them from entering the waste stream

Reducing and reusing are the most effective ways to prevent generation of wastes. Sometimes, reusing can also happen after collection, example where informal traders collect materials of no use from households, reshape or repair them and sell in second-hand markets..

b. Recycling

Wastes once generated and collected, is recycled where the materials generally undergo a chemical transformation. Unlike reusing a used material, recycling involves using the waste as raw material to make new products .

c. Composting

United Nations Environment Program (UNEP) defines composting as " the biological decomposition of biodegradable solid waste under predominantly aerobic conditions to a state that is sufficiently stable for nuisance-free storage and handling and is satisfactorily matured for safe use in agriculture. "

Composting can also be defined as human intervention into the natural process of decomposition as noted by Cornell Waste Management Institute.

d. Waste to Energy

Refuse Derived Fuel refers to the segregated high calorific fraction of processed MSW. RDF can be defined as the final product from waste materials which have been processed to fulfill guideline, regulatory or industry specifications mainly to achieve a high calorific value to be useful as secondary/substitute fuels in the solid fuel industry (23). RDF is mainly used as a substitute to coal (a fossil fuel) in high-energy industrial processes like power production, cement kilns, steel manufacturing, etc. United Nations Environmental Program (UNEP) defines sanitary landfilling as the controlled disposal of wastes on land in such a way that contact between waste and the environment is significantly reduced and wastes are concentrated in a well defined area. Sanitary landfills (SLFs) are built to isolate wastes from the environment and render them innocuous through the biological, chemical and physical processes of nature. UNEP also recognizes three basic conditions to be fulfilled to be designated as an SLF:
a) Compaction of the wastes,
b) Daily covering of wastes (with soil or other material) and

c) Control and prevention of negative impacts on public health and environment

e. Dumping and disposal

The following are the different disposal methods of the solid waste :-

Open dump sites-Often most practiced and easiest methods of disposal of waste. It requires the selection of a site for disposal and there after successive dumping is undertaken.

Landfills- One of the most used technique for waste disposal. It includes the trenching or removal of some layers on the surface and dumping of waste there upon. Upon closure the waste pits are covered and left for reduction naturally. It is one of the techniques, which have been criticized for environmental pollution of the soil and ground water. Several countries that have used this technique have stopped using landfills to prevent further pollution.

Incineration-The burning and reduction of the waste is another method of waste management. The environmental concerns in this is enhanced with emission of hazardous gases during the process of reduction. As a method of waste management it is used exclusively for toxic, harmful and infected waste as the process kills the microbial contaminant. It was one of the oldest methods to tackle hospital waste. However, the method emits gases such as CO_2 and CO as well as Carcinogenic gases such as Dioxins and Furans, due to incomplete combustion of compositions like PVCs. Autoclave today is one the newest methods of medical wastes treatment which works based on wet disinfection in a controlled environment. However, the Management of Hazardous Waste Act has specified the methods of disposal based on the nature of the products which need to be disinfected prior to disposal or even elimination.

Sanitary disposal pits and compost pits- The method ranges from covered trenching, organic breakdown with scientific intervention. The most efficient method for some types of wastes particularly those involving night soil and organic waste.

a. Solid Waste Management in Mumbai

Mumbai as the financial capital has a population of 16.37 million and a garbage collection of 7025 metric tons per day.(BMC). It has been identified to have the highest generation of e waste per annum of about 3 lakh tons. To compound it the area of Mumbai is 437.71 sq kms with a high concentration of people about 46,000 persons / sq km in the city district and 20,000 persons/ sq kms. (Mahadevia,2005). However, out of this 7025 is solid waste out of which 5000MT is general municipal waste, about 2000 MT is silt

and construction debris and 10 MT is bio medical waste. The Ministry of Urban Development in its manual on Waste Management estimated in 2000 , that waste generation of the entire country is 100,000 MT. The city has 48.5 % area under BMC in slums(2001 Census), while including the industrial workers also called the *chawls* the numbers are 8.3 million or 70% people. The problems of over crowding and unsanitary conditions therefore persist.

The MSWM falls under the obligatory duties of the MCGM.Presently**,** the SWM department works under the direction and control of the Chief Engineer (SWM). He is assisted by the Deputy Chief Engineer, Head Supervisor, Deputy Supervisor, Assistant Head Supervisor in the Conservancy Wing. The Transport Wing provides vehicles for transportation of the refuse and cesspool, health services, encroachment services and other services. Each Administrative ward is under the control of one Assistant Head Supervisor. In order to render the services broadly outlined above, effectively the administrative wards are further subdivided into 48 conservancy wards. Each sub-ward is under the control of a Supervisor. Under each Supervisor there are 5 section Junior Overseers and one Motor Loading Junior Overseer in each shift. Each section Junior Overseer has 2 Mukadams and 40 to 50 scavengers.There are 24 wards in the city. The city is divided into island city wards, Eastern suburban wards and the Western suburban wards.method of collection would need to include a door to door collection system from all of the above outlets. The initial systems have been upgraded to include a Clean Up Project, which ensures that wastes both domestic or otherwise, are collected at source in dumpers which are compacters.

These machines then carry the compacted waste to the dump yards. These are thereafter loaded in trucks and containers to the other disposal sites.

For the sake of collection of waste the following initiatives have been taken by the BMC:-

1. Standardized community bins of the following type have been purchased
2. 6000 thousand wheeled bins with lid of 1.1 m^3 capacity
3. Bins of uniform design amenable to mechanical loading and unloading
4. 2000 (Pole mounted) dual litter bins of 50 liters capacity.
5. Dry waste sorting centres have been created to accept e-waste and recyclables in each ward. These are being managed by NGOs.

Transportation implies conveyance from point of collection to the point of disposal. Motor loaders work in the city and suburbs from 6.30 am to 1.30 p.m. in the morning shift and 1.45 p.m. to 8.45 p.m. in the afternoon shift.

There are four dump yards in Mumbai for the disposal of municipal solid waste-

i) Deonar- is the oldest and is still operational. Most vehicles carry waste to the yard from all over the city and also from the transfer stations

ii) Gorai- Started in 1972 and from 2006 is being scientifically closed. It has earned the MCGM carbon credits for the process of closure and is a flagship green project for the administration.

iii) Mulund- Is almost defunct presently but contributed to huge dumpings in the last 30 years.

iv) Kanjurmarg- A new site in the eastern suburbs of the city and has a potential to become a very important dumping yard for the city once even the Deonar grounds close.

b. Initiatives taken by the MCGM on Waste Management

The first major initiative was taken by the Honorable Supreme Court of India in 1998, which resulted in formation of an expert committee to study the status of SWM in Indian cities. This Committee identified the deficiencies/gaps in the existing SWM system in the country and prepared the Interim Report in 1999 on SWM Practices for few cities. As a second major initiative, in conformance with Sections 3, 6 and 25 of the Environment Protection Act of 1986, and on the basis on the recommendations by the Committee, the Ministry of Environment and Forests (MoEF) of the Government of India, developed and issued Municipal Solid Waste (Management and Handling) Rules (MoUD, 2000). These rules aim at standardization and enforcement of SWM practices in urban areas.

i) Mumbai Initiative – Chakachak Mumbai / Clean up

The garbage of the city is picked up door to door and is transported in heavy compactors to the transfer stations and dumping yards. This has reduced the wayside open dumping that was followed previously. Segregation is also encouraged in housing and other communities and the Municipality aids in setting up compost bins.

ii) Setting up of Advanced Local Management Committee-

The ALM is an identified locality or neighborhood, the residents of which commit themselves to improve the “Quality of Life” in the locality / neighborhood in close co-operation with the

MCGM. The ALM has grown into a movement since its inception as more and more citizens in different neighborhoods of the city have came forward to form ALMs in their localities, driven by the efforts of the ALM officer of the MCGM and existing active ALM groups.

iii) Stree Mukti Sangathan an NGO supported by the MCGM, started **the Parisar Vikas** Program since 2002**.** Under the program the SMS train the rag pickers to collect, handle and process the waste collected and organise them into cooperatives**.**

Details of the Initiative-The Parisar Vikas Programme has been initiated by the Stree Mukti Sanghatana (SMS) which is an NGO based in Chembur, Mumbai. SMS is a Woman's Liberation Organisation and was established in 1975. The organisation has directed its efforts towards the upliftment of women primarily by creating awareness in the society about women's issues. Since its inception, SMS has made significant contributions to the women's movement in Maharashtra through various activities. The SWM project of the SMS is being funded by 'War on Want', a London based NGO, and the Central Government's Suvarna Jayanti Shahari Rojgar Yojna (SJSRY). The duration of the project was from 2002 upto the end of 2005. The main strategies of the programme involved the following: • Organisation and training of the women ragpickers. • Improving the standard of living of women ragpickers by understanding their problems. • Developing new techniques for treatment of waste. • Creating zero waste situation in cities by appropriate waste recycling techniques.

iv) Slum Adoption or the Dattak Vasti Yojna-To handle the solid waste management in the slums.

Details of the Initiative- A Community Based Organisation (CBO) has been involved in work related to SWM in the Prem Nagar Slum Community since last one and a half years. The MCGM has provided necessary equipments for the purpose to the CBO and it also takes care of the salaries of the slum cleaners. The project has turned out to be successful. This scheme is being put forward as an example to motivate other slums, to participate in the scheme. However, SAS is only meant for authorised slums. After the successful implementation of Prem Nagar Pilot Project, in 1999, the MCGM formed 'Slum Adoption Policy' (Jain 2000). A circular followed this in 2001 for appointing an Officer on Special Duty to educate slum dwellers about SWM.

1.7 CITIZEN INITIATIVES

General citizens can play a very important role through public participation in the waste management system. Changes in

the habits of segregation, littering, can change the approach towards wastes.

a. **Bhagidari Scheme:**
Based in Delhi, the government instituted the Bhagidari Scheme for ensuring close cooperation of the Residents Welfare Association (RWAs), civic agencies and the government.

Highlights-

- Based on a court order for compulsory segregation of waste at the household level from January 1, 2004.
- In December 2003 (Hindustan Times 26.12.2003), the Municipal Commissioner of Delhi announced a system by which segregated garbage from homes would be transported to municipal bins through specially designed handcarts having two compartments. He further mentioned that the segregation system would reduce 50 per cent of the garbage going to landfills and thereby result in cost reduction.
- In the initial phase, zones were selected in colonies like Hauz Khas, Gulmohar Park, Vasant Vihar, Green Park, Safdarjung Enclave and Sewa Nagar. Due to various reasons, the scheme has not been very effective except in some colonies, where RWAs decided to tackle the problem themselves, the scheme is working.

b. Bangalore Agenda Task Force (BATF)-

Highlights-

- Solid waste management has been taken up for Bangalore City.
- The whole operation has been outsourced to private agencies who provide the infrastructure right from Safai Karamcharis, their uniforms and caps, bins, trolleys and vehicles (dumpers) that pick up the collected waste and transport it to the composting site on the city's outskirts.
- The Safai Karamcharis have been given strict instructions not to collect the waste from households if it is not segregated. Their areas of responsibility are clearly demarcated along with their collection schedule. These areas are under supervisors of the contracted agency and hence, it is ensured that every place is kept clean. This exercise also has a few snags that will be discussed later.

c**. Individual Effort in Rural Maharashtra**:

A 39 year old bank cashier, Ms. Asha Shivajirao Bhise, left her job and took up vermi-composting in a big way (Indian Express, 16.04.2004). With a total corpus of Rs. 15 lakhs, she set up a vermi-composting project and harvested 20 tonnes of compost in

40 days, which was picked up by farmers within days. It is an example of tapping commercial opportunities in solid waste management and total commitment by an individual.

Role of the Citizens of Mumbai
The citizens of Mumbai have to be trained in the three 'Rs' with respect to management of wastes.

Reduce - As the budget of the Municipal Corporation indicate, about one quarter of the budget is spent on transportation of waste. There is an urgent need to reduce the waste by cutting down on transportation. The reduction of waste can happen only when we, as citizens of Mumbai, reduce waste generation in the first place. Also they can segregate and reduce the quantity of waste to be transported.

Reuse – Reuse of products prior to disposal is the way forward. Plastics must be used in as little manner as possible.

Recycle - To recycle, we should segregate our garbage at source. Wet garbage can be recycled by composting or vermi-composting in your backyard or in the vicinity. This will produce good manure that can be used for gardens and lawns. The dry garbage can be given to the rag pickers who sell it to re-users.

1.8 SUMMARY

Since economic reforms in 1992 – 1993, India has undergone rapid urbanization, which changed material consumption patterns, and increased the per capita waste generation rate. Since 2011, India underwent unprecedented economic growth and the urban per capita waste generation increased from 440 grams/day to 500 grams/day at a decadal per capita waste generation growth rate of 13.6%. These have made it necessary to understand and manage the waste generated in the country. Waste management is a manner of reducing the pile of garbage dumped into the environment. There are several methods such as segregation of the waste, recycling of the waste, composting of the organic part of the waste, incineration of the waste and eventual dumping of the waste. Mumbai has attemped as a city to handle its waste very effectively with door to door collection and daily transportation of the project through the Project Clean up.

1.9 CHECK YOUR PROGRESS/EXERCISE

1. True or False

a. Solid waste only includes garbage in a solid state
b. Biomedical Waste is included in the Handling Rules of MSW, 2000.
c. Recycling reduces waste
d. There is a need for water bodies near the dumping yards
e. Deonar is the oldest dumping yard for MSW

2. Fill in the Blanks

a. The MSW handling Rules followed is for year_____
b. _____is released as a gas from the dump yards
c. _____is an ailment that is associated with solid waste pollution
d. _____dump yard has earned carbon credits for the MCGM
e. The project to handle MSW in Mumbai is _____.

3. Multiple Choice Questions

a. Hospital Waste is also called_____
   i. MSW
   ii. BMW
   iii. HW
   iv. E Waste

b. Environmental Protection Act was passed in the year_____
   i. 1992
   ii. 1997
   iii. 1985
   iv. 1986

c. _____is also defined as human intervention into the natural process of decomposition
   i. Composting
   ii. Recycling
   iii. Degradation
   iv. Biomagnification

d. The highest % in the composition of MSW is _____
   i. Plastics
   ii. Glass
   iii. Kitchen Waste/ Organic
   iv. Inerts

e. _____is the newest dumping site for Mumbai.
   i. Gorai
   ii. Kanjurmarg
   iii. Mulund
   iv. Deonar

1.10 ANSWERS TO THE SELF-LEARNING QUESTIONS

1. True or False

1.a. False
1.b. True
1.c. True
1.d. False
1.e. True

2. Fill in the Blanks

2.a. 2000/ 2016
2.b. Methane
2.c. Asthma
2.d. Gorai
2e. Project Clean up

3. Multiple Choice Questions

3.a. (ii)
3.b. (iv)
3.c. (i)
3.d. (iii)
3.e. (ii)

1.11 TECHNICAL WORDS AND THEIR MEANINGS

- **Solid Waste-** All unwanted thrash that is disposed from commercial and domestic institutions.
- **Leachate:** The pollutants which are carried into the water and land bodies and cause pollution
- **Biomagnification:** The process whereby the tissue concentrations of a contaminant (heavy metals) increases as it passes up the food chain through two or more trophic levels.

1.12 TASK

- Visit a Dump yard in your town or city. Write a report on the collection and disposal of the waste as you see it.
- Make a scrap book with a week's record of what you dispose in your garbage bin.

1.13 REFERENCES FOR FURTHER STUDY

- Basics in Environmental Studies, Dr. Pushpendra
- Environmental Management, Swapan Deb.
- The Sage Handbook of Environment and Society, Ward, Hugh eds.
- Environment and Sustainable Development, Sundar, I.

Unit -2

AGRICULTURE AND INDUSTRIAL DEVELOPMENT

After going through this chapter, you will be able to understand the following features:

2.1. OBJECTIVES

By the end of this unit you will be able –

- To understand the environmental problems associated with agriculture
- To comprehend the ways of sustainable agricultural practices
- To know environmental problems associated with industries

2.2. INTRODUCTION

Environment and agriculture are closely related. Every agricultural activity has an impact on the environment. From the prehistoric era, when humans survived by hunting and collecting food, the human species has intervened in the natural food chains. When human communities became settled and started domesticating animals and plants, their impact on the environment assumed new proportions. Since then human agricultural activity has continued to intensify, and over the last 150 years the rate of intensification has accelerated dramatically.

The negative environmental impact of agricultural practices cannot be ignored. Inappropriate agricultural practices and land use can also have an adverse impact on natural resources, like

- Pollution of soil, water and air
- Desertification
- Fragmentation of habitats
- Loss of wildlife and plant species.

Unsustainable agricultural practices are an immediate threat to species and ecosystems around the world .Farmed areas provide important habitats for many wild plants and animals. When farming operations are sustainably managed, they can help preserve and restore critical habitats, protect watersheds, and improve soil health. But when practiced without care, create various environmental problems and greatest threat to species and ecosystem.

2.3 SUBJECT DISCUSSION

This unit brings out the impact of agriculture on environment. The need for farmers today is to follow agricultural practices that are sustainable. Sustainable agricultural practices do not only benefit the farmers but also the customers and society as whole. The farmers are encourages to follow simple practices such as organic farming, crop rotation, soil enrichment etc.to preserve the land.

Further in the unit the impact of industries on the environment is discussed. New concepts like green business and green consumption are suggested as sustainable practices.

2.4 ENVIRONMENTAL PROBLEMS ASSOCIATED WITH AGRICULTURE

The various environmental problems associated with agriculture are as follows:

A. Loss of Productivity:

Agricultural productivity declines considerably due to floods and the climatic change. The degradation of land, siltation of rivers, pollution of soil from acid rains and industrial wastes are some of the issues that are associated with urbanisation and industrialization that are strong causes of land degradation and decline in agricultural productivity.

A1. Causes of Decline in Agricultural Productivity

The causes of the decline in Agricultural Productivity are as follows:

1. With the explosion in human population the agricultural land has gradually been converted into residential and industrial areas.
2. The increasing demand for food has resulted in extensive farming and commercialization. These practices caused serious depletion of nutrients causing loss in the agricultural productivity.

3. The agricultural production was to be boosted up by the application of synthetic chemical fertilizers and crops were protected from pests and diseases by the applications of pesticides and fungicides. These synthetic chemicals have resulted in degradation of lands.

4. Vast areas of productive land are destroyed by heavy mining and quarrying.

5.Frequent floods due to siltation of rivers caused by soil erosion often leads to damage of the top soil resulting in soil degradation.

A2. Effects of Decline in Agricultural Productivity

1. The decline in Agricultural Productivity is causing hunger in major parts of the world. In spite of great improvements in the food production, still about half million people are still starving across the world..

2. Poor maintenance of irrigation system causes loss of water through wastage and seepage. The scarcity of water affects crop production adversely.

3. The decline in agricultural productivity has no longer left the agriculture profitable activity for farmers. Hence, large scale migration of people from rural areas towards cities is increasing day by day.

4. Declining agricultural productivity compounded with natural calamities which is aggravated by human factors is creating acute shortage of food. Many countries have to take loans from the International Monetary Fund (IMF) and the World Bank to import food and to feed its people.

All the factors mentioned above, heavily contribute to hunger and poverty together with causing bad effect on local, regional and national economies.

B. Land Degradation

Land degradation is a process in which the value of the biophysical environment is affected by a combination of human-induced processes acting upon the land. Land degradation is the major consequences of direct interference of human activities in the natural phenomenon. Land degradation means:

1. Loss of natural fertility of soil because of loss of nutrients.
2. Less vegetation cover
3. Changes in the characteristic of soil.

It is viewed as any change or disturbance to the land perceived to be undesirable. Natural hazards are excluded as a

cause; however human activities can indirectly affect phenomena such as floods and bush fires. It is estimated that up to 40% of the world's agricultural land is seriously degraded.

B1.Causes of Land Degradation

The various causes of land degradation are as follows:

1. Deforestation

Deforestation is taking place at a faster rate due to increasing demands of timber, fuel and forest products which results into degradation of land resources.

2. Overgrazing

Overgrazing refers to excessive eating of grasses and other green plants by cattle. It results into reduced growth of vegetation, reduced diversity of plant species, excessive growth of unwanted plant species, soil erosion, and degradation of land due to cattle movement.

3. Agricultural practices

The modern agricultural practices, excessive use of fertilizers and pesticides has adversely degraded the natural quality and fertility of the land.

4. Industrialization

Development of industries for the economic growth of the country leads to excessive deforestation and utilization of land.

5. Urbanization

Increasing growth of population and demand for more residential areas and commercial sectors is also one of the reasons for land degradation.

B2. Effects of Land Degradation

1. Land degradation occurs because people are cutting forests, woodlands and shrublands at a pace exceeding the natural growth rate.
2. Overgrazing is the grazing of livestock above the livestock carrying capacity which results in the decrease in the vegetation cover.
3. Improper agricultural practices, occur when there is saturation of good lands under population pressure which leads settlers to cultivate too shallow or too steep soils, plough fallow land before it has recovered its fertility, or attempt to obtain multiple crops by irrigating unsuitable soils.

4. Land degradation rsults in the displacement of people from their natural habitat.
5. Severe land degradation affects the economic development of nations. When the land is less productive, the food availability is compromised which results in scarcity of food.

B3. Prevention and Control Measures for Land Degradation

Some practices for controlling land degradation are as follows:

1. Strip farming

It is a practice in which cultivated crops are sown in alternative strips to prevent water movement.

2. Crop Rotation

It is one of the agricultural practice in which different crops are grown in same area following a rotation system which helps in replenishment of the soil.

3. Ridge and Furrow Formation

Soil erosion is one of the factors responsible for land degradation. It can be prevented by formation of ridge and furrow during irrigation which lessens run off.

4. Construction of Dams

Dams usually checks or reduces the velocity of run off so that soil support vegetation.

5. Contour Farming

This type of farming is usually practiced across the hill side and is useful in collecting and diverting the run off to avoid erosion.

B4. Desertification

Desertification is a type of land degradation in which relatively dry area of land becomes increasingly arid, typically losing its bodies of water as well as vegetation and wildlife. It is caused by a variety of factors, such as climate change and human activities like agriculture, mining, over grazing etc.

Desertification is a significant global ecological and environmental problem. Deserification occurs on all continents except Antarctica and affects the livelihoods of millions of people, including a large proportion of the poor in dry lands. Desertification takes place worldwide in dry lands, and its effects are experienced locally, nationally, regionally, and globally.

B5. Causes of Desertification

1. Overgrazing: Animal grazing is a huge problem for many areas that are starting to become desert. If there are too many animals that are overgrazing in certain spots, it makes it difficult for the plants to grow back, which hurts the land and makes it lose its former green glory.

2. Deforestation: Deforestation, clearance or clearing is the removal of a forest or stand of trees where the land is thereafter converted to a non-forest use. Examples of deforestation include conversion of forest land to farms, ranches, or urban use.

3. Improper Farming Practices: Some farmers do not know how to use the land effectively. They may essentially strip the land of everything that it has.

4. Urbanization and other types of land development: Development can cause people to invade forest land and kill the plant life. As areas become more urbanized, there are less places for plants to grow, thus causing desertification.

5. Climate Change: Climate change plays a huge role in desertification. As the days get warmer and periods of drought become more frequent, desertification becomes more and more eminent. Unless climate change is slowed down, huge areas of land will become desert; some of those areas may even become uninhabitable as time goes on.

B6.Effects of Desertification

1. Farming becomes very difficult. If an area becomes a desert, then it's almost impossible to grow substantial crops there without special technologies.

2. Hunger: Areas which suffer from desertification do not have productive land and hence these areas don't have enough food available for people living in these areas.

3. Flooding: Without the plant life in an area, flooding is a lot more eminent. Not all deserts are dry; those that are wet could experience a lot of flooding because there is nothing to stop the water from gathering and going all over the place.

4. Poor Water Quality: If an area becomes a desert, the water quality is going to become a lot worse than it would have been otherwise. This is because the plant life plays a significant role in keeping the water clean and clear; without its presence, it becomes a lot more difficult for you to be able to do that.

5. Overpopulation: When areas becomes desert, people start shifting to other areas and this results in overpopulation in these areas.

B7. Prevention and Control Measures for Desertification

1. Reforestation is one of the easiest ways to eliminate desertification from its root cause. Environmental Organizations work in places where deforestation and desertification are contributing to extreme poverty. There they focus primarily on educating the local population about the dangers of deforestation.

2. Another technique that is useful is contour trenching. This involves the digging of 150m long, 1m deep trenches in the soil. The trenches are made parallel to the height lines of the landscape, preventing the water from flowing within the trenches and causing erosion. Stone walls are placed around the trenches to prevent the trenches from closing up again.

C. Uneven Food Production

Globally, the production of food is unequal. This is because there are two main components which are the **environmental capacity of the area, and the human capacity.** Environmental capacity is its ability 'to accommodate a particular activity or rate of an activity without unacceptable impact'. The climate, soil types, and availability of water affect it. Human capacity, in relation to food production, is the size of the population and the amount of agricultural skill within that population.

Increasing world population, climatic change, political unrest, social, economic and environmental problems lead to world food problems. There are many associated reasons of food problems. Each problem is interconnected, so if there is an influence, it will affect all.

D. Hunger

Hunger is a condition in which a person, for a sustained period, is unable to eat sufficient food to meet basic nutritional needs.

D1. Causes of Hunger

1. Poverty

Poverty is the main cause of hunger in the world. This is true in rich and poor countries alike. The largest groups of people in extreme poverty are small farmers in developing countries. They do not have land to grow enough food, hence their earning are very low.

2. Food Shortages and Waste

Food shortages in developing countries are common. The people most affected are small farmers and their families who depend on their own surplus to survive between harvests.

3. Poor infrastructure

Poor infrastructure may be a reason for hunger. Sometimes it is impossible to transport food to areas where there are shortages. The roads were so poor it was not possible to reach all who needed the food to survive.

4. Climate Change

Climate change is affecting the supply of food world over though nothing can be done by people about climate change directly. They are affecting the environment indirectly.

5. War and Conflict

Hunger is both a cause and effect of war and conflict. Wide-scale poverty and hunger lead to frustration and resentment with governments that appear to ignore hungry people's plight.

6. Nutritional Quality

People require certain nutrients to lead a healthy life, and when they don't consume sufficient amounts, they can become sick and even die. Infants and young children are most vulnerable to the harmful effects of hunger.

E. Malnutrition and Food Security

Malnutrition is a lack or excess of energy and nutrients, essential vitamins and minerals in any one diet and it does not mean starvation. Malnutrition increases the risk of infection and infectious diseases.

Food Security refers to the availability of food and one's access to it. A family is considered food-secure when its members are able to consume a minimum adequate and balanced diet on regular basis. Availability and affordability of such diet, in an environmentally sustainable scenario will enable a person to lead a healthy life.

The term food security first originated in the mid of 1970s, when the World Food Conference (1974) defined food security in terms of food supply assuring the availability and price stability of basic foodstuffs at the international and national level.

E1. Food Security in India

The Green Revolution resulted in the increase in the production of grain in India. Therefore we were not facing any problems of food availability. The main problem today is

affordability, by the poor people of the country. In this concept, we can interpret food security as livelihood security and also the economic capacity to buy the food.

2.5 SUSTAINABLE AGRICULTURAL PRACTICES

Sustainable agriculture is farming in sustainable ways based on an understanding of ecosystem services, the study of relationships between organisms and their environment. The main objectives of sustainable agriculture practices are:

•Satisfy human food and fiber needs.
•Enhance environmental quality
•Make the most efficient use of non-renewable resources .
•Enhance the quality of life for farmers and society as a whole.

Some important sustainable measures taken up by the agricultural sector are as follows:

a. Organic Farming

Organic farming is an alternative agricultural system which originated early in the 20th century in reaction to rapidly changing farming practices. It relies on fertilizers of organic origin such as compost, manure, green manure, and bone meal and places emphasis on techniques such as crop rotation and companion planting. Biological pest control, mixed cropping and the fostering of insect predators are encouraged. In general, organic standards are designed to allow the use of naturally occurring substances while prohibiting or strictly limiting synthetic substances.

b. Crop Rotation

Crop rotation is one of the most powerful techniques of sustainable agriculture. Its purpose is to avoid the consequences that come with planting the same crops in the same soil for years in a row. During rotation, farmers can plant certain crops, which replenish plant nutrients. These crops reduce the need for chemical fertilizers.

c. Soil Enrichment

Healthy soil is full of life, which can often be killed by the overuse of pesticides. Good soils can increase yields as well as creating more robust crops. It is possible to maintain and enhance the quality of soil in many ways. Some examples include leaving crop residue in the field after a harvest, and the use of composted plant material or animal manure.

2.6 BENEFITS OF SUSTAINABLE AGRICULTURE

1. Contributes to Environmental Conservation

Sustainable agriculture helps to replenish the land as well as other natural resources such as water and air. This replenishment ensures that these natural resources will be able for future generations to sustain life.

2. Public Health Safety

Sustainable agriculture avoids hazardous pesticides and fertilizers. As a result, farmers are able to produce fruits, vegetables and other crops that are safer for consumers, workers, and surrounding communities.

3. Prevents Pollution

Sustainable agriculture means that any waste a farm produces remains inside the farms ecosystem. In this way the waste cannot cause pollution.

4. Biodiversity

Sustainable farms produce a wide variety of plants and animals resulting in biodiversity. During crop rotation, plants are seasonally rotated and this results in soil enrichment, prevention of diseases, and pest outbreaks.

5. Economically Beneficial for Farmers

In exchange for undertaking sustainable farming methods, farmers receive a fair wage for their produce. This greatly reduces their reliance on government subsidies and strengthens rural communities.

6. Beneficial for Environment

Sustainable agriculture reduces the need for use of non-renewable energy resources and as a result benefits the environment.

2.7 ENVIRONMENTAL PROBLEMS ASSOCIATED WITH INDUSTRIES

An industry is a collection of companies that operate in a related set of goods or services, which are eventually sold to purchasers. In any country, numerous industries work together to produce the necessary goods and services needed and desired for its people. By convention, industries are divided into three groups:

• **Primary industries** are involved in the collection, utilizing, and harvesting of resources directly produced by physical processes (e.g., mining and smelting).

• **Secondary industries** deal with manufacturing as they take raw materials, convert them in various ways, and produce tangible goods (e.g., automobile factories).

• **Tertiary industries** produce services for individuals and groups (e.g., advertising).

These three groups are distinctive regarding the amount of pollution produced in their operations. Some sectors (such as tourism) have a close relationship with the environment, whereas others have adopted a particularly proactive environmental response (such as the automobile industry with regard to recycling old cars) and still others continue to have a noticeable detrimental impact on the environment (such as the automobile industry with regard to exhaust emissions). Since the largest impact from pollution (and associated waste products) is produced within the secondary industries, this sector will be the subject of discussion. Most economists commonly refer to the secondary industries (the manufacturing sector) as a factory emitting large amounts of smoke into the air.

However big or small, environmental groups help to publicize industries that pollute. In every case, industry has important decisions to make regarding how it conducts business. The industrialization of the world has had a profound effect on its people and environment. Industry has not always performed admirably with respect to its responsibility for the pollution it expels into the ecosystem. Nonetheless, with current governmental regulations, the efforts of individuals and environmental groups, and the realization by leaders of industry, themselves, that a healthy environment is good for business and profits, the industrial community is more effectively balancing profits with its environmental responsibility to the general satisfaction of most people.

A. Pollution

Environmental pollution is the condition when the natural cycle of our environment gets disturbed and harms us. Some harmful environmental contaminants in the form of smoke, solid or liquid wastes get intermingled into the environment and pollute it. Humans can keep a check on environmental pollution by limiting their bad activities.

Pollution is classified into many categories according to the natural resources getting affected such as air pollution, soil pollution, water pollution, noise pollution, etc. Rate of pollution is increasing due to the greediness of the human being to earn more money and to fulfill their never ending desires.

Some types of pollution affecting our day to day life are:

1. Water pollution

Water is one of the most important natural resources on the planet which is one of the necessary elements to sustain life on earth. Addition of harmful products to water which make is unusable is commonly known as Water Pollution. These products could be chemical, biological or physical materials that deteriorate the quality of water and the lives associated with it. Some of the most common water pollutants include industrial wastes (which are directly dumped into the sea or lakes making the water unfit for fishes and other organisms living in the water), domestic and farm wastes, oil spills, pesticides, as well as mining and agricultural wastes. (Pollution, Water Pollution, Air Pollution).

2. Noise pollution

It is the excessive harshness in the environment, primarily due to sounds created by machines. It is generally caused by loudspeakers, microphones, loud music, noise from industries, from construction and civil engineering works etc.

3. Land Pollution

Degrading the earth's surface by improper commercial, industrial, agricultural and domestic activities is known as land pollution. Dumping of e-wastes and other industrial wastes into the land causes land pollution. Insecticides, pesticides etc also harm the agricultural land and the soil. Mining, deforestation, oil refineries construction debris, etc are the most common land pollutants.

B. Global Warming

Global warming is a major atmospheric issue all over the world. Global warming occurs when carbon dioxide (CO_2) and other air pollutants and greenhouse gasses collect in the atmosphere and absorb sunlight and solar radiation that have bounced off the earth’s surface. Normally, this radiation would escape into space—but these pollutants, trap the heat and cause the planet to get hotter. That's what's known as the greenhouse effect.

The effects of Global Warming are as follows:

1. Climate Change

Global warming is causing climate change. The world’s is becoming warmer.

2. Sea Level Change

One major consequence of global warming arising out of greenhouse effect is the rise in sea level. Four major changes take place prior to this. They are: Thermal expansion, mountain glacier melting, Greenland ice sheet melting and Polar (Arctic and

Antarctic) ice sheet melting. Thus, the coastal cities and ports may be submerged under sea-water. Many islands may vanish from the earth surface as well as from the world map.

3. Water Balance

Although changes in sea-level have received much publicity, problems of water availability are likely to be more serious and perhaps more expensive to solve. In future, warmer world will face water crisis in some parts while in other regions it will be wetter than it is now.

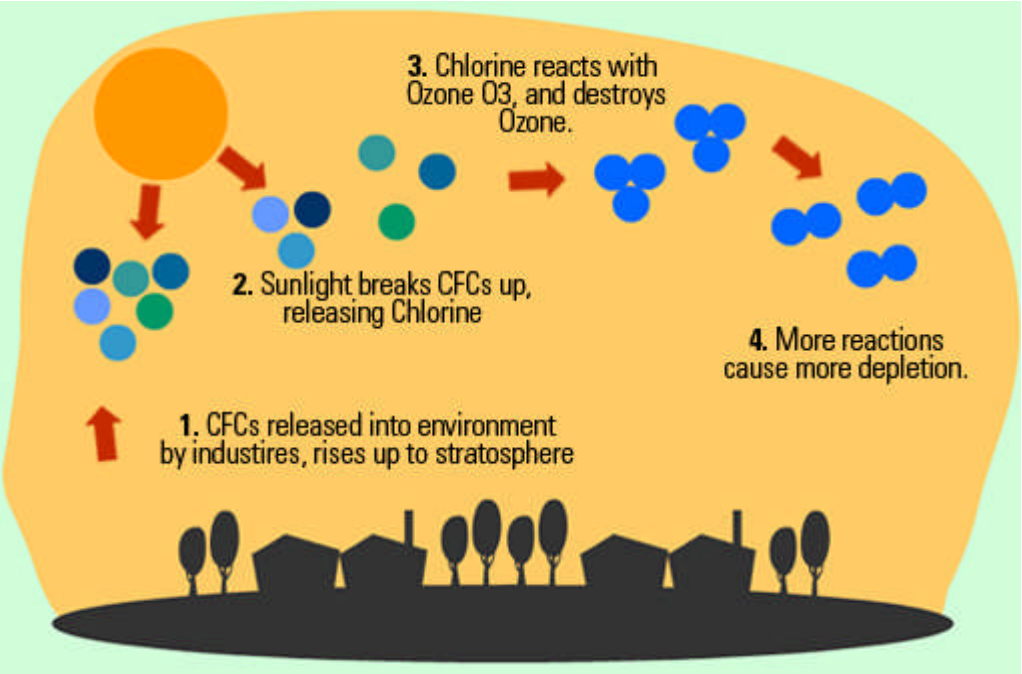
4. Human Health

The human health is put at risk because of Global warming. In recent years, there have been reports of spread of major tropical diseases with changing climate. As the earth becomes warmer, more and more people are likely to be affected by tropical diseases.

C. Ozone depletion

Ozone layer depletion, is simply the wearing out (reduction) of the amount of ozone in the stratosphere. Unlike pollution, which has many types and causes, Ozone depletion has been pinned down to one major human activity i.e. industries that manufacture things like insulating foams, solvents, soaps, cooling things like Air Conditioners, Refrigerators and 'Take-Away' containers use something called chlorofluorocarbons (CFCs). These substances are heavier than air, but over time, (2-5years) they are carried high into the stratosphere by wind action.

Depletion begins when CFC's get into the stratosphere. Ultra violet radiation from the sun breaks up these CFCs. The breaking up action releases Chlorine atoms. Chlorine atoms react with Ozone, starting a chemical cycle that destroys the good ozone in that area. One chlorine atom can break apart more than 100,000 ozone molecules.



Understanding Ozone Depletion

C1. Impact of Ozone Depletion

1. Skin cancer: Exposure to ultraviolet rays poses an increased risk of developing several types of skin cancers, including malignant melanoma, and basal and squamous cell carcinoma.

2. Eye damage: Direct exposure to UV radiations can result in photokeratitis (snow blindness), and cataracts.

3. Immune system damage: Effects of UV rays include impairment of the immune system. Increased exposure to UV rays weakens the response of the immune system.

4. Accelerated aging of skin: Constant exposure to UV radiation can cause photo allergy, which results in the outbreak of rashes in fair-skinned people.

5. Other effects: Ozone chemicals can cause difficulty in breathing, chest pain, throat irritation, and hamper lung functioning.

6. Effects on Marine Ecosystems: Plankton (phytoplankton and bacterioplankton) are threatened by increased UV radiation. Marine phytoplankton play a fundamental role in both the food chain as well as the oceanic carbon cycle. It plays an important role in converting atmospheric carbon dioxide into oxygen. Ultraviolet rays can influence the survival rates of these microscopic organisms, by affecting their orientation and mobility. This eventually disturbs and affects the entire ecosystem.

7. Impact on Plants: In some species of plants, UV radiation can alter the time of flowering, as well as the number of flowers produced by a plant. Plant growth can be directly affected by UV-B radiation. Despite mechanisms to reduce or repair these effects, physiological and developmental processes of plants are affected.

D. Acid Rain

Acid rain is a matter of great global concern and has become one of the major environmental problems. The term acid rain used first by Robert Angus Smith, the Chief Inspector of UK in 1872, describes the “acidic nature of rain falling around Manchester. Acid rain can describe as a condition in which natural precipitation becomes acidic after reacting chemically with pollutants in the air”. Acid rain is any other form of precipitation that is unusually acidic, meaning that it possesses elevated levels of hydrogen ions (low pH).

D1. Causes of Acid Rain

Acid rain is caused by emissions of sulfur dioxide and nitrogen oxide, which react with the water molecules in the atmosphere to produce acids. The principal cause of acid rain is sulfur and nitrogen compounds from human sources, such as electricity generation, factories, and motor vehicles. Some governments have made efforts since the 1970s to reduce the release of sulfur dioxide and nitrogen oxide into the atmosphere with positive results.

D2. Effects of Acid Rain

It can have harmful effects on plants, aquatic animals and infrastructure. The chemicals in acid rain can cause paint to peel, corrosion of steel structures such as bridges, and weathering of stone buildings and statues. The adverse effects of acid rain can be seen on vegetation, soil, marine resource, monuments as well as on man. Its reaction includes change in color of leaves, premature drops of leaves, trees die. In soil, rate of decomposition of organic matter and formation of nitrogen fixing organisms is reduced by acids.

Acid rain is an increasing problem in the industrial region and effects the environment. Only developed technology can save the world from this.

2.8 SUSTAINABLE INDUSTRIAL PRACTICES

Sustainable business practices mean the application of sustainability principles to business operations. Sustainability can mean a variety of things – ecological sustainability, social sustainability or even sustained economic growth.

A sustainable business is any organization that participates in environment friendly or green activities to ensure that all processes, products, and manufacturing activities adequately address current environmental concerns while maintaining a profit. In other words, it is a business that “meets the needs of the present world without compromising the ability of the future generations to meet their own needs.” It is the process of assessing how to design products that will take advantage of the current environmental situation and how well a company’s products perform with renewable resources.

Some ways of making business sustainable are as follows:

2.8A. Green Business

The business which is concerned about the environment becomes a Green Business. Sustainable business, or green business, is an enterprise that has minimal negative impact on the global or local environment, community, society, or economy. In general, business is described as green if it matches the following four criteria:

1. It incorporates principles of sustainability into each of its business decisions.
2. It supplies environment friendly products or services that replace demand for non green products and/or services.
3. It is greener than traditional competition.
4. It has made an enduring commitment to environmental principles in its business operations.

Green businesses ensure that they use the safest ingredients, to keep their customers and clients and their families healthy. They also provide green living alternatives to improve quality of life, with products and services that help in areas like affordable housing, sustainable agriculture, education, clean energy and efficiency, fair trade, healthy air, clean water, and more. This business use “Three-R’s” to manage waste - Reduce, Reuse, and Recycle.

Becoming a green business involves a learning curve where business owners learn how other businesses have changed their business practices, then make changes to their own practices that are appropriate to their line of business.

2.8B.Green Consumption

Green consumerism creates a balance between the expectations of consumer behavior and businesses' profit motives - within the realm of environmental protection. It increasingly looks at

the entire life cycle of a consumer's purchases - because a consumer does not just buy a product, but also everything that goes into its production, and everything that will happen in the future as a result of that product.

Consumers need to realize that all products have an environmental impact, however small. The concept of green consumers also focuses on businesses and their survivability as they respond quickly to demands of consumers for products and services that are also environment friendly.

Green consumerism creates a balance between the expectations of consumer behavior and businesses' profit motives. To highlight the balance the following points are made:

- Businesses that innovate and respond quickly to consumer demands survive best.
- Everyone has a part to play, at various levels of administration, manufacture and use.
- A consumer has to realize that he/she not just buys 'a' product, but understand everything that goes into its production, and everything that will happen in the future as a result of that product.
- All products have an environmental impact, however small. The idea is to reduce it to the minimum.

The impacts of green products are as follows:

- There is a rise in demand for such products.
- Businesses have looked into the green process - generating corporate environmental profiles, monitoring and evaluating green performance, and improving corporate image as a result.
- Green products have also increased competition among businesses to generate more environmentally friendly products.
- Eco-labeling networks that monitor and evaluate green products have been developed in many countries..
- Governments have also taken several measures that have supported and facilitated such businesses.
- Well-informed consumers are emerging as a new force to create an environmentally sustainable world.

2.9 CORPORATE SOCIAL RESPONSIBILITY (CSR) TOWARDS ENVIRONMENT

Corporate social responsibility (CSR) is a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with the stakeholders on a voluntary basis.

The concept of CSR goes beyond charity and requires the company to act beyond its legal obligations and to integrate social, environmental and ethical concerns into company's business process. What is generally understood by CSR is that the business has a responsibility – towards its stakeholders and society at large – that extends beyond its legal and enforceable obligations.

The triple bottom line approach to CSR emphasizes a company's commitment to operating in an economically, socially and environmentally sustainable manner.

2.9A. Advantages of Corporate Social Responsibility (CSR)

The advantages of CSR are as follows:

1. Improvement in the image of the Corporation

Corporates that implement CSR policies have increased goodwill. People always want to be associated with the best and the most popular company's product and services, so in that respect, the corporation rises in stature and becomes an important player in its market.

2. Increased Attraction and Retention of Employees

Companies having solid CSR commitments find it easier to recruit and retain employees. People want to work for companies that care about the well-being of their employees and provide good working conditions.

3. Attracts more Capital Inflow from Various Sources

A company's image plays a huge role in attracting investors. If the company is engaged in CSR programs, its image gets a massive boost, and so, people invest in its operations heavily.

4. Positive Publicity

A good CSR program will always give good publicity and even act as an advertisement for the company. It also sets the company apart from its competitors.

2.9B. Corporate Social Responsibility towards Environment

Companies while creating profit should also be aware that they can contribute to managing their operations in a sustainable manner in such a way as to enhance economic growth and increase competitiveness whilst ensuring environmental protection and promoting social responsibility, including consumer interest.

Leading corporations that have achieved CSR success with environmental initiatives can motivate their contemporaries to improve operational efficiency, rethink product designs, and seek out new and innovative technology. Effective resource management and energy efficiency are major environmental CSR goals that are relevant for every business. This creates opportunities for cost savings, revenue generation, and can even influence overall brand strength through positive environmental reputation.

2.10 SUMMARY

Conserving the environment is the need of the hour. Development of mankind is necessary, however it should not compromise on environment. While doing agriculture if sustainable practices are not followed, it can result harming the land and untimely the land may become unusable. If care is not taken while doing agriculture the following problems may occur to the land - loss of productivity, land degradation, desertification, uneven food production, hunger and malnutrition.

Similarly industries also have to take the necessary steps to protect the environment. The environmental problems associated with industries are pollution, global warming, ozone depletion and acid rain. Industries can help to conserve the environment by practicing green business, i.e. making eco-friendly products. Similarly consumers can also help to conserve the environment by practicing green consumerism. It means consumers become cautious and consume only those products which are eco-friendly.

Corporates can help conserve the environment by taking up the issue as a part of the Corporate Social Responsibility. Today, customers have a better image for companies that work on conserving the environment. Corporates can adopt technology which is eco-friendly.

2.11 CHECK YOUR PROGRESS/EXERCISE

A. True or False

1. There is no relationship between environment and agriculture.

2. Agricultural productivity declines considerably due to floods and the climatic change.

3. Healthy soil is full of life, which cannot be killed by the overuse of pesticides.

4. Global warming is a major atmospheric issue all over the world.

5. Corporate Social Responsibility does not increase the goodwill if the company practicing it.

B. Fill in the Blanks

1._____ pollution is the excessive harshness in the environment, primarily due to sounds created by machines.

2. The business which is concern about the environment becomes a _____ Business.

3._____ farming relies on fertilizers of organic origin such as compost, manure, green manure, and bone meal and places emphasis on techniques such as crop rotation and companion planting.

4. _____ is a type of land degradation in which relatively dry area of land becomes increasingly arid, typically losing its bodies of water as well as vegetation and wildlife.

5. Increasing growth of population and demand for more residential areas and commercial sectors is also one of the reasons for _____ degradation.

C. Multiple Choice Questions

1. Agricultural productivity declines considerably due to _____ .

a. Floods
b. Hunger
c. Crop production
d. Poverty

2. _____refers to excessive eating of grasses and other green plants by cattle.

a. Deforestation
b. Land Degradation
c. Overgrazing
d. Overboard

3. _____ is a lack or excess of energy and nutrients, essential vitamins and minerals in any one diet.
a. Starvation
b. Infection
c. Minerals
d. Malnutrition

4. Addition of harmful products to water which make is unusable is commonly known as _____ Pollution.
a. Soil
b. Water
c. Air
d. Noise

5. _____ is when carbon dioxide (CO_2) and other air pollutants and greenhouse gasses collect in the atmosphere and absorb sunlight and solar radiation that have bounced off the earth's surface.
a. Global warming
b. Acid Rain
c. Ozone Depletion
d. Pollution

2.12 ANSWERS TO THE SELF-LEARNING QUESTIONS

A. True or False
1. False
2. True
3. False
4. True
5. False

B. Fill in the Blanks
1. Noise
2. Green
3. Organic
4. Desertification
5. Land

C. Multiple Choice Questions
1. Floods
2. Overgrazing
3. Malnutrition
4. Water
5. Global warming

2.13 TECHNICAL WORDS AND THEIR MEANINGS

a. Land degradation: It is a process in which the value of the biophysical environment is affected by a combination of human-induced processes acting upon the land.

b. Desertification: It is a type of land degradation in which relatively dry area of land becomes increasingly arid, typically losing its bodies of water as well as vegetation and wildlife.

c. Sustainable agriculture: It is farming in sustainable ways based on an understanding of ecosystem services, the study of relationships between organisms and their environment.

d. Environmental pollution: It is the condition when the natural cycle of our environment gets disturbed and harms us.

e. Global warming: It occurs when carbon dioxide (CO_2) and other air pollutants and greenhouse gasses collect in the atmosphere and absorb sunlight and solar radiation that have bounced off the earth's surface.

f. Acid rain: It is a condition in which natural precipitation becomes acidic after reacting chemically with pollutants in the air.

g. Green Business: The business which is concern about the environment becomes a Green Business.

h. Corporate social responsibility (CSR): It is a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with the stakeholders on a voluntary basis.

2.14 TASK

Find out from three Industries, the sustainable practices they have adopted to conserve the environment.

2.15 REFERENCES FOR FURTHER STUDY

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Unit -3

TOURISM IN INDIA: NATURE, SCOPE, POTENTIALS, ECOTOURISM.

After going through this chapter, you will be able to understand the following features:

3.1. OBJECTIVES

By the end of this unit you will be able to –

- Understand the nature and scope of tourism
- Understand the concept of ecotourism
- Understand types and potentials of tourism

3.2. INTRODUCTION

Economic, geographical and social studies include the study of all those sectors which affect the economy, nature and mankind respectively. Various sectors like banking, research, education and many more play a vital role in the development of mankind and countries. A sector which is recently recognized is the **Tourism sector**. Though tourism is only about exploring new places and rejuvenation, in true sense it is a lot more. It has the potential to develop a country by contributing economically and socially to the country and serve the mankind by offering facilities of leisure, pleasure, recreation and vacation. However, tourism is largely based on geographical factors as geographical factors provide resources for tourism like topography, natural beauty, culture, traditions and a lot more. Hence, it forms an important component of geographical studies. On the other hand, it is a highly labour intensive industry. This makes tourism important in social and economic studies too. In developing countries like India, which has a huge diversity in natural and manmade factors, tourism plays an important role in its growth and development.

3.3. SUBJECT DISCUSSION

The tourist, the businesses providing tourist goods and services, the government of the host community, and the host community tourism is the processes, activities, and outcomes arising from the relationships and the interactions among tourists, tourism suppliers, host governments, host communities, and the surrounding environments that are involved in the attracting and hosting of visitors. Tourism, therefore, is a composite of activities, services, and industries that deliver a travel experience: transportation, accommodations, foodservices, and attractions. Definitions of tourism and tourists vary as the basis of distance travelled, length of time spent, and purpose of the trip.

3.4. DEFINITIONS AND MEANING

Theobald (1994) suggested that etymologically, the word **'tour'** is derived from the Latin word**'tornare'** and the Greek word

'tornos' which means **'a lathe or a circle'**. In simpler words, it means to move around a central point or axis.

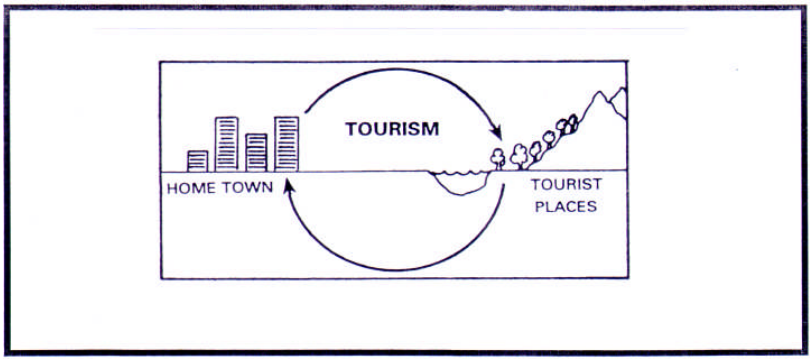

Fig.3.1 Tourism

One of the earliest definitions of tourism was given by an Australian economist. **Hermann V Schullard**, in the year **1910** who defined it as, "the sum total of operators, mainly of economic nature which directly relate to the entry, stay and movement of foreigners inside and outside a certain country, city or region".

In **1942 Swiss Professors Hunziker and Krapf** defined tourism as "tourism is the totality of the relationship and phenomenon arising from the travel and stay of strangers, provided the stay does not imply the establishment of permanent residence and is not connected with a remunerative activity."

In **1976**, the **Tourism Society of England's** definition was "Tourism is the temporary, short-term movement of people to destination outside the places where they normally work and live and their activities during the stay at each destination. It includes movements of all purposes"

"Tourism is therefore, a composite phenomenon which embraces the incidence of mobile population of travellers who are strangers to the places they visit. It is essentially a pleasure activity in which money earned is one's normal domicile is spent in the place visited".

<u>According to W.T.O. recommendations</u>

Tourism comprises of all the activities related to a person's travelling to and staying in places outside his/her usual environment for not more than one consecutive year for leisure, business and other purposes.

From the above definitions, it is clear that tourism represents various types of short-term travel and is variably defined for particular purpose of the journey, its duration and other criteria.

Tourism is broadly understood with the help of three major aspects viz. **Leisure, Pleasure, and Recreation**.

- **Leisure:** use of free time for enjoyment.
- **Pleasure:** a feeling of happy satisfaction and enjoyment.
- **Recreation:** done for enjoyment when one is not working.

Thus, a synoptic definition of tourism could be 'travel for leisure, pleasure, recreation or business purposes'.

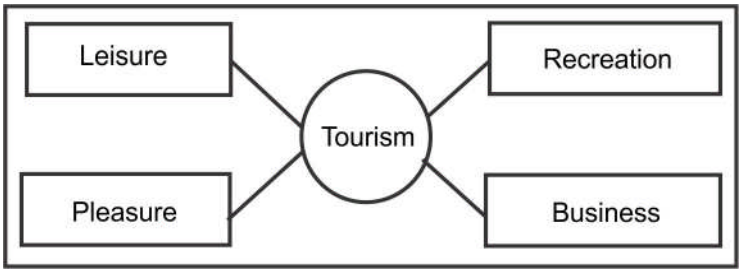

Fig.3.2 Major causes of Tourism

3.5. NATURE, SCOPE AND IMPORTANCE OF TOURISM

- **Nature of Tourism**

The nature of tourism is dynamic. It has the ability to change and grow with the changing environment.

- **Scope of Tourism**

The scope of the tourist industry is vast. It includes all sectors of the economy and may be governed by public sector and private sector in coherence. It is supported by sectors like transportation and telecommunication, financial sector and educational sector at a large scale. It is a highly labour intensive industry, thus, Research and Development and Human Resource activities form a major component of the industry.

With increasing demand for international and national tourism, the need to discover or invent new destinations and ideas of tourism is also increasing. Thus, newer forms of tourism are being added every day to the existing list.

For example: Slum Tourism in Mumbai

Many foreign tourists belonging to the affluent and rich countries of the world visit India every year. There is an increasing trend of visiting the slum areas of India especially Mumbai to experience the unique slum culture in the country. This is more prominent in Mumbai because of the presence of the Dahravi Slum which is Asia's largest slum that has gained popularity through cinema and other media. Movies like Slumdog Millionaire and Bhootnath returns have contributed to its popularity.

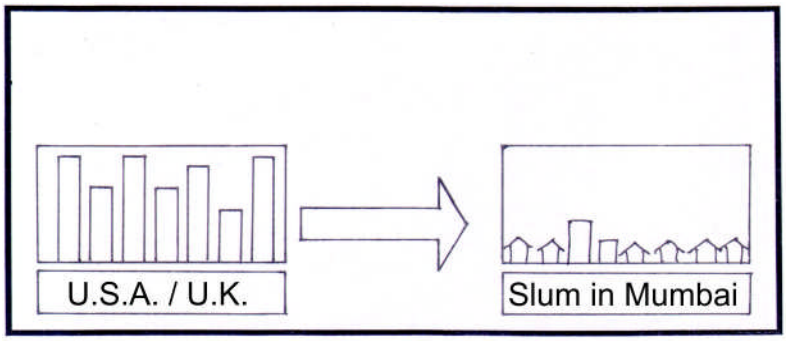

Fig.3.3 Slum Tourism

In short it can be said that the scope of tourism is unlimited as it every small and big purpose of tourism which satisfies the tourists in their own way and here lies the importance of tourism.

- **Importance of Tourism**

Tourism industry has the potential to benefit the economy on a large scale by providing foreign exchange, exchange of goods and services and through cultural exchange. It helps in building image of the country in the global market and has a huge potential for employment.

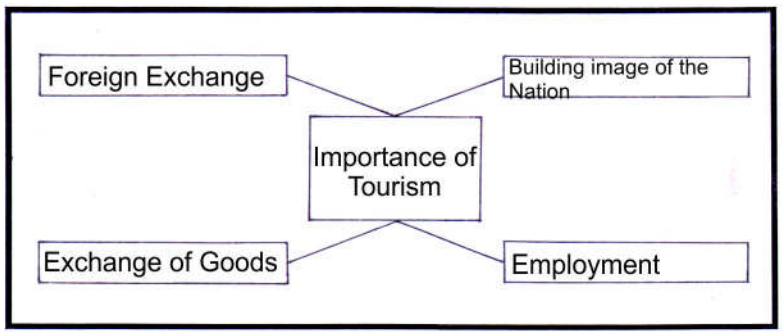

Fig.3.4 Importance of Tourism

3.6 TYPOLOGY OF TOURISM: CLASSIFICATION

Tourism can be broadly classified into the following three types:

- **Domestic Tourism:** It involves visiting tourist destinations within the country of residence. For example: Citizens of India visiting tourist destinations of India.

- **Inbound Tourism:** It involves tourism from one country to another country where none of the countries is a resident country. For example: Citizens of India going on a world tour where they travel from one to another country besides India.

- **Outbound Tourism:** It involves tourism to another country besides the residing country. For example: Residents of India visiting Dubai.

All the above forms of tourism can be combined to form three more types of tourism

- **Internal Tourism** which involves movement within a country and is a combination of domestic tourism and inbound tourism

- **National Tourism** which involves movement between countries and is a combination of domestic tourism and outbound tourism

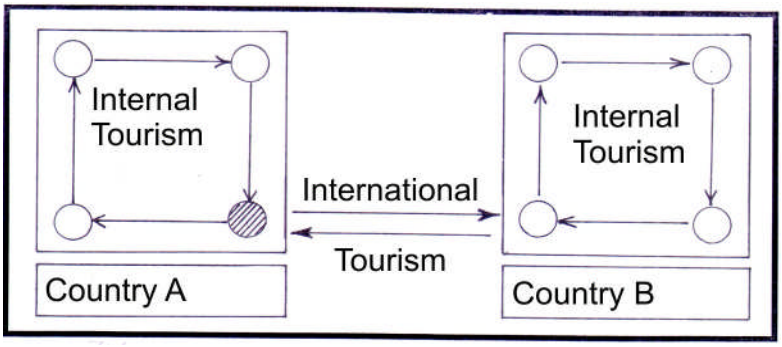

Fig. 3.5 Internal & International Tourism

- **International Tourism** which involves tourism within the countries but is a combination of inbound tourism and outbound tourism.

Tourism Based on Purpose

Recently many new types of tourism based on the purpose of travel and/or tourism have evolved. The list is exhausting, however following are some of the prominent new types of tourism:

a) Religious Tourism: Visits to religious places, places of worship and holy locations. For example: trip to the holy caves of Amarnath, the Golden Temple at Amritsar, Mecca and Madina, etc.

b) Adventure/ Sports Tourism: Travel for the purpose of experiencing adventure. It involves trekking, adventurous sports etc. For example: a trip to Uttarakhand may include spots of adventure tourism like river rafting, paragliding, river crossing, trekking etc.

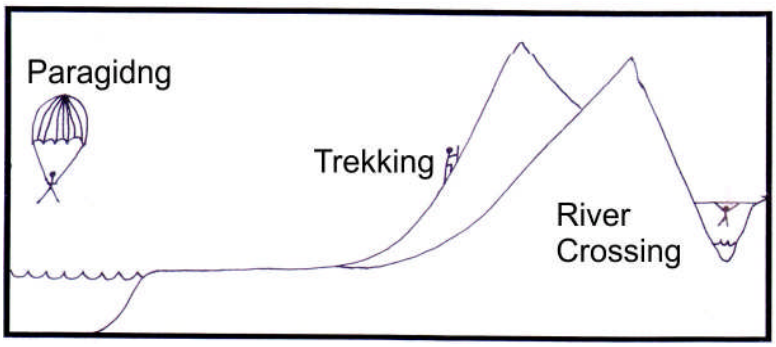

Fig. 3.6 Adventure Tourism

c) Cultural Tourism: Travel to places of entertainment and landmarks of a particular country or a place. It includes man made events like tourism festivals, museums, musical concerts, famous locations etc. For example: travelling to Delhi to enjoy the Qutub Minar festival which is organized in November-December every year.

d) Medical Tourism: Travel for medical and health purposes. In India, Kerala has observed a rise in Medical tourism particularly for Ayurveda in the last decade. Medical tourism is practiced due to two reasons viz. non availability of medical infrastructure in the place of residence and cheapness of the treatments in other locations. India receives a large number of patients from all over the world due to the relative lower costs of best treatments here. Mumbai is famous for Allopathic treatments especially for cancer and heart related problems.

e) Rural Tourism: Traveling to rural areas to experience the lifestyle of a village is called rural tourism. It is prominent in mega cities like Mumbai where people move to destinations in the periphery to enjoy the bounty of nature and a life free from all the urban stresses and tensions. Karjat is a famous rural tourism destination arround Mumbai. When visting agricultural areas is included in rural tourism, it may also be called as Agrotourism.

f) Geotourism: Tourism to geologically important and extravagant places is geotourism. It includes visits to places of visible landforms and geologically active locations like crater lakes, fossil parks, active plate boundary locations, etc. The Siwalik Fossil Park in Himachal Pradesh and the Lonar Crater Lake in Maharashtra are good examples.

g) Dark Tourism: Visits to places that involve danger to life at present or have a history brutality are a part of dark tourism. Places that are abandoned or have been struck by a massive disaster in the past are also visited in this of tourism. The Jallianwala Baugh Massacre site and the site of Chernobyl disaster are most suited examples.

h) Historical Tourism: Historical tourism involves travel to places of historical importance. Visits to forts, palaces, important locations in history, caves, etc. is included in this. In India, the Red Fort in Delhi, the Taj Mahal in Agra and the Victoria Memorial in Kolkata are some of the famous examples.

i) Disaster Tourism: It is visiting the site of disaster to study or observe the effects of a disaster either occurred recently or in the past. The effects of the disaster in this case may not be as detrimental as in the case of dark tourism. Also, disaster tourism is often observed at the sites of natural disasters. Tourists may include people ranging from politicians who visit to express sympathy and offer help to local people who visit for research and observation purposes.

j) Slum Tourism: When people from affluent backgrounds visit slum areas to experience their poor conditions, conduct research related activities and extend social service activities, it is termed as slum tourism. It is observed in the developing countries of the third world like India, Brazil and many African countries. In India, the Dharavi slum in Mumbai is famous for its increasing slum tourism due to its popularity as being the largest slum in Asia.

k) Business Tourism: Travel to other places for business purposes is called as business tourism. Economically proliferating places like country and state capitals, other business centres, industrial development zones, etc. are famous business tourism destinations. In India, all the four metropolitan cities of Delhi, Kolkata, Chennai and Mumbai along with Bangalore, Pune, Nagpur, etc. are famous business tourism centres.

l) Coastal Tourism: Many coastal areas are experiencing particular pressure from growth in lifestyles and grooming number of tourists. Coastal environment is limited extent consisting of only a narrow strip along the edge of the ocean. Coastal areas are becoming popular as health resorts, beach resorts and water resorts facilities e.g.: - Wind – surfing, Scuba diving etc. The 7500-sq. km coastline of India offers several beaches and related attractions.

m) Yoga Tourism: India’s Greater contribution is its ancient system of yoga and aerobics. Several short term courses or crash courses are also offered to the tourists who come for a short visit. For the last ten years, international yoga week is being organised at Rishikesh. (21st June International Yoga Day)

3.7 TOURISM POTENTIAL IN INDIA AND CHALLENGES

Although India has progressed a lot since 1950s with respect to tourism, she is still way behind the developed or even the developing countries. India's share in the tourist arrival has been growing at a snail's pace from 0.23 per cent in 1975 to 0.28 per cent in 1980 and 0.42 per cent in 2004. This small percentage comes under sharp focus when we see that in 2004, India received only 2.9 million foreign tourists. Compared with this, the foreign tourist arrivals were 6.5 million in Singapore, 9.6 million in Thailand, 10.0 million in Malaysia, 13.1 million in Hong Kong and 31.2 million in China. West is doing better getting 29 per cent of the tourist inflow. South, despite its beaches, temples, hills, etc. gets only 18 per cent of foreign and domestic tourists. Thus, there is great potential for development of tourism, particularly in east and south, which require proper tapping with immediate effect. Foreign tourists often fail to get suitable accommodation in hotels and go back as a dissatisfied lot. At the beginning of the millennium, India's shortage was estimated at 30,000 rooms. Today, the requirement is much larger, considering rapid increase in the inflow of foreign tourists after 2002. There is lack of appreciation of the holistic approach to tourism development which takes into account the linkages between environment and pressure of tourists. The result is that, almost all the popular tourist centres are groaning under the pressure of annual visitors and quite often facing difficult situation.

- **Natural Potentials:**

India has a large variety of natural phenomena and resources of tourism. With its diverse geographical features ranging from high mountains to low lying plains and waterbodies, India has a lot to offer. It has the potential to satisfy all the tourism purposes demanded by different types of tourists.

The natural potentials of tourism in India can be studied by dividing them into three viz. high mountainous regions, plains and waterbodies.

a) High Mountainous Regions: India has many mountain ranges which are present in all its directions. The Himalayan Mountains in the North and East, Eastern Ghats on the Eastern coast, Western Ghats on the western coast, the Aravallis in the West and Vindhya and Satpuda ranges in the Central part. Mountains have a cooler climate and wilderness that attract tourists. Due to altitude and topography, mountains serve as hotspots for adventurous activities like trekking and other sports. Hence, many hill stations and adventure spots have developed in the mountainous regions of the country. For example: Mount Abu in

the Aravallis Ranges of Rajasthan, Shimla in Himalayan Ranges in Himachal Pradesh, Darjeeling in Assam and Coorg in Karnataka are some of the famous hill station in India.

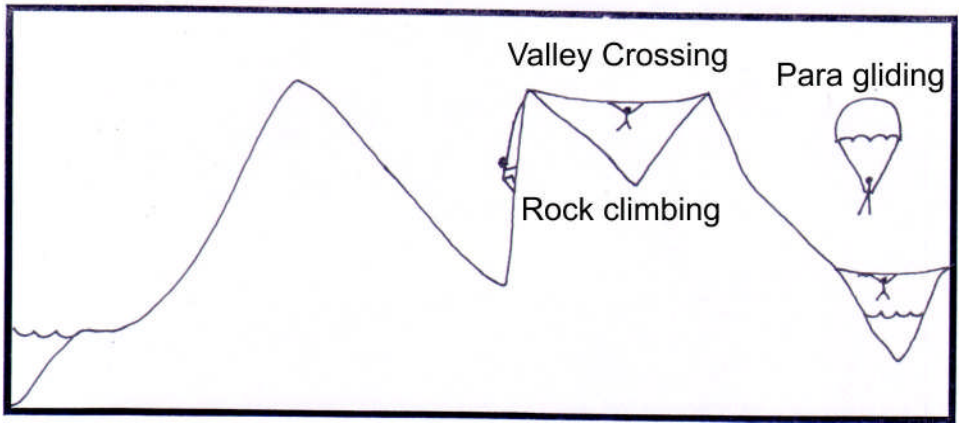

Fig. 3.7 Sports Tourism

b) Plains: Plains include natural features like rivers, forests and sites of unique natural beauty like deserts. India is a country of rich natural phenomena. There are many major and minor rivers which are attractive from tourism point of view. Most of them also offer sites for water sports and research. The landforms created by rivers is a major attraction. The dams established on these rivers are also attractive to the tourists. Forest resources like the diversity in species of flora and fauna attract the tourists. Photographers, wildlife researchers and students visit forests quite often. In India, the holy rivers of Ganga and Yamuna in the North receive maximum tourists, river Godavari, Krishna and Bhima are also famous for tourism. The forests of Chhattisgarh and Western Ghats are frequently visited by tourists. The Thar Desert in Rajasthan and Rann of Kutchtch in Gujarat are all time favourite tourist attractions.

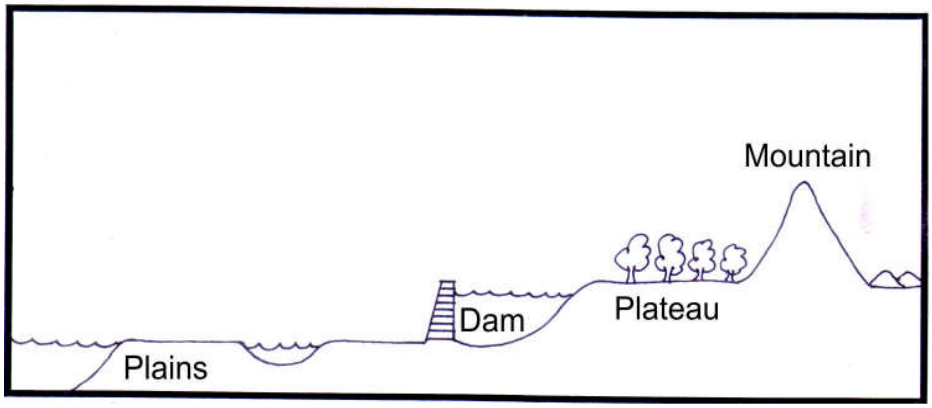

Fig. 3.8 Relief divisions

c) Water Bodies: Water bodies include oceans, seas, rivers and associated features like waterfall and plunge pool and natural lakes and ponds. Water bodies carve the landscape to form special landforms and thus, attract tourist from interdisciplinary fields. The

coastal tourism and island tourism are a result of the actions of the ocean and resultant attractions. Waterfalls are a major attraction worldwide. Even a small waterfall can attract tourists and fulfill their purpose of tourism. On the other hand, glaciers which is frozen water also attract people, however, not all can reach the site due to problems associated with altitude and health. The Dhuandhar falls in Madhya Pradesh, the Gangotri Glacier in Uttarakhand and all the beaches and landforms created by the Arabian Sea and Bay of Bengal are good examples.

- **Man-Made Tourism Potentials:**

Along with natural resources of tourism, India has developed a large number of man-made tourist sites also. Man-made tourist sites may include all those establishments that are created by man with a view to boost tourism or have become famous tourism destinations over time. This is due to the unique characteristics or distinctive history.

The man-made tourism potentials in India can be studied by dividing them into the following three broad categories:

a) Religious/Cultural sites: The pilgrimage sites and sites of cultural showcase or exchange are all considered a part of man-made tourism attractions. This is because though cultures and religions are influenced by natural environment, they are ultimately created or established by mankind. Since India is a country of almost all religions residing within its boundaries with respective cultures, it is obvious to have a variety of religious places here. There are innumerous religious places spread across the country. The Vaishnodevi Temple in Jammu and Kashmir, Jagannathpuri on Odhisa and the twelve Jyotirlinga Temples across India are some of the examples of Hindu religious places. The Golden temple in Amritsar, Punjab; the Jama Masjid in Delhi, the Churches in Goa are some famous examples of religious places belonging to other religions in India. Similarly, many cultural programmes are organized to attract tourists from all over the world. These shows showcase India's varied cultural regimes that are not very known to the people. For example: The Jaisalmer Desert Festival in Rajasthan, Khajuraho Dance Festival at Madhya Pradesh and Rann Utsav in Gujarat which are held every year to boost tourism.

b) Historical sites: Historical sites include monuments and places of historical importance. History has been created by mankind, hence, all structures, places and historically important objects are also considered to be the product of mankind's interaction with time. In India, there are several such monuments, places and objects that depict its mythological and post mythological history. These places satisfy the curiosity and explorative attitude of researchers, historians and other interested

people. The Qutub Minar in Delhi, The Victoria Palace in Kolkata, The Stupa of Ranchi at Ranchi, Ram Bhoomi in Uttar Pradesh, forts of Great Shivaji, all the caves like Ajanta and Ellora Caves in Maharashtra and the site of Jallianwala Baug massacre in Punjab are good examples of historical sites of tourism in India. One of the seven wonders of the World- The Taj Mahal

c) Amusement/Entertainment sites: Man has always been a curious animal and keeps finding out newer ways of satisfying and entertaining himself. An outcome of this is the amusement parks and other sites of entertainment. In india there are several amusement parks like AdlabsImagica and Essel world in Maharashtra, Akshardham in Delhi, Wonderla parks at Bangalore, Kochi and Hyderabad and many more. Other sites of entertainment may include examples like Ramoji Fim studio in Hyderabad, Film city in Mumbai and Kingdom of Dreams in Gurgaon.

Overall, it can be said that India is a rich country with all tourism potentials present here.

- **Challenges Faced by India:**

The challenges that are faced by the tourism industry in India are as follows:

a) Over population and pressure on resources: India is the second most populous country in the world. The pressure on resources is therefore huge. The resources that India has, are already insufficient to meet the basic needs of the population. Thus, shelling out extra resources for an additional demand laid by the tourism industry is a difficult task for India.

b) Lack of Infrastructure: Due to insufficient capital and shortage of resources the tourism infrastructure is inadequate in India. Tourism infrastructure includes transportation facilities, accommodation facilities, availability of hygienic and multi cuisine food and beverages and a huge manpower to extend hospitality to the tourists. Lack of planning and expertise required by quality development is the main cause of inadequate tourism infrastructure in the country.

c) Political Instability: India is a politically very active nation. It has many political parties, so the incidences of fights and riots are a common feature here. When such incidences take place in the country, tourists believe that it is unsafe to travel here and the trend of tourism is badly affected.

d) Unforeseen Events: Natural or man-made disasters are considered as unforeseen events. Recently, many disasters have occurred in India either due to man-made causes or natural causes.

Once a disaster occurs, it takes a long time for the country to recover from the situations and bring everything back to normal. The difficult situations of the disaster affected places do not allow tourist to visit them and tourism is affected.

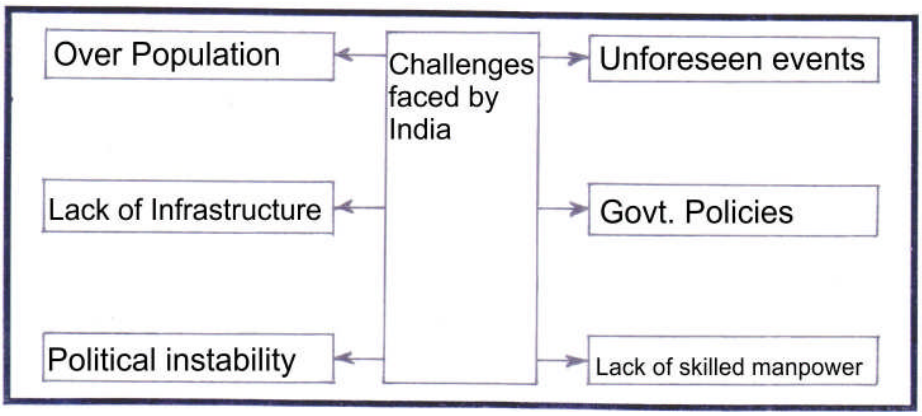

Fig. 3.9 Challenges faced by India

e) Government Policies: The role of Government is crucial in the development of any industry. If the policies laid down by the Government are strict, applicable and supportive the concerned industry can develop very well, but, in India, the policies laid for the development of tourism industry are not so strict and supportive giving a setback to industry.

f) Lack of skilled manpower: Tourism is a highly labour intensive industry requiring skilled labour on a large scale. Due to lack of awareness about the scope of industry and lack of training institutes, only a few people are able to get the training required to suit the tourism industry. Hence, the industry is dependent on a limited man power and is having a tough time expanding it further.

3.8 NATIONAL TOURISM POLICY

In 1982, the Indian Government presented its first tourism policy. It took the government until 2002 to present an updated policy document.

In the early days of independent India, quite rationally, the Government didn't pay much attention to tourism. The first public milestone in the history of tourism was the creation of the Indian Tourism Development Corporation (ITDC), in 1966. This federal organization was meant to develop tourist infrastructure and services. On a state level, similar Corporations were established, although unwillingly and after considerable delay. Their budgets were small and the scales of their operations were limited. Moreover, the tourist services they offered were generally considered substandard and indifferent.

- **The first Tourism Policy (1982)**

The first significant policy initiatives were taken in the early 1980s. With the prospect of hosting the Asian Games of 1982, the Indian Government had to start thinking about accommodating, transporting and entertaining the large number of visitors attracted by the event. This awakened a serious public interest in tourism, which was enhanced by the fact that tourism was India's largest earner of foreign currency. The objectives of this policy is to develop tourism industry in such a way that it:

1. Becomes a unifying force nationally and internationally fostering better understanding;
2. Helps preserving Indian heritage and culture and projecting the same to the world.
3. Brings socio-economic benefits in terms of employment, income generation, revenue generation, foreign exchange etc.
4. Gives direction and opportunity to the youth of the country to understand the aspirations and view point of others and helps in greater national integration;
5. Offers opportunities to the youth of country, not only for employment but also for taking up activities for nation- building and character building like sports, adventure, etc.

The national tourism policy, 1982 gave a boost to tourism and suggested improvements on various aspects like infrastructure to support increasing tourist arrivals in India, promotion of tourism so that India’s tourism destinations become popular worldwide and focus on the various types of tourism potential in the country.

- **The New Tourism Policy (2002)**

In the Chief Minister’s Conference held on October 30, 2001, the then Prime Minister of India, Shri. Atal Bihari Vajpayee had highlighted the importance of tourism for the growth and development of the country. Following this, a new tourism policy was formulated in 2002. The Government announced the policy with an aim to project India as a worldwide brand so as to ensure benefits from escalating travel and trade globally and the infinite potential in India that has not been tapped as a tourist destination.

The objectives of the National Tourism Policy, 2002 are as follows:

1. Placing tourism as a main economic growth engine;
2. Harnessing multiplier effects of tourism besides direct effects for generating employment, development of economy providing momentum to rural tourism;
3. As a main tourism growth driver, more focus is being laid on domestic tourism.

4. Placing India as a worldwide brand so as to benefit from escalating travel and trade globally and the infinite potential in India that has not been tapped as a tourist destination;
5. Private sector's critical role is acknowledged with administration working as a catalyst and pro-active facilitator;
6. Developing and creating integrated circuits of tourism on the basis on heritage, culture and unique civilization in India in partnership with private sector, states and other agencies; and
7. Ensure that tourists coming to India get mentally rejuvenated, physically invigorated, spiritually elevated, culturally enriched and "feel India from within".

The policy takes into consideration seven keys that will provide the thrust to tourism development. These are :

- **Swagat** (welcome)
- **Soochna** (information)
- **Suvidha** (facilitation)
- **Suraksha**(safety)
- **Sahyog**(cooperation)
- **Samrachana** (infrastructure development)
- **Safai**(cleanliness)

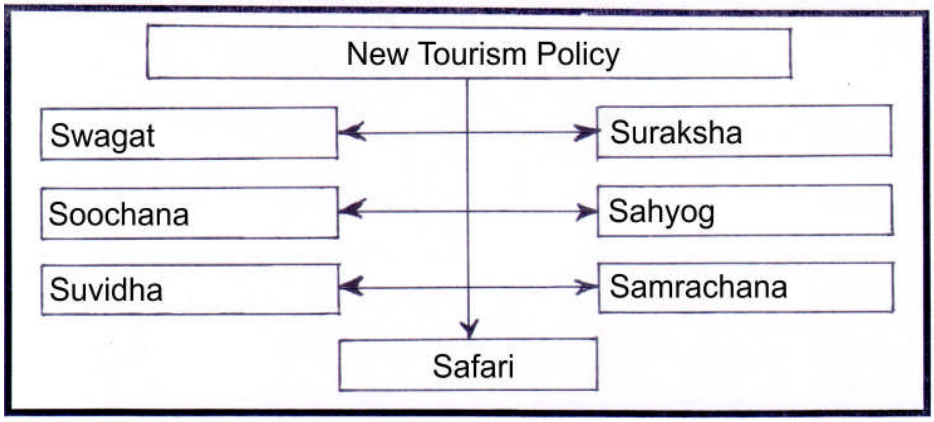

Fig. 3.10 New Tourism Policy

The policy suggests the following:

a) Improving and Expanding Product Development: The policy has made suggestions for the development of tourism destinations in India by giving region specific applicable ideas. For example: Develop sustainable beach and coastal tourism resort products based on a more flexible approach to developments in the coastal zone. These sites should be primarily in the regions of Goa, Kerala, Karnataka. The unique fairs and festivals of India like the KumbhMela should be promoted as unique tourism product of India as "Festivals of India"

b) Creation of World- Class Infrastructure: The infrastructure ranges from ports of entry, to modes of transport to destinations, to urban infrastructure supporting tourism facilities such as access roads, power electricity, water supply, sewage etc. New Tourism Policy suggests to improve the same so that tourism can be supported well.

c) Strategies for Effective Marketing: To effectively compete in tourism markets India will have to shift its current traditional marketing approach to one that is more aggressive and competitive.

d) Creating an India Tourism Brand Position: In the international market India requires a positioning statement that captures the essence of its tourism product to convey an image of the product to a potential consumer and which will become brand India. For e.g.: “Amazing Thailand”, “Malaysia, truly Asia.”. Thus, India came up with its campaign called ‘**Incredible India’**

Incredible India Campaign

In 2002, India's Ministry of Tourism launched a campaign to promote India as a popular tourist destination. The phrase **"Incredible India"** was adopted as a slogan by the ministry. The campaign projected India as an attractive tourist destination by showcasing different aspects of Indian culture and history like yoga, spirituality, etc. The campaign was conducted globally and received appreciation from tourism industry observers and travellers alike. Iconic Indian actor Amitabh Bachchan and former Miss World Priyanka Chopra have replaced Aamir Khan as the brand ambassador of Incredible India.

3.9 IMPACTS OF TOURISM

Like ever industry tourism too has its positive and negative impacts on all the dimensions of our soundings. These impacts can be observed at both places-place of remuneration and place of destination.

We shall study the positive and negative impacts of tourism on the following aspects: -

- Economy
- Culture
- Environment

On one hand, tourism wields tremendous economic positive outcomes: it is one of the world’s most significant sources of economic outcomes and employment. However, tourism is a very complex industry involving numerous stakeholders (sometimes with

opposite interests) and requiring significant amount of resources. As such, tourism can have very opposite effects according to the way activities are managed. Managed well, tourism can play a positive role in the socio, cultural, economic, environmental and political development of the destination and as such represents a significant development opportunity for many countries and communities. On the contrary, unchecked tourism development can lead to very damageable impacts.

➢ **Impacts of Tourism on Economy:**

Tourism has a high potential to impact the economy in several ways. Following are the positive and negative impacts of tourism on economy:

- **Positive Impacts:**

a) Increased domestic income and foreign currency earnings: the travel and tourism sector generates income and wealth for private individuals, companies and national Governments. At international level, the money that tourists spend in a country can make a considerable contribution to the economic output of the country. Many developing countries are therefore turning to tourism as a way of increasing their foreign currency earnings which they use to improve the status of health, education and social facilities.

b) Economic multiplier effect: At local level, revenue generated by tourism development leads to multiplier effect. The money that is spent by visitors in the destination area is re-circulated in the local economy and is actually worth more to the area than its face value. This is because the owners of travel business are likely to spend their money locally which is actually earned from tourists outside that area.

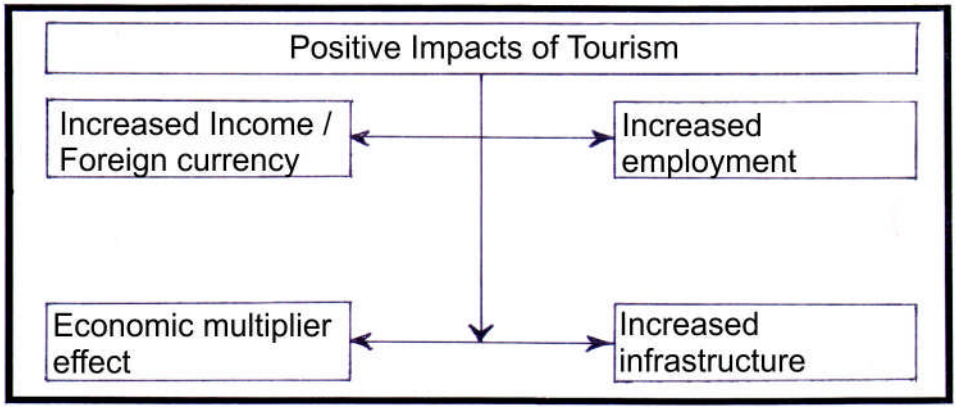

Fig. 3.11 Positive impacts of Tourism

c) Increased employment: Tourism's ability to create jobs is one of the main reasons of encouraging its development. It is a highly labour intensive industry which has the potential to create direct and indirect employment opportunities on a very large scale.

Direct employment is offered in hotels, travel agencies and as tour guides whereas indirect employment is offered in the associated sectors like construction, banking and transport companies.

d) Improved infrastructure: there exists a directly relationship between tourism and infrastructure. Tourism development contributes to infrastructure improvements in destination areas ranging from basic supplies like water and electricity to luxuries facilities like airport and telecommunications.

- **Negative Impacts:**

a) Leakage: A leakage occurs in tourism when money is lost from a destination area. This could be because the hotels are owned by companies that operate in other countries and the profits are taken away from the local area. Further, local suppliers are often over-looked and larger travel and tourism companies buy their goods and services centrally in order to get best prices. Responsible tourism can help reduce the leakage.

b) Decline in traditional employment: Tourism development can lead to the loss of traditional jobs when workers move from industries such as farming, forestry, mining and fishing into service jobs in tourism. This is a major problem faced by the developing countries where people engaged in the primary activities are getting attracted to service sector jobs for economic gains.

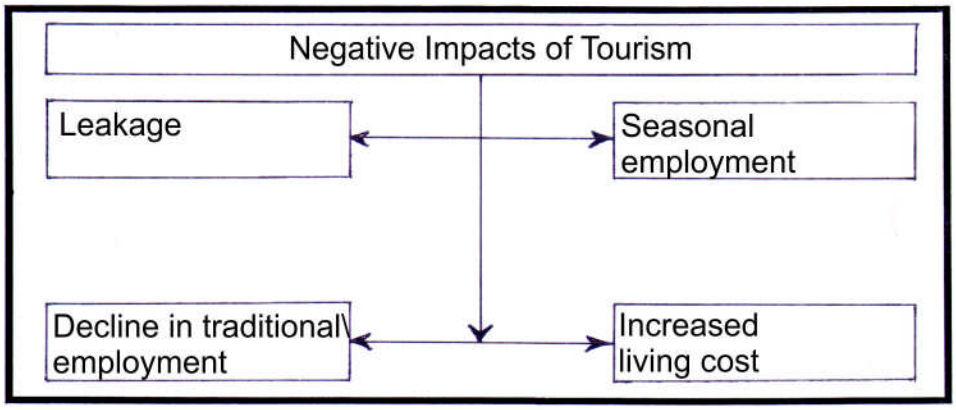

Fig.3.12 Negative impacts of Tourism

c) Seasonal unemployment: Seasonal unemployment can be a problem in tourist destinations that are not active all year round, putting extra strain on local and national government resources. However, measures to extent the tourist season not only will create extra revenue for business but will also increase employment.

d) Increased living costs: An influx of visitors to a holiday can push up the price of goods and services particularly when demand is high in peak season. This affects local people which may be to pay higher prices for food, drinks, entertainment, transportation,

etc... Extra charges may be levied on the local community to finance facilities and services for visitors. This, makes it difficult for the local community to survive. Regulations of prices in such areas can prove to be beneficial.

➢ **Impacts of Tourism on Culture:**

- **Positive Impacts:**

a) Better leisure facilities: Demand for tourism and related activities in a destination leads to the development of leisure and recreational facilities which were not present earlier. This gives an advantage to the local community as even they can enjoy the facilities to the fullest.

b) Frequent social events: To boost tourism, the frequency and variety of social events increases in the destination. This not only attracts tourists from other areas but also helps the local culture to grow.

c) Conservation of local heritage: Besides natural beauty, cultural features like monuments and cultural landmarks also attract tourists. Hence, local and state Government take extra efforts to conserve the heritage structures so that they remain as attractive as always.

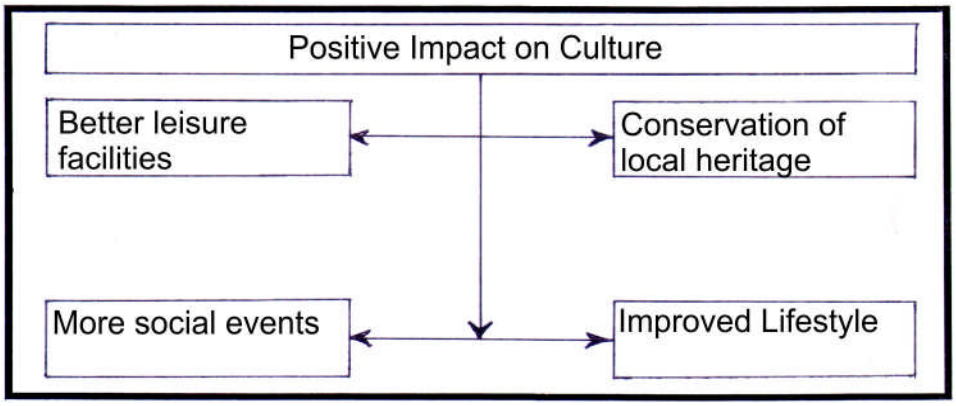

Fig. 3.13 Positive impact of tourism on culture

d) Improved lifestyle: With additional leisure and economic opportunities, the lifestyle of local people improves. An increase in the income leads to an increased educational and health status. This also improves the standard of living style of living.

e) Restricts brain drain: Brain drain is a result of lack of employment and educational opportunities in the place of residence. Tourism brings in development leading to infrastructural development making education and employment available. People

therefore do not need to travel to other countries, restricting brain drain.

- **Negative Impacts:**

a) Overcrowding: Sometimes, in certain destinations, the number of people visiting exceeds the capacity it can hold. This not only puts pressure on resources but may also irritate the local community as their day to day activities may get restricted and life may not remain a simple as it was.

b) Poor sanitation: Due to insufficient infrastructural facilities and overcrowding, the sanitation facilities are poorly managed. This is evident especially in the case of religious tourism destinations as people from different socio-economic-educational backgrounds gather there and sanitation is poorly managed.

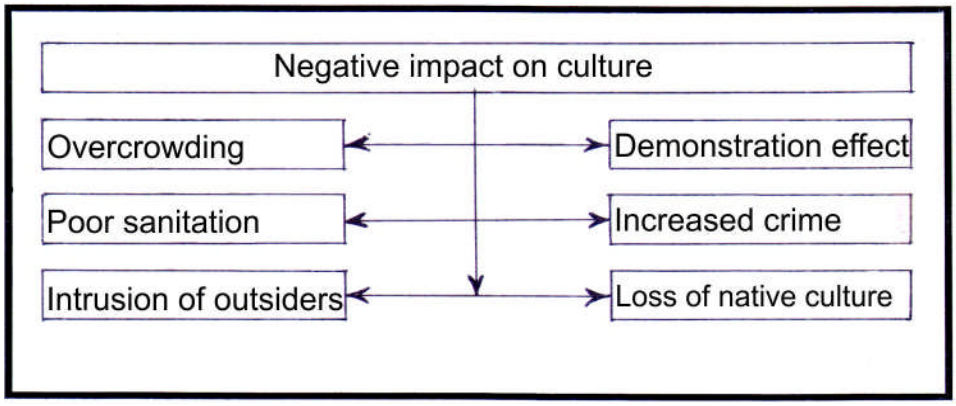

Fig. 3.14 Negative impact of tourism on culture

c) Intrusion of outsiders: People visiting a destination belong to different societies. They are outsiders for the destination. Sometimes, they settle there or start interfering in the local activities which may not be accepted by the local people.

d) Demonstration effect: The local community observes the various cultural and social values demonstrated by the visitors. The visitors often try to portray their affluent side and this influences the local people the youth in particular. Demonstration effect may lead to positive and negative changes. Positive changes may include the urge to get educated and negative changes may include the urge to get richer through unfair means, establish liquor shops and imitation of other cultures.

e) Increased crime and anti-social activities: Demonstration effect may lead to crimes and anti-social activities. The comparatively poor local community may indulge in robbery, theft and murders of visitors to acquire their valuables or engage in crimes against women.

f) Loss of native culture: There is assimilation of the local culture with several other cultures when visitors visit the destination. This may lead to the loss of native culture and associated values.

➢ **Impacts of Tourism on Environment:**

The impacts of tourism on environment are only negative which are as follows:

a) Depletion of natural resources: Tourism leads to overcrowding and higher demand for natural resources like water, food and land. As more and more is supplied, the stocks start depleting and natural resources begin to become scarce.

b) Pollution: Destinations which were earlier clean and green, undergo pollution of all types. Increased use of technology and luxurious products, leads to air, water, land and noise pollution.

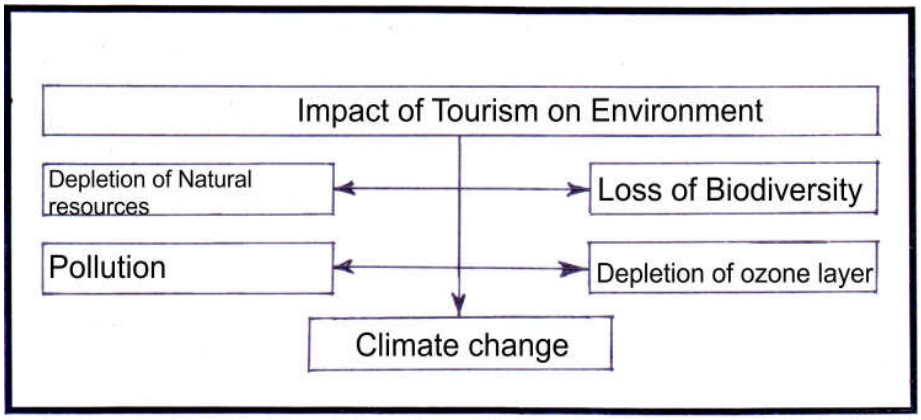

Fig. 3.15 Impact of Tourism on Environment

c) Loss of biodiversity: Tourism areas develop tourism activities for which they need land. Deforestation is carried on a large scale causing loss of floral biodiversity. Faunal biodiversity is lost due to intrusion of people in their habitat and due to loss of their habitat in the form of individual trees and forests.

d) Depletion of ozone layer: Increased quantities of greenhouse gases from air conditioners, refrigerators and less use of conventional sources of energy cause depletion of the ozone layer. In coastal tourism destinations, depletion of mangroves is causing depletion of ozone layer.

e) Climate change: Depletion of natural resources, loss of bio diversity and ozone depletion is leading to climate change. This not only is affecting the local community and their indigenous activities, but, tourism is also getting affected due to unreliable climate patterns.

3.10 ECOTOURISM IN INDIA

Ecotourism is entirely a new approach in tourism. It involves travel to natural areas to appreciate the cultural and natural history of the environment in such a way that care is taken not to disturb the integrity of the ecosystem, while creating economic opportunities that make conservation and protection of natural resources advantageous to the local people. In other words, ecotourism is an integrated programme that is “Nature based, ecologically sustainable, where education and interpretation is a major constituent and where local people are benefited."

Simply put, it is tourism with an ecological conscience. It involves visiting fragile, pristine, and relatively untouched natural areas, with the intention to support conservation efforts. One observes the flora and fauna in their natural environment and cause as little impact as possible. It is often done on a small scale and is a great alternative to the mainstream commercial tourism. Ecotourism is critical. We have far left behind the years when this was simply ‘important’- today it is critical. Today each one of us must contribute towards nature. Nature has all the resources to satisfy man’s need. Although humans have become increasingly greedy (our ‘needs’ remain the same, our ‘wants’ spiral out of control), we need, we want but no one gives back. No one replenishes what they take.

3.11 HISTORY OF ECOTOURISM IN INDIA

Since ages, nature worship and the conservation ethics have been an inseparable part of Indian thought and traditions. The Indian tradition has always taught that, humankind is a part of nature and one should look upon all creation with love and respect.

India, the land of varied geographical features, offers several tourist destinations that not just de-stress but also rejuvenates the tourists. India offers several ways to enjoy Mother Nature in most pristine way. The few places like the Himalayan Region, Kerala, the northeast India, Andaman & Nicobar Islands and the Lakshadweep Islands are some of the places where one can enjoy the treasured wealth of the Mother Nature. Thenmala in Kerala is the first planned ecotourism destination in India created to cater to the Eco-tourists and nature lovers.

The Indian topography offers an abundant source of flora & fauna. India has numerous rare and endangered species in its surroundings. The declaration of several wildlife areas and wildlife hunt by several kings in the past. Today, India has many wildlife sanctuaries and protection laws. Currently, there are about 80 national parks and 441 sanctuaries in India, which work for the

protection and conservation of wildlife resource in India.

The major national parks in India for ecotourism are:

i. Corbett National Park in Uttar Pradesh
ii. Bandhavgarh National Park in Madhya Pradesh
iii. Kanha National Park in Madhya Pradesh
iv. Gir National Park and Sanctuary in Gujarat
v. Ranthambore National Park in Rajasthan.

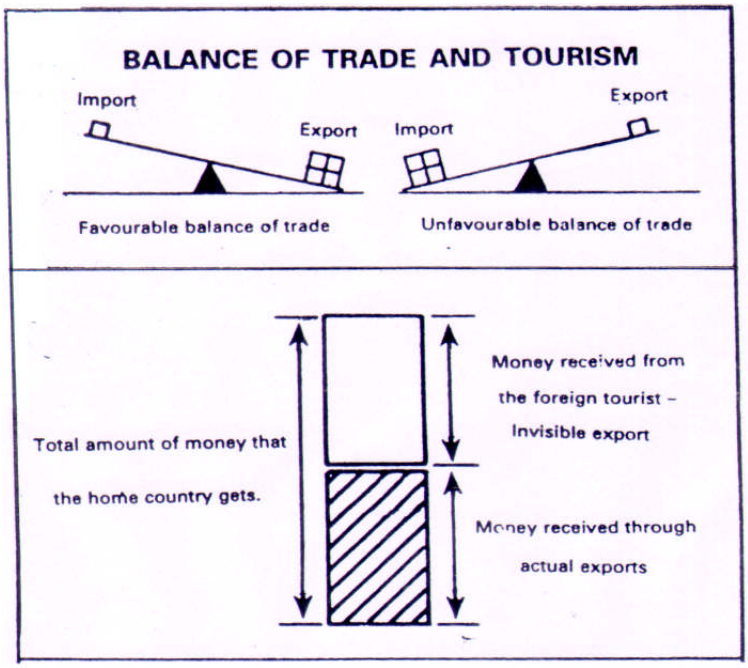

Fig. 3.16 Balance of Trade & Tourism

There are numerous Botanical and Zoological Gardens in India, which are working towards the enhancement of the Ecosystem. Poaching has stopped to large extent. There are severe punishments for poachers, hunters and illegal traders of animals and trees. Tree plantation drives are taking place in several places. There are several animal & plant rights organisations, who fight for the rights of the animals and plants. Numerous organisations and NGOs are coming forward to provide environmental education to the common people at the grass root level.

3.12 IMPORTANCE OF ECOTOURISM IN INDIA

In India, the emergence of alternative tourism promotes natural and cultural events and others. Few promising alternative tourism paths include green tourism, ecotourism, eco cultural tourism, heritage tourism etc. Ecotourism developed in India in 1970s and 1980s. Ecotourism was globally identified as a means of achieving twin goals of bio diversity conservation and sustainable development. Both short-term goals and long-term goals can be achieved without sacrificing one's own interests. Sustainable

tourism and nature tourism are umbrella concepts that include ecotourism. The return on investment in tourism from the point of view of employment generation is much higher compared to agriculture and manufacturing sector.

The most significant feature of the ecotourism industry in India is its capacity to generate large scale employment opportunities, particularly in remote and underdeveloped area. It offers enormous potential for utilising natural resources like landscapes, mountains, bio-diversity areas, rivers etc. for the benefit of people. Ecotourism is not only a travel statement; it gives the message of our relationship with nature and its own inhabitants. India became a very common name for ecotourism, because of its natural resources and beauty. Ecotourism focuses on Indian local cultures, wilderness, adventures, and environmental protection. In India, the movement is gathering momentum with more travel and travel related organisations for addressing the needs of the eco tourists and promoting ecotourism in the country.

3.13 EFFECTS OF ECO TOURISM IN INDIA

Increase foreign exchange: - Ecotourism is one of the important industries that earn foreign exchange for a country without actually exporting any material goods. The income from ecotourism has tended to increase at a higher rate than merchandise export in a number of countries. Hence Tourism is considered as the invisible form of export.

To help in the development of infrastructure facilities: - Development and improvement of infrastructure facilities are another important benefit offered by the ecotourism industry. A variety of secondary industries may be promoted which may not serve the needs of ecotourism. Thus, indirectly; tourist expenditure may be responsible for stimulating other economic activities of a country.

1) To help in balanced regional development: - Tourism development greatly benefits underdeveloped regions of a country. These economically backward regions mostly have places of high scenic beauty which if developed for the tourism industry, will help to bring a lot of prosperity to the local people.

2) To help in generating employment: - Tourism industry is highly labour intensive service industry that generates employment for highly skilled, semiskilled and unskilled labour in sectors like hotels, restaurants, travel agencies, tourism offices, shops etc.

3) To help in maintaining peace and understanding: - Tourism plays an important role in promoting international goodwill.

It creates awareness and appreciation of other countries culture and nature.

A fundamental requirement for ecotourism to be practiced is control on access to an area. Various hill stations or beaches therefore do not get categorised as ecotourism destinations because it is impossible to control access to them. National parks and wildlife sanctuaries are on the other hand most amenable to regulate access and thus most suitable as eco-tourist destinations. The Protected Area Network in the country therefore becomes the most logical starting point for development of ecotourism. Most eco tourists are from Europe, North America and Japan.

3.14 MAJOR ECO-TOURISM DESTINATIONS IN INDIA

1. Eco-Tourism in Kerala-A Paradise for Tourist

Kerala, which is known as 'God's Own Country' is situated in the lap of southwestern coast of India. Eco-visitors found Kerala as a green heaven. Sandy beaches, tropical dense forests etc. enhance the natural attraction to the nature lovers. Here we can witness several animal species and thousands of plant species. The Nilgiri mountain range will definitely draw tourist's attention. There are many wildlife sanctuaries in Kerala. In Kerala, tourism activities are mainly based on nature and its facilities. The first planned ecotourism destination in Asia was the Thenmala Ecotourism Project in Kerala.Idukki is one of the districts in Kerala, which has abundance of wide scale tourist attractions. There is wide scope for ecotourism in Idukki.

2. Sundarban Eco-Tour- World's Largest Natural Delta

In West Bengal, Sundarban is a place that introduces us the real meaning of ecotourism. The world's largest natural delta is a name of Royal Bengal Tigers. Wildlife sanctuary, bird sanctuary, crocodile projects are the main attractions for the eco-visitors. The tidal rivers, water channels, large mangrove trees etc. will give us the feeling of adventure with the essence of freshness. The mangrove swamp in the south of West Bengal is the place where the Royal Bengal Tigers rule. These majestic big cuts are fascinatingly beautiful and extremely dangerous. Unfortunately these animals are now on the verge of extinction. This marsh land has become a sanctuary for these magnificent creatures in yellow and black strips. Deer, antelopes, gaur and wild pigs also have made this marsh land their home.

3. Himalayas

The whole mountain range of North India will give the tourists a perfect picture of an eco-tour. Several places like Kulu, Manali, Ladak, Dharmashala, Dalhosietc are specially known for its natural beauty to the nature lovers. The eco-visitors can witness the

magical glow of sunrise and sunset from the different corner of mountain range. Himalaya ranges are famous for trekking and camping. In different colours, shapes and heights, valleys of mountains impress the ecovisitors by their inherent qualities.

3.15 PROMOTING ECO-TOURISM IN INDIA

The key players in the ecotourism business are Government, local authorities, developers and operators, visitors and local community. Each one of them has to be sensitive to the environment and local traditions and follow a set of guidelines for the successful development of ecotourism. In addition, governmental organisations and scientific and research institutions also have to play key role in development of ecotourism. Special officers have been designated to coordinate activities regarding ecotourism. The Forest and Tourism Departments of the states like Karnataka, Kerala, Sikkim, Rajasthan and Andhra Pradesh have specifically announced a policy for the development of ecotourism laying special emphasis to the involvement of the local communities. A management plan for each ecotourism area should be prepared by professional landscape architects and urban planners in consultation with the local community as well as others directly concerned. Integrated planning should be adopted to avoid inter-sectoral and cross-sectoral conflict. A first step should be to prepare 20-year master plans for each state.

The architectural programme for ecotourism centres should include controlled access points, roads, self-guided nature trails, transportation options, interpretation centers, signs and adequate but unpretentious lodging and dining facilities, docks, garbage disposal facilities and other utilities as needed. If required, suitable living quarters and facilities for project personnel should be provided.

3.16 RECENT INITIATIVES IN ECO-TOURISM IN INDIA

- A project of ecotourism for development of Horsely Hill in Chittor district of Andhra Pradesh has been sanctioned.
- The project of development of Satkosi in Orissa (Rs.4.25 crore) has been sanctioned in which interpretation centre; landscaping, elephant camps, trekking park, watch towers and parking facilities etc. are proposed to be developed.
- Ministry of Tourism (MOT) has sanctioned a project for development of ecotourism in Morni-Pinjore Hills and Sultanpur National Park in Haryana for which Rs2.63 crore have been sanctioned.

- The project of integrated development of tribal circuit with special focus on ecotourism in Himachal Pradesh has been approved for Rs.6.98 crore.
- Development of Wayanad in Kerala for an amount of Rs.2.01 crore.

3.17 NATIONAL ECO-TOURISM POLICY AND GUIDELINES

- The National Ecotourism Policy and Guidelines of the Ministry of Tourism after considering the national policy on tourism has identified the following cardinal principles for the development of ecotourism:-
- It should involve the local community and lead to the overall economic development of the area
- It should identify the likely conflicts between resource use for tourism and the livelihood of local inhabitants and attempt to minimise such conflicts
- The type and scale of tourism development should be compatible with the environment and socio-cultural characteristics of the local community and
- It should be planned as a part of the overall area development strategy, guided by an integrated land use plan while avoiding inter sectorial conflicts and ensuring sectorial integration, associated with commensurate expansion of public services.

3.18 ENVIRONMENTAL AND SOCIO-ECONOMIC ISSUES

➢ **Environmental Issues**: - One of the most disturbing facts about ecotourism is that it is mainly promoting the intrusion into wilderness area, national parks, isolated tribal areas and even the areas having no trace of any permanent settlement. Tourists opting for such tourism often belong to the prosperous strata of society and are capable and ready to pay for everything they wish, so consumerism becomes focal theme here. Tour operators surrender to ever increasing demands made by visitors and to facilitate and entertain them, they build completely artificial landscape in the area, which have mega-resorts, luxury hotels, and shopping centers. Such changes cost almost the entire eco system, many of flora and fauna species lose their natural habitat and in the long run this may even lead to species extinction. Tourism competes with other forms of development and human activity for natural resources, especially land and water. The use of natural resources

subsequently leads to the transformation of ecological habitats and loss of flora and fauna. Land transformation for tourism development can directly destroy ecological habitats. The use of resources for tourism involves an 'opportunity cost' as they are denied to other sectors of economic development.

➢ **Socio-Economic Issues**: - Just because something is marketed as ecotourism, it does not necessarily mean that the long-term motto of providing socio-economic benefit with protection of environment to the host areas will be achieved.

3.19 ECO TOURISM SOCIETY OF INDIA

Ecotourism Society of India (ESOI) is a non-profit organisation with the sole aim to promote and ensure environmentally responsible and sustainable practices in the tourism industry. The society was formed in 2008 by a group of eminent professionals from the tourism industry, as well as, environmentalists under the advice of the Ministry of Tourism. ESOI works closely with the central and state government bodies responsible for sustainable tourism and a network of like-minded regional / state players across the country to facilitate and support synergy of policies, initiatives and activities at the national and state level. The Ecotourism Society of India is dedicated to the promotion of sustainable and responsible tourism practices within the tourism industry. All funds/income generated are utilised towards achieving the following objectives of the society:

- Tabulate eco-sensitive areas where tourism will have an impact on the social, cultural and natural environment.
- Make strategies and efforts to ensure long-term (perpetual) sustenance of the environment.
- Work with empowered bodies to establish carrying capacity and sustainable tourism practices which include conservation of nature and wildlife, and allow local communities to benefit from tourism.
- Tourists and visitors' numbers and tourism practices must allow nature to re-generate itself.
- To work with government bodies to develop policies and codes of conduct for promotion of sustainable tourism, and help implement the same.
- To work towards certification of tourism service providers.

3.20 SUMMARY

A synoptic definition of tourism could be travel for leisure, pleasure, recreation or business purposes. The nature of tourism is dynamic. It has the ability to change and grow with the changing environment. The scope of the tourist industry is vast. It includes all sectors of the economy and may be governed by public sector and private sector in coherence. Tourism industry has the potential to benefit the economy on a large scale by providing foreign exchange, exchange of goods and services and through cultural exchange. Tourism can be broadly classified into Domestic Tourism, Inbound Tourism and Outbound Tourism. All these forms of tourism can be combined to form three more types of tourism viz. Internal Tourism, National Tourism and International Tourism. The challenges that are faced by the tourism industry in India include over population, lack of infrastructure and expertise and many more. However, the national tourism policies of 1982 and 2002 are trying to solve the problems. Ecotourism is entirely a new approach in tourism. It involves travel to natural areas to appreciate the cultural and natural history of the environment in such a way that care is taken not to disturb the integrity of the ecosystem, while creating economic opportunities that make conservation and protection of natural resources advantageous to the local people. In India, the emergence of alternative tourism promotes natural and cultural events and others. Few promising alternative tourism paths include green tourism, ecotourism, eco cultural tourism, heritage tourism etc. Ecotourism developed in India in 1970s and 1980s. Ecotourism was globally identified as a means of achieving twin goals of bio diversity conservation and sustainable development. Ecotourism Society of India (ESOI) is a non-profit organisation with the sole aim to promote and ensure environmentally responsible and sustainable practices in the tourism industry.

3.21 CHECK YOUR PROGRESS/EXERCISE

1. True or False

a. Pleasure isa feeling of happy satisfaction and enjoyment.

b. Many foreign tourists belonging to the affluent and rich countries of the world visit India every year to enjoy its rich culture

c. Internal Tourism which involves movement within a country and is a combination of domestic tourism and inbound tourism

d. The scope of tourism is very limited

e. Tourism helps in building image of the country in the global market and has a huge potential for employment.

2. Fill in the Blanks

a. _____(Safety) is one of the seven keys of National Tourism Policy, 2002

b. The first significant policy initiatives were taken in the early 1980s with the prospect of hosting the _____.

c. In the Chief Minister's Conference held on October 30, 2001, the then Prime Minister of India, _____had highlighted the importance of tourism for the growth and development of the country

d. Due to altitude and topography, _____serve as hotspots for adventurous activities like trekking and other sports

e. Along with natural resources of tourism, India has developed a large number of _____tourist sites also.

3. Match the columns

A **Type of tourism based on purpose**		**B** **Examples**	
a.	Religious	1.	Western Ghats
b.	Medical	2.	Uttarakhand after Floods
c.	Eco tourism	3.	Rishikesh, India
d.	Disaster	4.	Lonar lake, Maharashtra
e.	Slum	5.	Bhangarh, Rajasthan
f.	Dark	6.	Dharavi Slum, Mumbai
g.	Yoga	7.	Paris
h.	Cultural	8.	Shri AmarnathYatra
i.	Geotourism	9.	QutubMinar
j.	Fashion	10.	Kerala

4. Multiple choice questions:

a. What out of the following is a positive impact of tourism on the economy?

i. Leakage
ii. Decline in traditional employment
iii. Seasonal unemployment
iv. Increased employment

b. What out of the following is a positive impact of tourism on the culture?

i. Overcrowding
ii. Poor sanitation
iii. Frequent social events
iv. Intrusion of outsiders

c. What out of the following is a negative impact of tourism on the economy?

i. Increased living costs
ii. Increased domestic income and foreign currency earnings
iii. Economic multiplier effect
iv. Improved infrastructure

d. What out of the following is a negative impact of tourism on the culture?

i. Better leisure facilities
ii. Conservation of local heritage
iii. Restricts brain drain
iv. Poor sanitation

e. What out of the following is an impact of tourism on the environment?

i. Frequent social events
ii. Increased living costs
iii. Better leisure facilities
iv. Depletion of ozone layer

3.22 ANSWERS TO THE SELF-LEARNING QUESTIONS

1. True or False

a. True
b. False
c. True
d. False
e. True

2. Fill in the Blanks

a. Suraksha
b. Asian Games of 1982
c. Shri. AtalBihari Vajpayee
d. Mountains
e. Man-made

3. Match the columns

a. 8
b. 10
c. 1
d. 2

e. 6
f. 5
g. 3
h. 9
i. 4
j. 7

4. Multiple choice questions:
a. Increased employment
b. Frequent social events
c. Increased living costs
d. Poor sanitation
e. Depletion of ozone layer

3.23 TECHNICAL WORDS AND THEIR MEANINGS

- **Tourism:** Tourism comprises of all the activities related to a person's travelling to and staying in places outside his/her usual environment for not more than one consecutive year for leisure, business and other purposes.

- **Host community:** The people of tourism destinations are termed as host community

- **Leisure:** Use of free time for enjoyment

- **Pleasure:** A feeling of happy satisfaction and enjoyment

- **Recreation:** Done for enjoyment when one is not working.

- **Purposes of tourism:** The aim for which tourism is undertaken

- **Resources:** A stock or supply of money, materials, staff, and other assets that can be drawn on by a person or organization in order to function effectively

- **Tourism potentials:** Resources having potential to develop as tourist destinations

- **Plains:** Geographically, a plain is a flat landmass that generally does not change much in elevation.

- **National Park:**An area of countryside, or occasionally sea or fresh water, protected by the state for the enjoyment of the general public or the preservation of wildlife.

- **Ministry of Tourism:** The Ministry of Tourism, a branch of the Government of India, is the apex body for formulation and

administration of the rules, regulations and laws relating to the development and promotion of tourism in India.

- **NGOs:** A non-profit organization that operates independently of any government, typically one whose purpose is to address a social or political issue.

- **Eco-sensitive areas:** Eco-Sensitive Zones (ESZs) or Ecologically Fragile Areas (EFAs) are areas notified by the Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India around Protected Areas, National Parks and Wildlife Sanctuaries.

3.24 TASK

Make a travel diary with pictures of your travels so far and differentiate the types of tourism potentials in India you visited.

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Unit -4

ENVIRONMENTAL MOVEMENTS AND MANAGEMENT

After going through this chapter, you will be able to understand the following features:

4.1 OBJECTIVES

By the end of this unit you will be able –

- To understand the Environmental Movements in India
- To comprehend the need and relevance of Environmental Management
- To explain the concept of ISO 14000 and 16000, Carbon Bank and Carbon Credit, EIA and ecological footprint
- To understand the Environment Protection Act
- To know the concept and components of Geospatial Technology and applications of GST in Environmental Management

4.2 INTRODUCTION

An environmental movement can be defined as a social or political movement, for the conservation of environment or for the improvement of the state of the environment. The terms ‘green movement’ or ‘conservation movement’ is alternatively used to denoted the same.

The environmental movements favor the sustainable management of natural resources. The movements often stress the protection of the environment via changes in public policy. Many movements are centered on ecology, health and human rights.

4.3 SUBJECT DISCUSSION

This Unit concentrates on the Environmental Movements in India. Some of the movements highlighted in this session are Save Narmada Movement, Chipko Movement, Appiko Movement and Save Western Ghats movement. The unit further throws light on Environmental Management and it need and relevance in today’s times.

The unit further familiarizes the learner to concepts like ISO 14000 and 16000, Carbon Bank and Carbon Credit, EIA and ecological footprint. The student is also introduced to Environmental Protection Act and the need to protect the environment. Finally the unit concludes with an understanding of the concept and components of Geospatial Technology and applications of GST in Environmental Management.

4.4 ENVIRONMENTAL MOVEMENTS IN INDIA

Environmental movements range from the highly organized and formally institutionalized ones to the radically informal activities. Exploitation of resources by people in India has resulted in the disruption of balance of nature. These disruptions have led to many conflicts in the society. The major environmental movements in India are as follows:

A. Save Narmada Movement / Narmada Bachao Andolan (NBA)

Narmada Bachao Andolan is a powerful mass movement, started in 1985, against the construction of huge dam on the Narmada River. Narmada is the India's largest west flowing river, which supports a large variety of people with distinguished culture and tradition ranging from the indigenous (tribal) people inhabited in the jungles to the large number of rural population. The proposed Sardar Sarovar Dam and Narmada Sagar will displace more than 250,000 people.

The movement first started as a protest for not providing proper rehabilitation and resettlement for the people who have been displaced by the construction of Sardar Sarovar Dam. Later on, the movement turned its focus on the preservation of the environment and the eco-systems of the valley. Activists also demanded the height of the dam to be reduced to 88 m from the proposed height of 130m.

The environmental issue was taken into court. In October 2000, the Supreme Court gave a judgment approving the construction of the Sardar Sarovar Dam with a condition that height of the dam could be raised to 90 m. This height is much higher than the 88 m which anti-dam activists demanded, but it is definitely lower than the proposed height of 130 m. The project is now largely financed by the state governments and market borrowings. The project is expected to be fully com-pleted by 2025.

Although not successful, as the dam could not be prevented, the NBA has created an anti-big dam opinion in India and outside. It questioned the paradigm of development. As a democratic movement, it followed the Gandhian way.

Save Narmada Movement at a Glance

Year: 1985

Place: Narmada River, which flows through the states of Gujarat, Madhya Pradesh and Maharashtra.

Leaders: Medha Patker, Baba Amte, adivasis, farmers, environmentalists and human rights activists.

Aim: A social movement against a number of large dams being built across the Narmada River.

B. Chipko Movement

In the 1970s, an organized resistance to the destruction of forests spread throughout India and came to be known as the Chipko movement. The name of the movement comes from the word 'embrace', as the villagers hugged the trees, and prevented the contractors' from felling them.

In the 20th century, in the hills the forests are the main source of livelihood, since agricultural activities cannot be carried out easily. The first Chipko action took place in April 1973 in the village of Mandal in upper Alakananda valley and over the next five years spread to many districts of the Himalayas in Uttar Pradesh. It was sparked off by the government's decision to allot a plot of forest area in the Alaknanda valley to a sports goods company. This angered the villagers because their similar demand to use wood for making agricultural tools had been earlier denied. With encouragement from a local NGO (non-governmental organization), DGSS (Dasoli Gram Swarajya Sangh), the women of the area, under the leadership of an activist, Chandi Prasad Bhatt, went into the forest and formed a circle around the trees preventing the men from cutting them down.

The success achieved by this protest led to similar protests in other parts of the country. From their origins as a spontaneous protest against logging abuses in Uttar Pradesh in the Himalayas, supporters of the Chipko movement, mainly village women, have successfully banned the felling of trees in a number of regions and influenced natural resource policy in India. Dhoom Singh Negi, Bachni Devi and many other village women, were the first to save trees by hugging them. They coined the slogan: 'What do the forests bear? Soil, water and pure air'. The success of the Chipko movement in the hills saved thousands of trees from being felled.

Some other persons have also been involved in this movement and have given it proper direction. Mr Sunderlal

Bahuguna, a Gandhian activist and philosopher, whose appeal to Mrs Indira Gandhi, the then Prime Minister of India, resulted in the green-felling ban. Mr Bahuguna coined the Chipko slogan: 'ecology is permanent economy'. Mr Chandi Prasad Bhatt, is another leader of the Chipko movement. He encouraged the development of local industries based on the conservation and sustainable use of forest wealth for local benefit.

The Chipko protests in Uttar Pradesh achieved a major victory in 1980 with a 15-year ban on green felling in the Himalayan forests of that state by the order of Mrs Indira Gandhi, the then Prime Minister of India. Since then, the movement has spread to many states in the country. In addition to the 15-year ban in Uttar Pradesh, the movement has stopped felling in the Western Ghats and the Vindhyas and has generated pressure for a natural resource policy that is more sensitive to people's needs and ecological requirements.

Chipko Movement

Year: 1973

Place: In Chamoli district and later at Tehri-Garhwal district of Uttarakhand.

Leaders: Sundarlal Bahuguna, Gaura Devi, Sudesha Devi, Bachni Devi, Chandi Prasad Bhatt, Govind Singh Rawat, Dhoom Singh Negi, Shamsher Singh Bisht and Ghanasyam Raturi.

Aim: The main objective was to protect the trees on the Himalayan slopes from the axes of contractors of the forest.

C. Appiko Movement

Appiko movement is the southern version of the Chipko movement. The Appiko Movement was locally known as “Appiko Chaluvali”. The locals embraced the trees which were to be felled by contractors of the forest department. The Appiko movement used various techniques to raise awareness such as foot marches in the interior forest, slide shows, folk dances, street plays etc. The second area of the movement’s work was to promote afforestation on denuded lands. The movement later focused on the rational use of ecosphere through introducing alternative energy resources to reduce pressure on the forest.

Appiko Movement,

Year: 1983

Place: Uttara Kannada and Shimoga districts of Karnataka State

Leaders: Appiko's greatest strengths lie in it being neither driven by a personality nor having been formally institutionalised. However, it does have a facilitator in Pandurang Hegde. He helped launch the movement in 1983.

Aim: Against the felling and commercialization of natural forest and the ruin of ancient livelihood.

D. Save Western Ghats Movement

The Western Ghats in India cover six states and have an incredible diversity of species as also some of the finest examples of moist deciduous and tropical forests. Preventing the ecological degradation due to construction and other activities is the main concern of the environmentalists.

Environmentalists in Bangalore, are reviving a plan to conserve the vast hilly, forested region running parallel to the west coast of peninsular India (Western Ghats), recognized as a global biodiversity hotspot.

The 'Save Western Ghats' movement of the 1980s involved over 20 local and regional people's movements who got together to march the length of the sector between November 1987 and February 1988, in an awareness-building protest against the construction of dams and power stations that destroy one of the world's richest habitats.

Movements under this banner influenced government policy to stop the felling of trees in Karnataka and cancel plans for a dam in the Silent Valley which was declared a patch of undisturbed tropical forest and converted into a national park in 1984.

The Indian government also set up the Western Ghats Development Programme in 1981 to ensure policies maintained ecological balance, preserved genetic diversity and created awareness for eco-restoration for the damage already done. But those successful environmental movements of the 1980s had, in subsequent decades, died down.

The Western Ghats cover 159,000 sq. km, traverse 1,600 km through six west coast states – Gujarat, Goa, Maharashtra,

Kerala, Karnataka and Tamil Nadu – and house an incredible diversity of species and some of the finest examples of moist deciduous and tropical forests.

The Ghats, also known as Sahyadri in Maharashtra, has 5,000 species of flowering plants, 139 mammal species, 508 bird species and 179 amphibian species. At least 325 of these are globally threatened species. It's a complex network of 22 rivers that provides nearly 40% of India's water-catchment systems.

Currently the best stretch of wilderness exists in the Nagarahole-Bandipur--Mudumalai national park belt of Karnataka and Tamil Nadu states and the adjoining Wynad region of North Kerala, holding India's largest protected population of 1,500 elephants.

In Maharashtra, private urban townships, steel and power plants are posing a fresh set of threats to this biodiversity. Mining, diversion of rivers, wildlife tourism and monoculture plantations in Goa have conservationists worried.

Dams, power plants, mining and violent leftwing guerillas threaten the ghats in Karnataka. Encroachments from agricultural plantations, urbanisation and pollution threaten the forests in Tamil Nadu and Kerala.

Environmentalists have decided to have a summit involving all the stakeholders in the Western Ghats to decide upon a course of action.

A. 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 Kunthi puzha 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 started the campaign to save Silent Valley. This movement turned out to be a public education programme in many respects. The movement in many ways saved the ecosystem of Silent Valley area.

4.5 CONCEPT OF ENVIRONMENTAL MANAGEMENT

The ecological balance and ecosystem stability are duly maintained by the nature itself but the emergence of modern industrial era has disturbed the ecological balance through heavy

industrialization, technological revolution, faster growth of means of transportation, exploitation of resources, unplanned urbanization etc.

The modern day activities of people have disturbed the harmonious relationships between the environment and human beings. Environmental management is thus, the process to improve the relationship between the human beings and environment which may be achieved through check on destructive activities of man, conservation, protection, regulation and regeneration of nature.

A. Need and relevance for Environmental Management

The need and relevance of environmental management are as follows:

- To recognize that there are more sustainable ways of living
- To use natural resources more efficiently
- To know the behavior of organism under natural conditions
- To know the interrelationship between organisms in populations and communities; -
- To aware and educate people regarding environmental issues and problems at local, national and international levels.

Environmental management is vital to conform to environmental safety and thereby ensure sustainable economic development.It helps the planning and allows the management to take long term measures for effective management as well as environment conservation.

4.6 CONCEPT OF ISO 14000 AND 16000

ISO 14000 is a series of environmental management standards developed and published by the International Organization for Standardization (ISO) for organizations. The ISO 14000 standards provide a guideline or framework for organizations that need to systematize and improve their environmental management efforts. The ISO 14000 standards are not designed to aid the enforcement of environmental laws and do not regulate the environmental activities of organizations. Following these standards is voluntary for organizations.

The ISO 14001 standard is the most important standard within the ISO 14000 series. ISO 14001 specifies the requirements of an environmental management system (EMS) for small to large organizations. An EMS is a systemic approach to handling environmental issues within an organization.

ISO 14000 is similar to ISO 9000 quality management in that both pertain to the process of how a product is produced, rather than to the product itself. As with ISO 9001, certification is performed by third-party organizations rather than being awarded by ISO directly.

ISO 16000-25: It specifies a test method for determination of the area specific emission rate of semi-volatile organic compounds (SVOCs) from newly produced building products or furnishings under defined climate conditions. The objectives of ISO 16000 are:

- To provide manufacturers, builders, and end users with emission data useful for the evaluation of the impact of building products on the indoor air quality;
- To promote the development of improved products;
- On-site investigation of building product surfaces.

The method can be used for most building products used indoors.

4.7 CONCEPT OF CARBON CREDIT AND CARBON BANK

A carbon credit is a financial instrument that allows the holder, usually an energy company, to emit one ton of carbon dioxide. Credits are awarded to countries or groups that have reduced their greenhouse gases below their emission quota. Carbon credits can be legally traded in the international market at their current market price.

The carbon credit system was a solution that came about near the end of the 20th century, as people became more aware that human industrial activity is potentially responsible for global warming and environmental degradation. The premise of the system is that a government or another body can regulate the total tons of carbon dioxide emitted but is given some flexibility as to how exactly the regulation is accomplished.

Carbon credit systems place a cost on carbon emissions by creating credits valued against one ton of hydrocarbon fuel. A carbon credit, then, is essentially a permit that allows the receiver to burn a specified amount of hydrocarbon fuel over a specified period of time. Credits are granted to companies or other groups that take action to measurably reduce carbon emissions.

An Example of Carbon Credits :

An environmentalist group that works to reduce megatons of greenhouse gases from the atmosphere plants enough trees to

reduce emissions by one ton and is awarded a credit. If a steel producer, has an emissions quota of 10 tons but is expected to produce 11 tons, it can purchase the carbon credit from the environmental group. The carbon credit system looks to reduce emissions by ensuring that all countries keep their overall carbon emissions in check.

A. Carbon Bank :

Trading in carbons credits is regarded as an economically efficient mechanismto facilitate the transition to a low-carbon economy; price volatility can underminethe system's ability to meet its economic and environmental goals. Experience - such as that of the European Union Emissions Trading Scheme (EUETS) - has shown that emissions trading systems face a number of challengesrelated to the perceived stability of the system, particularly price volatility.

To maintain confidence in the system and ensure manageable compliance costs, price volatility in a cap-and-trade system must be minimized and managed. Setting up Carbon Bank by the government, can intervene in the carbon market to ensure price stability, minimize manipulation and speculation, and provide market oversight.

4.8 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

The term Environmental Impact Statement (EIS) and Environmental Impact Assessment (EIA) were coined in USA, when the preparation of these documents became compulsory in the USA under the National Environmental Policy Act (NEPA),

The purpose of Environmental Impact Assessment (EIA) is to identify and evaluate the potential impacts (beneficial and adverse) of development and projects on the environmental system. It is a useful aid for decision making based on understanding of the environment implications including social, cultural and aesthetic concerns which could be integrated with the analysis of the project costs and benefits. This exercise should be undertaken early enough in the planning stage of projects for selection of environmentally compatible sites, process technologies and such other environmental safeguards.

While all industrial projects may have some environmental impacts all of them may not be significant enough to warrant elaborate assessment procedures. The need for such exercises will have to be decided after initial evaluation of the possible implications of a particular project and its location. The projects which could have an Environment Impact Assessment include the following:-

- Those which can significantly alter the landscape, land use pattern and lead to concentration of working and service population;
- Those which need upstream development activity like assured mineral and forest products supply or downstream industrial process development;
- Those involving manufacture, handling and use of hazardous materials;
- Those which are sited near ecologically sensitive areas, urban centers, hill resorts, places of scientific and religious importance.
- Industrial Estates with constituent units of various types which could cumulatively cause significant environmental damage.

In India, the Environment Impact Assessment (EIA requirement for major projects started in the early 80s.

A. The EIA Process :

There are five stages in the EIA process:

Stage 1: Defining the present environment.

Stage 2: Study of the different components of the project.

Stage 3: Measurement of the quantum and character of the pollutant discharged.

Stage 4: Assessment of the impact of the pollutants discharged on various aspects of the environment.

Stage 5: Recommendation of some measures to reduce the impact of pollutants.

B. Objectives of EIA :

The objectives of EIA are to define the existing environmental conditions of each area of the study. Generally the area following within 10 to 15 Km radius of the project is studied in detail and the area within 30 to 50 Km radius of the project is studied only for major features.

C. Methodology of EIA

The methodology used for EIA is as follows:

1. Land Use: Land use maps are prepared.

2. Water uses: As study of the prevailing ground and surface water used is done.

3. Geology: Preparation of the geological map of the area is done.

4. Soil: Important soils are identified.

5. Hydrology: Information about surface and ground water is collected.

6. Water Quality: Information about the water quality of surface and ground water is collected around the area of the project.

4.9 ECOLOGICAL FOOTPRINT

All of the resources which people use for their daily needs and activities come from somewhere, even if not from their immediate surroundings. Food, electricity, and other basic amenities for survival must be produced within the confines of nature, using raw natural resources. Based on this relationship between humanity and the biosphere, an ecological footprint is a measurement of the land area required to sustain a population of any size. Under prevailing technology, it measures the amount of arable land and aquatic resources that must be used to continuously sustain a population, based on its consumption levels at a given point in time. To the fullest extent possible, this measurement incorporates water and energy use, uses of land for infrastructure and different forms of agriculture, forests, and all other forms of energy and material "inputs" that people require in their day-to-day lives. It also accounts for the land area required for waste assimilation.

Footprints can be measured at an individual level, or for cities, regions, countries, or the entire planet. Through specialized adjustments, EF analysis can also be used for specific activities, or to measure the ecological requirements of producing specific goods or services.

Analysts examine the quantity and different types of natural and manufactured materials and services used, and then use a variety of calculations to convert this into a land area. Footprints indicate how much "nature" is available for a defined population to use, compared to how much it needs to maintain its current activities. Obviously, the size of a footprint will vary depending on the volume and different types of natural resources consumed by a population, which will in turn depend on lifestyle choices, income levels, and technology.

4.10 ENVIRONMENT PROTECTION ACT, 1986

Environment Protection Act, 1986 is an Act of the Parliament of India. In the wake of the Bhopal Tragedy, the Government of India enacted the Environment Protection Act of 1986 under Article

253 of the Constitution. Passed in March 1986, it came into force on 19 November 1986.It has 26 sections. The purpose of the Act is to implement the decisions of the United Nations Conference on the Human Environments they relate to the protection and improvement of the human environment and the prevention of hazards to human beings, other living creatures, plants and property. The Act is an “umbrella” legislation designed to provide a framework for central government coordination of the activities of various central and state authorities established under previous laws, such as the Water Act and the Air Act.

4.11 CONCEPT AND COMPONENTS OF GEOSPATIAL TECHNOLOGY

Geospatial technology refers to a combination of equipment used in visualization, measurement, and analysis of earth’s features. It includes the broad range of services, technical and manufacturing professions, and products within the fields of geography, surveying and mapping, computer science, information science and other specialized areas of application.

A. Components of Geo- Spatial Technology (GST) :

GST comprises of three important components viz. Remote sensing, GIS and GPS. Each of these components has a similar base which is a product of geospatial technological processes.

There are now a variety of types of geospatial technologies potentially applicable to human rights, including the following:

•**Remote Sensing :** imagery and data collected from space- or airborne camera and sensor platforms. Some commercial satellite image providers now offer images showing details of one-meter or smaller, making these images appropriate for monitoring humanitarian needs and human rights abuses.

•**Geographic Information Systems (GIS):** a suite of software tools for mapping and analysing data which is georeferenced (assigned a specific location on the surface of the Earth, otherwise known as geospatial data). GIS can be used to detect geographic patterns in other data, such as disease clusters resulting from toxins, sub-optimal water access, etc.

•**Global Positioning System (GPS):** a network of U.S. Department of Defense satellites which can give precise coordinate locations to civilian and military users with proper receiving equipment.

4.12 APPLICATION OF GST IN ENVIRONMENTAL MANAGEMENT

With the help of GST, the environmental phenomena can be properly acquired and analysed so that degradation of environment can be minimised and its management be maximized.

Following are the specific applications of GST in environmental management:

a. Land use and land cover analysis: Changes in the land use and land cover is the major concern in environmental management as it is the first step in degrading the environment. With the help of remote sensing, images of the earth may be acquired to represent the levels of degradation so that it can be minimised in the endangered areas.

b. Groundwater analysis: Groundwater is essential to the living of human beings, agriculture and natural vegetation. Due to withdrawal of the same through wells and tube wells, it is declining day by day. GST helps to capture the levels and control the same.

c. Watershed management: With developing concrete jungles, the size of the watershed is declining. GST helps to analyse the same. It helps to identify the deficit areas and gives an overview of the prevalent conditions.

d. NDVI: NDVI stands for Normalized Difference Vegetation Index. It is an indicator to determine the declining number and species of vegetation in an area. It is a highly professional and reliable source of information which can be done only by using GST.

e. Disaster management: GST helps to track the upcoming disasters and analyse the affected areas from one distant location itself. This helps in giving early warnings and mitigation of the affected areas.

f. Biological conservation: With the analysis of routes of migration of animals and natural hazards like forest fires and floods, conservation plans for the natural areas like forests, marshy lands and even oceans can be formulated.

g. Pollution analysis: By mapping pollution data, one can understand the major areas struck by pollution and vice versa. This may help in regional planning and policy formulation to protect the environment.

4.13 SUMMARY

This Unit throws light on the various environmental movements in India ranging from Save Narmada Movement to Chipko Movement to Appiko Movement and Save Western Ghats movement. Further the learner is familarised with the concept of environmental management and its need and relevance.

The learner was also made aware about new concepts in environmental management like ISO 14000 and 16000, Carbon Bank and Carbon Credit, EIA, ecological footprint and Environment Protection Act. Finally the unit concluded with the understanding of the concept and components of Geospatial Technology and the applications of GST in environmental management.

4.14 CHECK YOUR PROGRESS/EXERCISE

A. True or False

1. Environmental movements range from the highly organized and formally institutionalized ones to the radically informal activities.

2. Appiko movement is the northern version of the Chipko movement.

3. Trading of carbon credits in the international market at their current price is illegal.

4. Geospatial technology refers to a combination of equipment used in visualization, measurement, and analysis of earth's features.

5. The need of Environmental Management is to use natural resources more efficiently.

B. Fill in the Blanks

1. Narmada Bachao Andolan is a powerful mass movement, started in 1985, against the construction of huge _____ on the Narmada River.

2. _____ management is the process to improve the relationship between the human beings and environment which may be achieved through check on destructive activities of man, conservation, protection, regulation and regeneration of nature.

3. Based on this relationship between humanity and the biosphere, an ecological _____ is a measurement of the land area required to sustain a population of any size.

4. The main objective of the Chipko Movement was to protect the trees on the _____ slopes from the axes of contractors of the forest.

5. A carbon credit is a _____ instrument that allows the holder, usually an energy company, to emit one ton of carbon dioxide.

C. Multiple Choice Questions

1. The name of the _____ movement comes from the word 'embrace', as the villagers hugged the trees, and prevented the contractors' from felling them.
   a. Chipko
   b. Appiko
   c. Save Western Ghats
   d. Save Narmada

2. The ISO _____ standards provide a guideline or framework for organizations that need to systematize and improve their environmental management efforts.
   a. 9000
   b. 16000
   c. 14000
   d. 10000

3. The purpose of _____ is to identify and evaluate the potential impacts (beneficial and adverse) of development and projects on the environmental system.
   a. GIS
   b. GST
   c. Carbon Banks
   d. EIA

4. GST can be used for _____ in environmental management.
   a. Motivational analysis
   b. Stress analysis
   c. Groundwater analysis
   d. EIA

5. The Narmada Movement first started as a protest for not providing proper _____ and resettlement for the people who have been displaced by the construction of Sardar Sarovar Dam.
   a. Preservation
   b. Rehabilitation
   c. Water
   d. Atmosphere

4.15 ANSWERS TO THE SELF-LEARNING QUESTIONS

A. True or False

1. True
2. False
3. False
4. True
5. True

B. Fill in the Blanks

1. Dam
2. Environmental
3. Footprint
4. Himalayan
5. Financial

C. Multiple Choice Questions

1. Chipko
2. 14000
3. EIA
4. Groundwater analysis
5. Rehabilitation

4.16 TECHNICAL WORDS AND THEIR MEANING

1. Environmental management: It is the process to improve the relationship between the human beings and environment which may be achieved through check on destructive activities of man, conservation, protection, regulation and regeneration of nature.

2. ISO 14000: It is a series of environmental management standards developed and published by the International Organization for Standardization (ISO) for organizations.

3. ISO 16000: It specifies a test method for determination of the area specific emission rate of semi-volatile organic compounds (SVOCs) from newly produced building products or furnishings under defined climate conditions.

4. A carbon credit: It is a permit that allows the receiver to burn a specified amount of hydrocarbon fuel over a specified period of time.

5. Environmental Impact Assessment (EIA): Its purpose is to identify and evaluate the potential impacts (beneficial and adverse) of development and projects on the environmental system

6. Ecological Footprint: Based on this relationship between humanity and the biosphere, an ecological footprint is a measurement of the land area required to sustain a population of any size.

7. Geospatial technology: It refers to a combination of equipment used in visualization, measurement, and analysis of earth's features.

4.17 TASK

Identify the process of obtaining ISO 14000 certification for an educational institute. Explain the process through a diagram and suggest the advantages of implementing the same to an educational institute.

4.18 REFERENCES FOR FURTHER STUDY

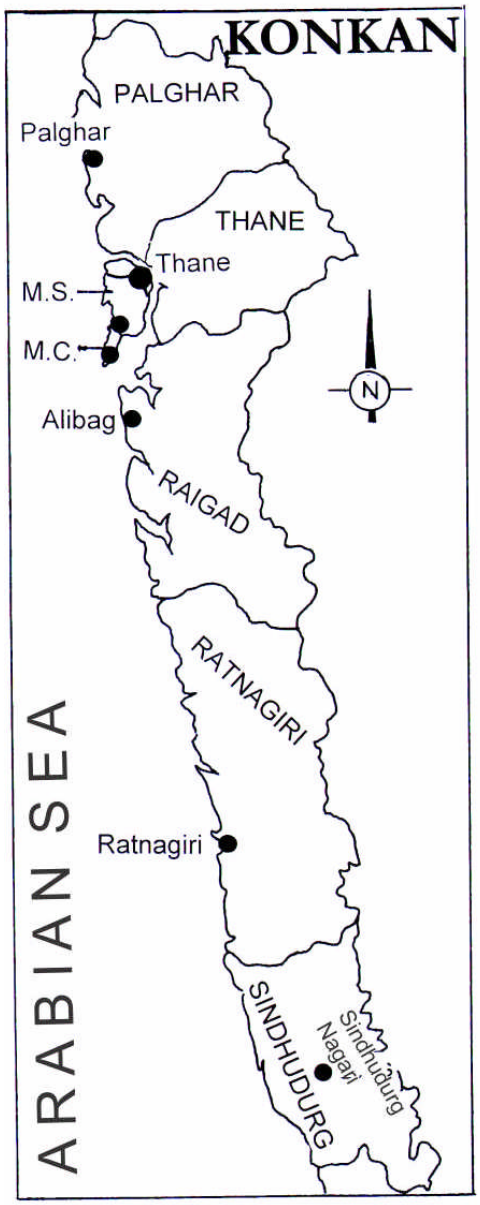
- Environmental Studies, Bagad Anjali
- Sustainable Urban Environments: An Ecosystem Approach, Beuren, Allan et. Al.
- The Sage Handbook of Environment and Society, Ward, Hugh eds.
- Environment and Sustainable Development, Sundar, I.

Unit -5

MAP FILLING
KONKAN

Use different appropriate Colours for various symbols marked in the Maps

ADMINISTRATIVE DIVISIONS

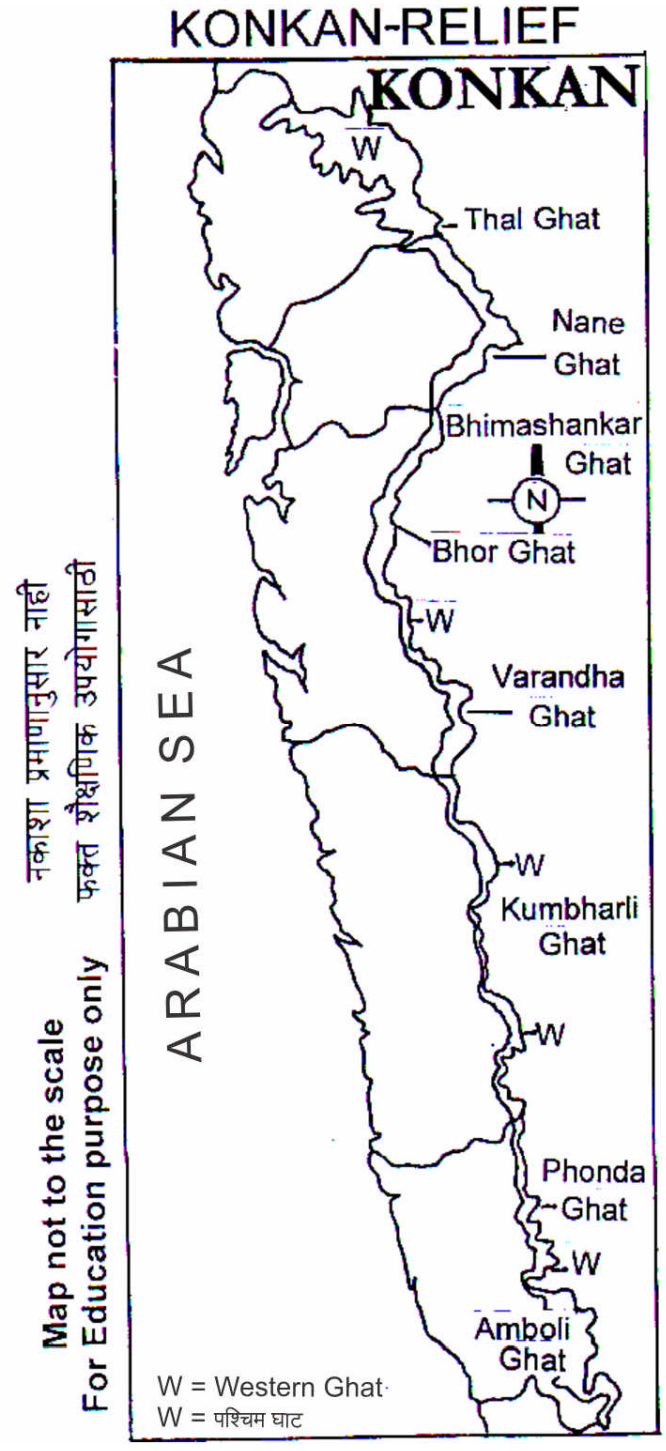


DISTRICTS

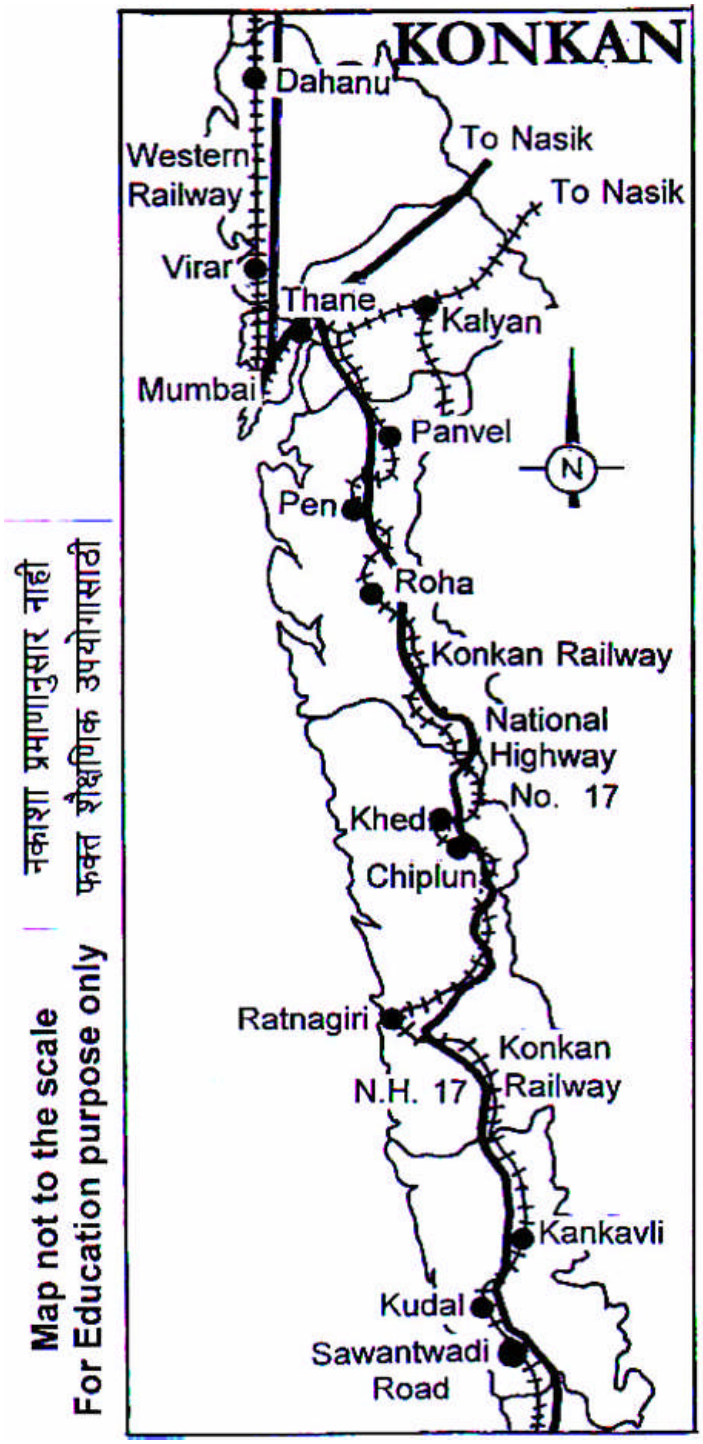
M.S. = Mumbai Surban District

M.C. = Mumbai City District

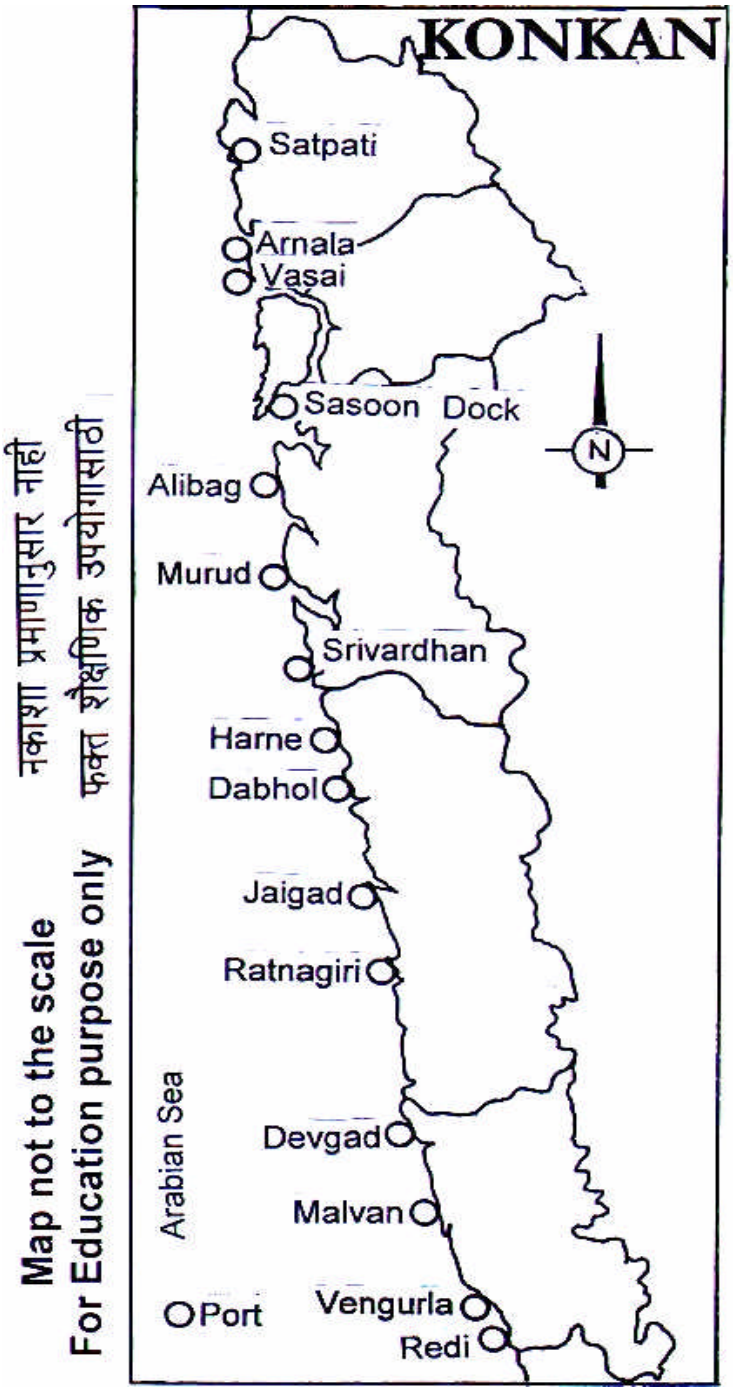
- **Administrative Divisions (Talukas)**
  प्रशासकीय विभाग (तालुके)



R = Rivers (नद्या)

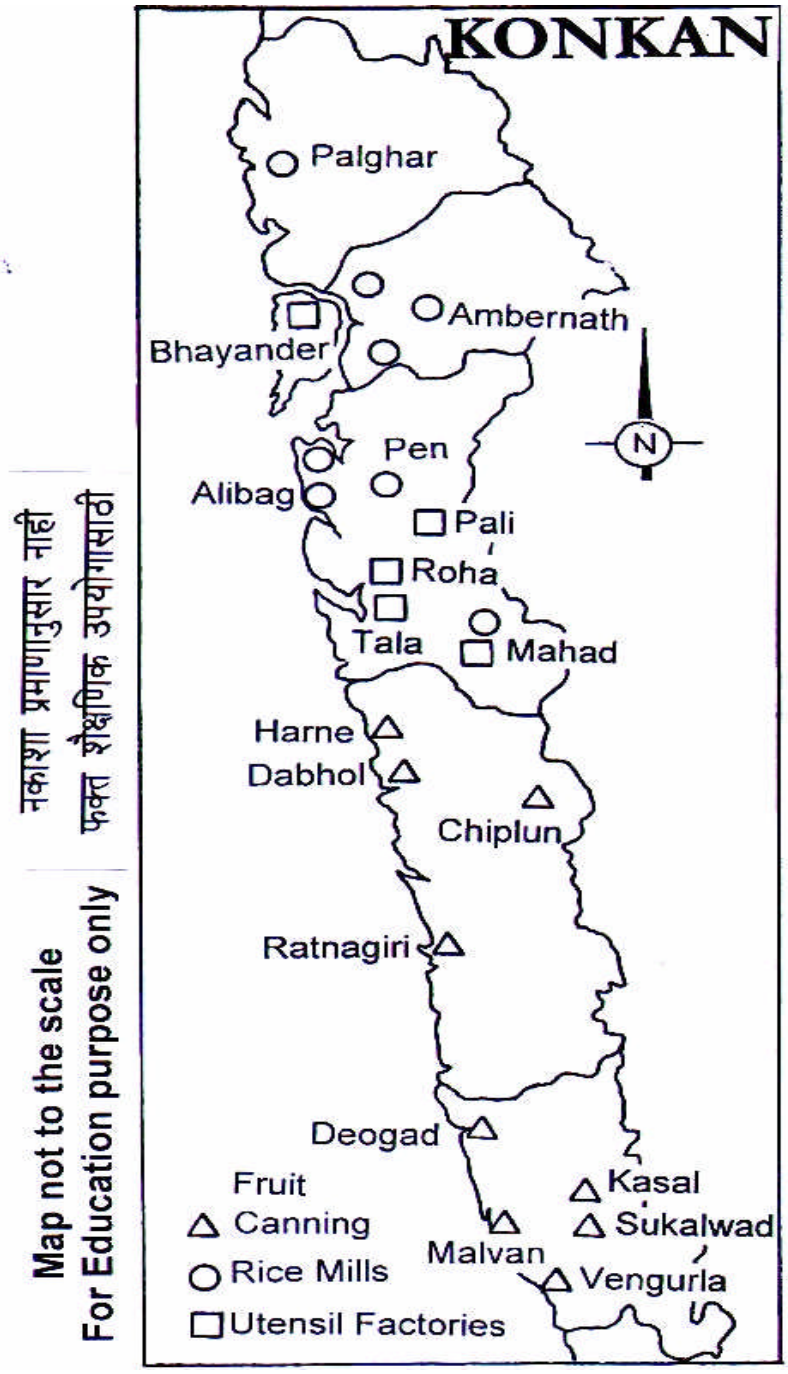


ROAD - RAILWAY (वाहतूक - रस्ते - रेल्वे)



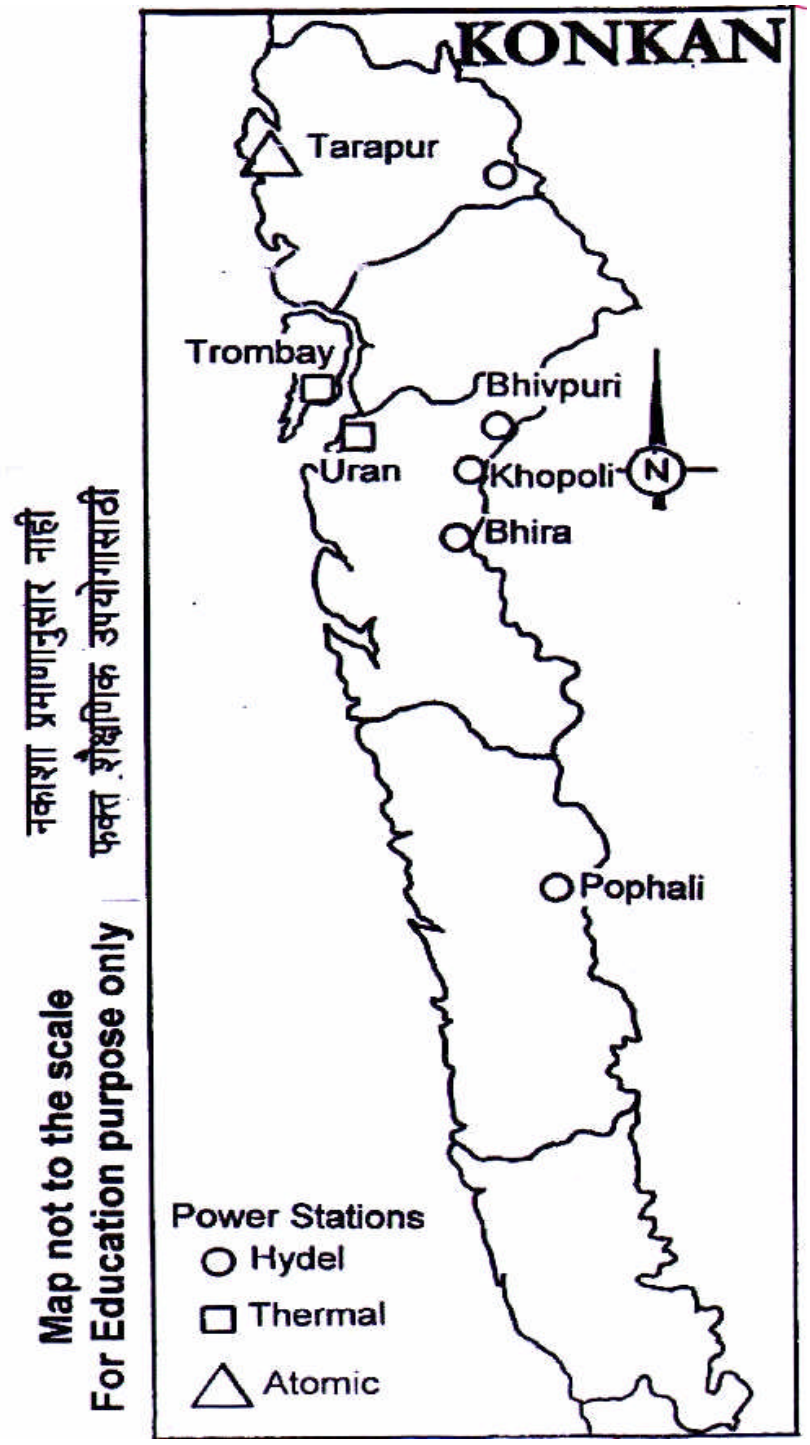
PORTS (वाहतूक बंदरे)
O Port (वाहतूक बंदरे)

Use Red Colour for Ports
बंदरांसाठी लाल रंग वापरा



KONKAN INDUSTRIES (उद्योग)

फळ व्यवसाय (Red लाल) ○ भात गिरण्या (Yellow पिवळा) □ इतर कारखाने (Blue निळा)

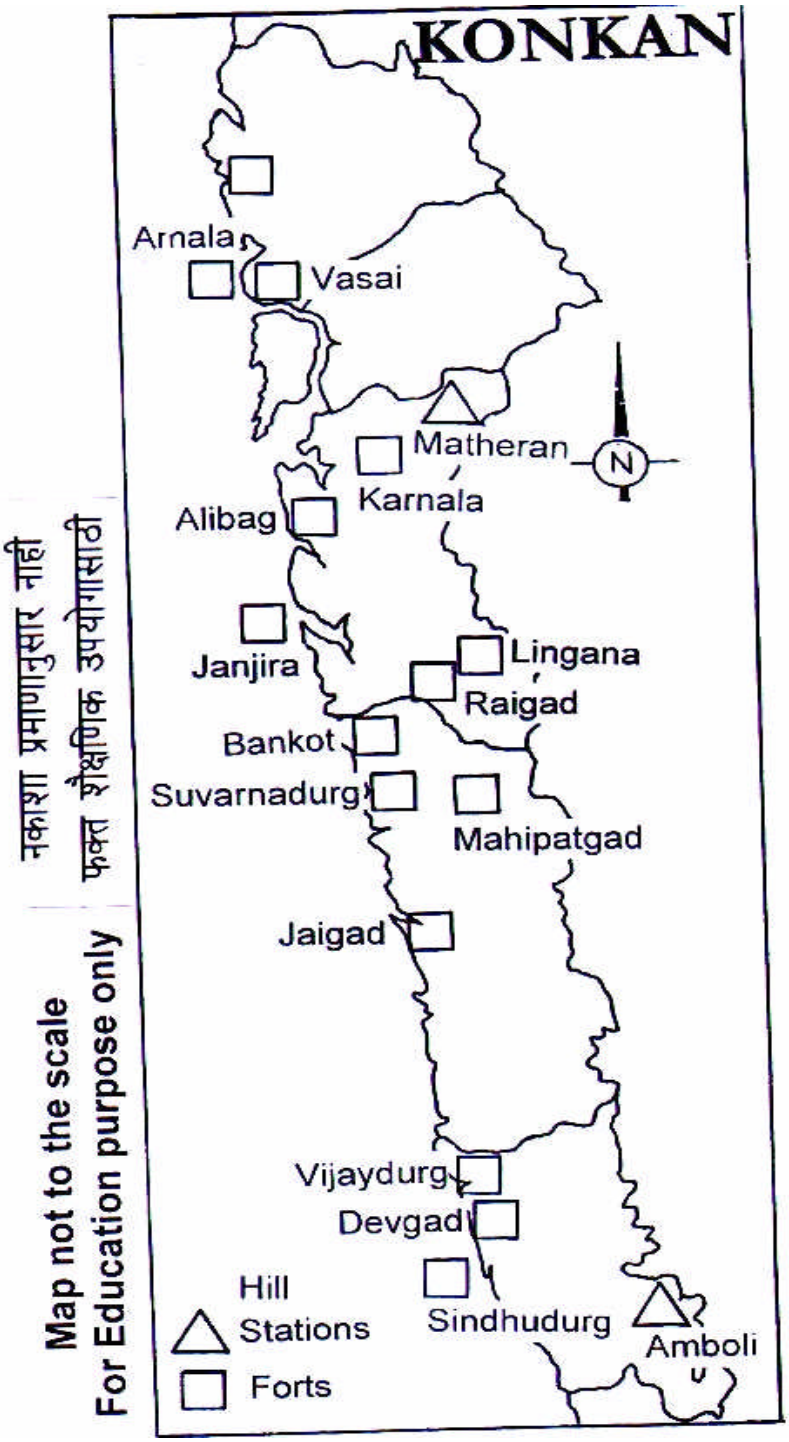


POWER STATIONS (विजनिर्मिती केंद्रे)

○ जलविद्युत (Blue निळा)

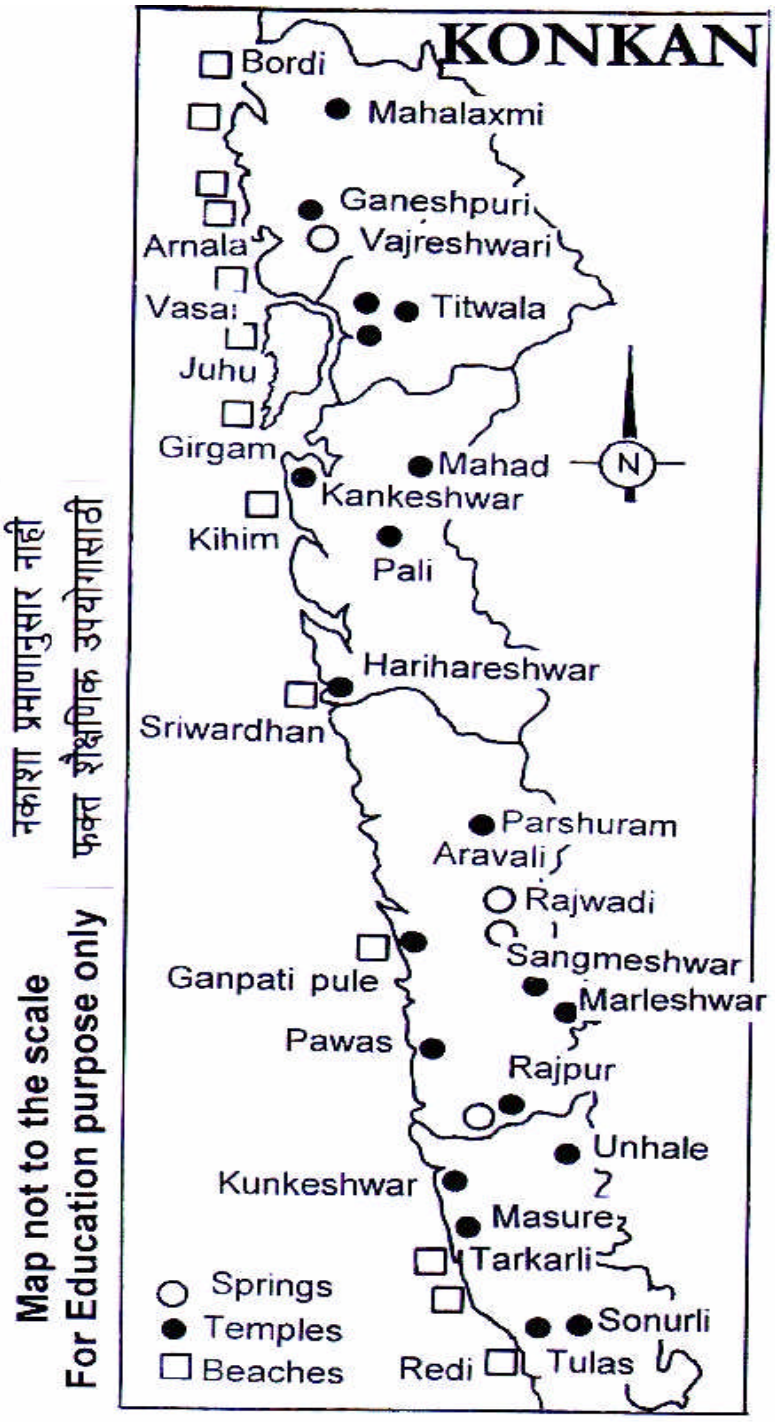
□ औष्णीक विद्युत (Black काळा)

△ अणुविद्युत (Red लाल)



TOURIST PLACES (पर्यटन स्थळे)

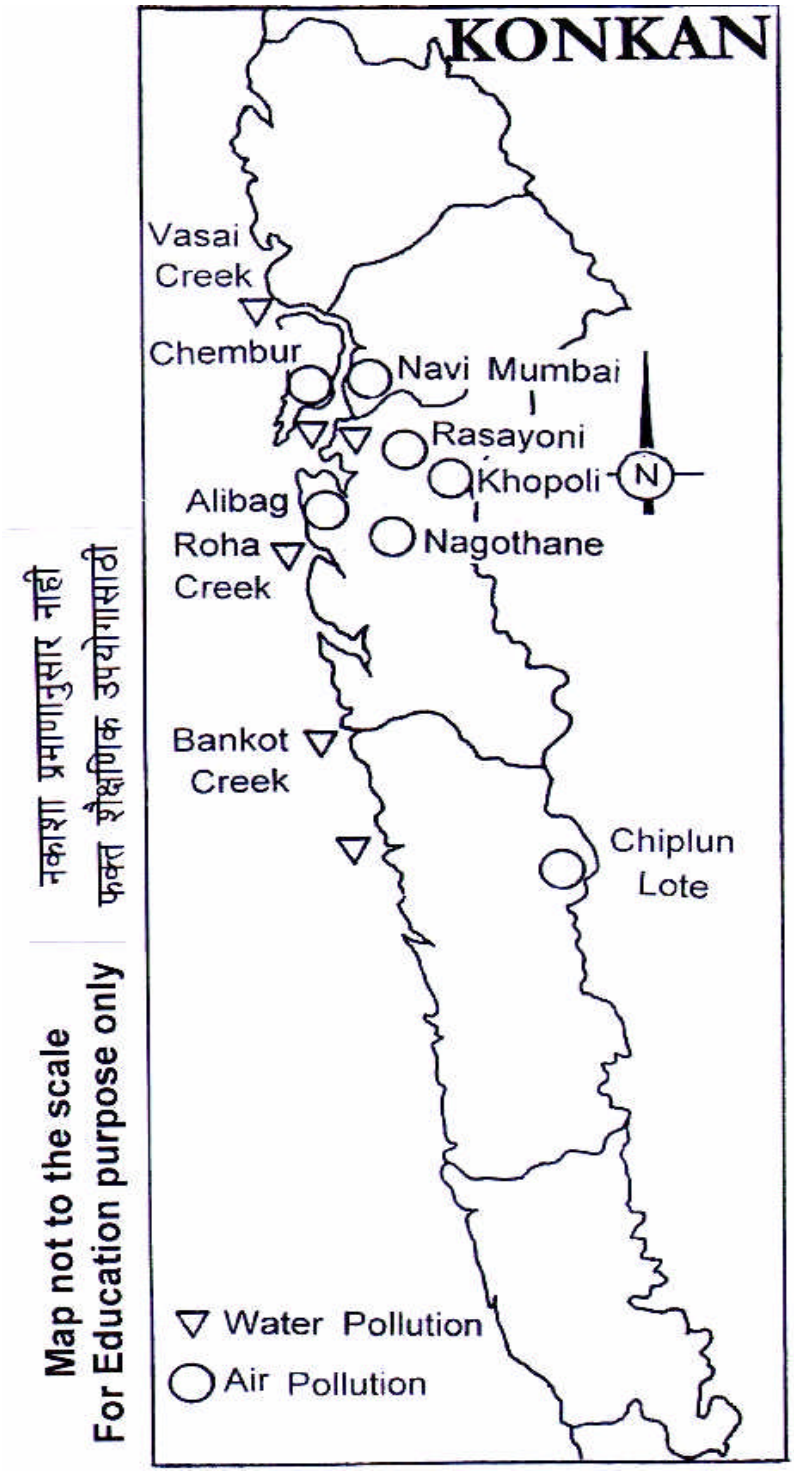
△ थंड हवेची ठिकाणे (Blue निळा) □ किल्ले (Red लाल)



TOURIST PLACES (पर्यटन स्थळे)

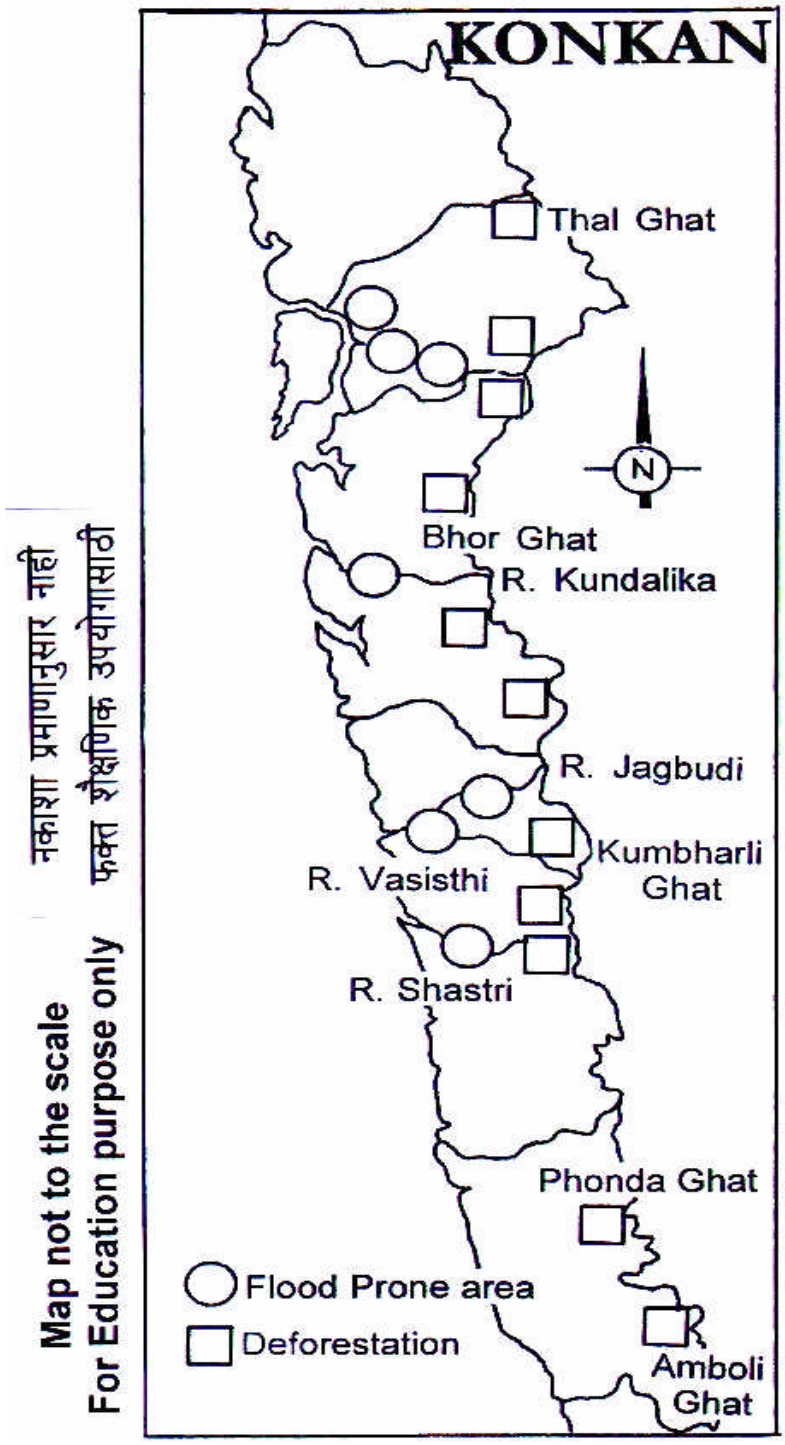
○ झरे (Red लाल)

● औष्णीक विद्युत □ किनारे (Blue निळा)

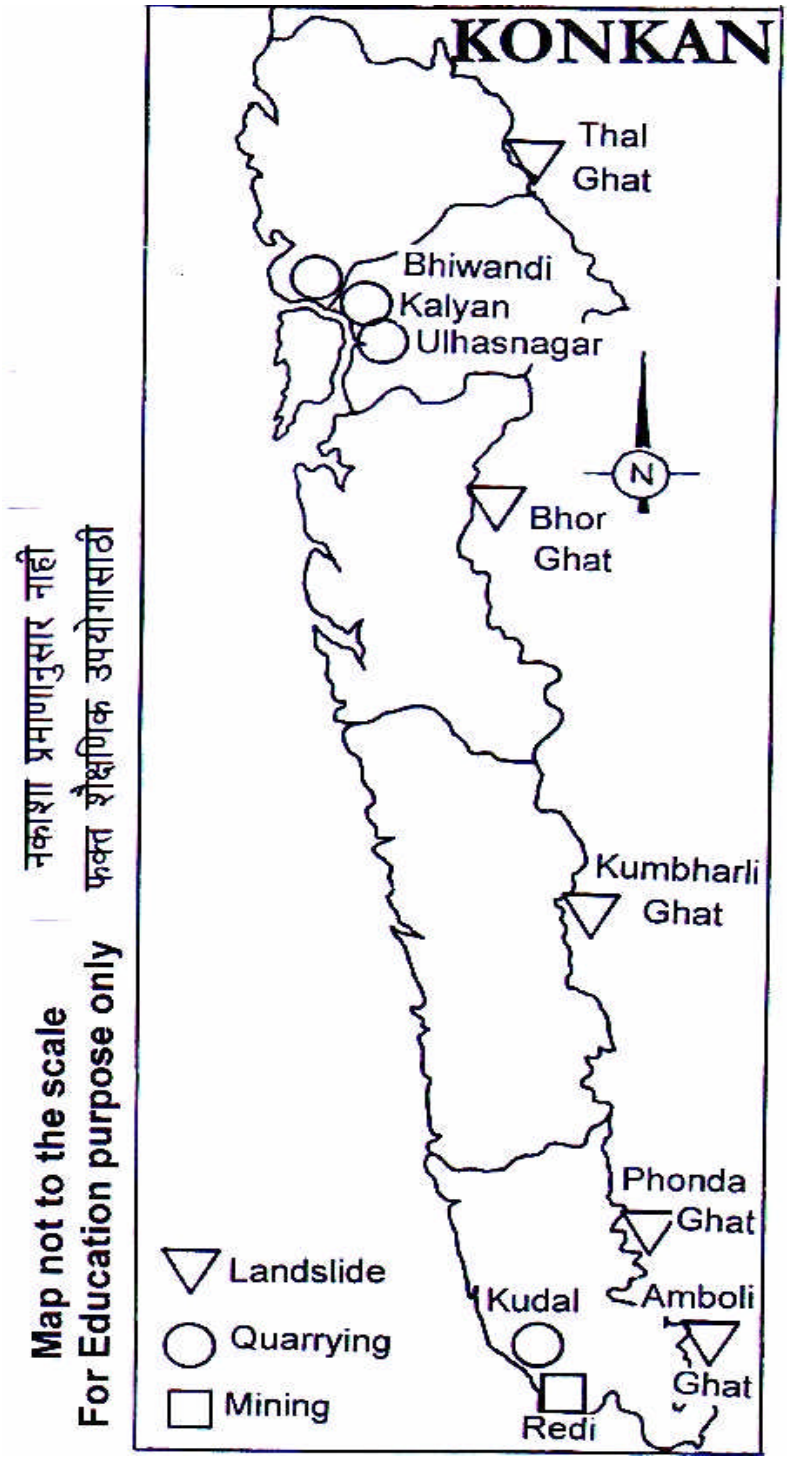


PROBLEMS (पर्यावरण समस्या)

○ हवा प्रदुषण (Blue निळा) ▽ जल प्रदुषण (Red लाल)



○ पूर प्रवण क्षेत्र (Blue निळा) □ जंगलतोड (Red लाल)



दरड कोसळणे ○ उत्खनन □ खाणकाम

(Red लाल) (Blue निळा) (Green हिरवा)

EXERCISES - KONKAN

Mark & Name following in the Map of Konkan

Northernmost district of Konkan (Palghar) (Map 1)

Southernmost district of Konkan (Sindhudurg) (Map 1)

District headquarter of Raigad District (Alibag) (Map 1)

District headquarter of Sindhudurg District (Oras / Sindhudurg Nagari) (Map 1)

Two districts of Mumbai (Mumbai City & Mumbai Suburb) (Map 1)

Smallest district of Konkan (Mumbai city) (Map 1)

Ratnagiri District (Map 1)

Amboli Ghat (Map 3)

Important Ghat in the northern part of Konkan (Thal Ghat) (Map 3)

Important Ghat in the Southern part of Konkan (Amboli Ghat) (Map 3)

Bhimashankar Ghat (Map 3)

Ghat in Ratnagiri district (Kumbharli) (Map 3)

Ghats in Sindhudurg district (Phonda and Amboli) (Map 3)

Ghat, which is used for going to Pune from Mumbai by train (Bhor) (Map 3)

Ghat, which is used for going to Nasik from Mumbai by train (Thal) (Map 3)

Varandha Ghat (Map 3)

Nane Ghat (Map 3)

Southernmost river of Konkan (Terekhol) (Map 4)

River which is a boundary between Raigad & Ratnagiri districts (River Savitri) (Map 4)

R. Vaitarna (Map 4)

R. Tansa (Map 4)

R. Ulhas (Map 4)

Most Polluted river in Raigad district (Patalganga) (Map 4)

R. Vasisthi (Map 4)

R. Karli (Map 4)

Railway route from Mumbai to Dahanu (Map 5)

Railway route from Ratnagiri to Sawantwadi (Map 5)

Railway route from Thane to Chiplun (Map 5)

Panvel Railway Station (Map 5)

Ratnagiri Railway Station (Map 5)

Kudal Railway Station (Map 5)

Kalyan Railway Station (Map 5)
Roha Railway Station (Map 5)
National Highway from Panvel to Sawantwadi (Map 5)
Konkan Railway (Map 5)
National Highway No. 17 (Map 5)
Major Port in Palghar District (Satpati) (Map 6)
Southernmost Port of Konkan (Redi) (Map 6)
Port mainly used for the export of minerals (Redi) (Map 6)
Major Dock along east coast of Mumbai (Sasoon Dock) (Map 6)
Dabhol Port (Map 6)
Jaigad Port (Map 6)
Ratnagiri Port (Map 6)
Vasai Port (Map 6)
Murud Port (Map 6)
Devgad Port (Map 6)
Malvan Port (Map 6)
Vengurla Port (Map 6)
Harne Port (Map 6)
Rice mills in Palghar District (Map 7)
Canning near Chiplun (Map 7)
Canning near Ratnagiri (Map 7)
Canning near Deogad (Map 7)
Canning near Vengurla (Map 7)
Utensil factories in the Raigad district (Pali, Roha, Tala, Mahad) (Map 7)
Utensil factories to the north of Mumbai (Bhayander) (Map 7)
Rice mills in the Thane District (Map 7)
Rice mills in the Raigad District (Map 7)

Ship building in Sindhudurg District (Devgad, Malvan) (Map 8)
Ship building near Mumbai (Uttan) (Map 8)
Industrial estates in Palghar District (Map 8)
Industrial estates in Thane District (Map 8)
Industrial estates in Raigad District (Map 8)
Industrial estates in Ratnagiri District (Map 8)
Industrial estates in Sindhudurg District (Map 8)
Atomic power station (Tarapur) (Map 9)
Hydel power station in Ratnagiri District (Pophali) (Map 9)
Thermal power station in Mumbai (Trombay) (Map 9)
Thermal power station in Raigad (Uran) (Map 9)

Hydel power station in Raigad District (Bhivpuri, Khopoli & Bhira) (Map 9)

Famous hill station in Sindhudurg District (Amboli) (Map 10)

Famous hill station in Raigad District (Matheran) (Map 10)

Forts in Palghar District (Map 10)

Forts in Raigad District (Map 10)

Forts in Ratnagiri District (Map 10)

Forts in Sindhudurg District (Map 10)

Sea Fort near Malvan (Sindhudurg) (Map 10)

Sea Fort near Raigad District (Janira, Alibag) (Map 10)

Fort at the headquarter of Raigad District (Alibag) (Map 10)

Famous beach in the northern Konkan (Bordi) (Map 11)

Hot Springs near Rajapur (Map 11)

Famous beach in Ratnagiri District (Ganpati Pule) (Map 11)

Famous beach in Mumbai (Juhu) (Map 11)

Temple at Marleshwar (Map 11)

Famous Ganpati temple in Thane District (Titwala) (Map 11)

Famous Ganpati temples in Raigad district (Mahad & Pali) (Map 11)

Beaches in Sindhudurg District (Tarkarli, Redi) (Map 11)

Aread of Air Pollution in Ratnagiri District (Chiplun - Lote) (Map 12)

Air pollution in Raigad District (Rasayani, Khopoli, Alibag, Nagothane) (Map 12)

Polluted creek to the north of Mumbai (Vasai creek) (Map 12)

Air Pollution in Mumbai (Chembur) (Map 12)

Air Pollution in Navi-Mumbai (Map 12)

Deforestation near Thal Ghat (Map 13)

Deforestation near Phonda Ghat (Map 13)

Deforestation near Amboli Ghat (Map 13)

Deforestation near Kumbharli Ghat (Map 13)

Deforestation near Bhor Ghat (Map 13)

Flood prone areas in Thane District (Map 13)

Flood prone areas in Raigad District (Map 13)

Flood prone areas in Ratnagiri District (Map 13)

Landslide near Thal Ghat (Map 14)

Landslide near Bhor Ghat (Map 14)

Landslide near Kumbharli Ghat (Map 14)

Landslide near Phonda Ghat (Map 14)

Landslide near Amboli Ghat (Map 14)

Mining at Redi (Map 14)

ADDITIONAL EXERCISE MAP OF KONKAN

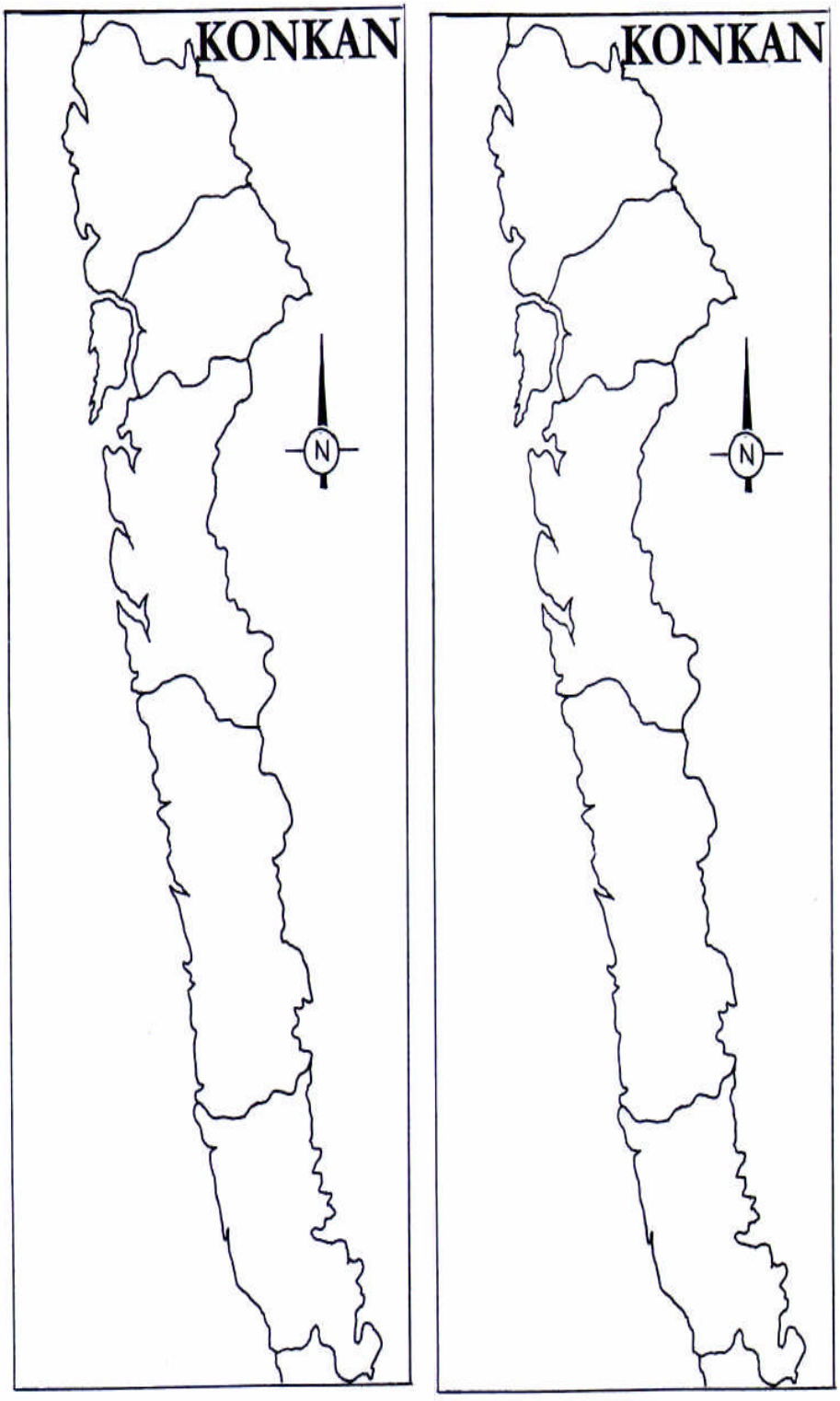
Mark and Name the following on the outline Map of Konkan supplied to you
Southern most district of Konkan.
Mark the railway station on Konkan railway located in between Rajapur Road and Kudal Railway Station.
The port of Ratnagiri district experiences the problem of marine erosion.
The area famous for horticulture in Thane District.
A famous hill station of Raigad District.

Mark and name the following on the outline map of Konkan :

A place of hot spring
A port in Sindhudurg district
Fruit and vegetable market
Most polluted river
A tourist place in Ratnagiri District

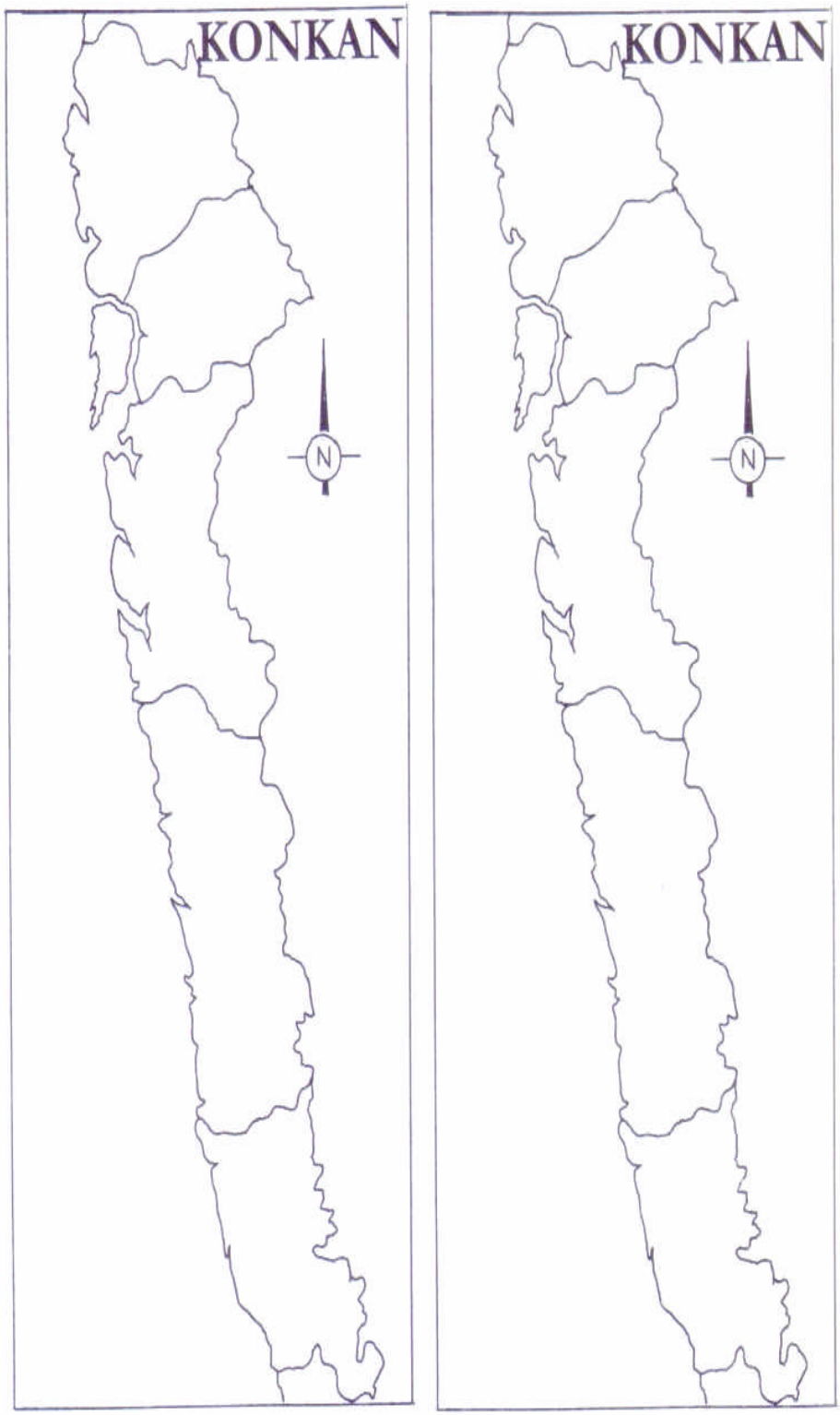
i) Northernmost district of Konkan.
Famous hill station in Raigad.
Famous religious centre at the coast of Ratnagiri.
Fishing port in Sindhudurg District.
Most polluted river in Raigad.

Mark and Name the following features in the outline Map of Konkan
Mumbai Suburban District
Amboli Ghat
Ratnagiri to Kudal Konkan Railway
Distrit Raigad
National Highway No. 17
Thane City



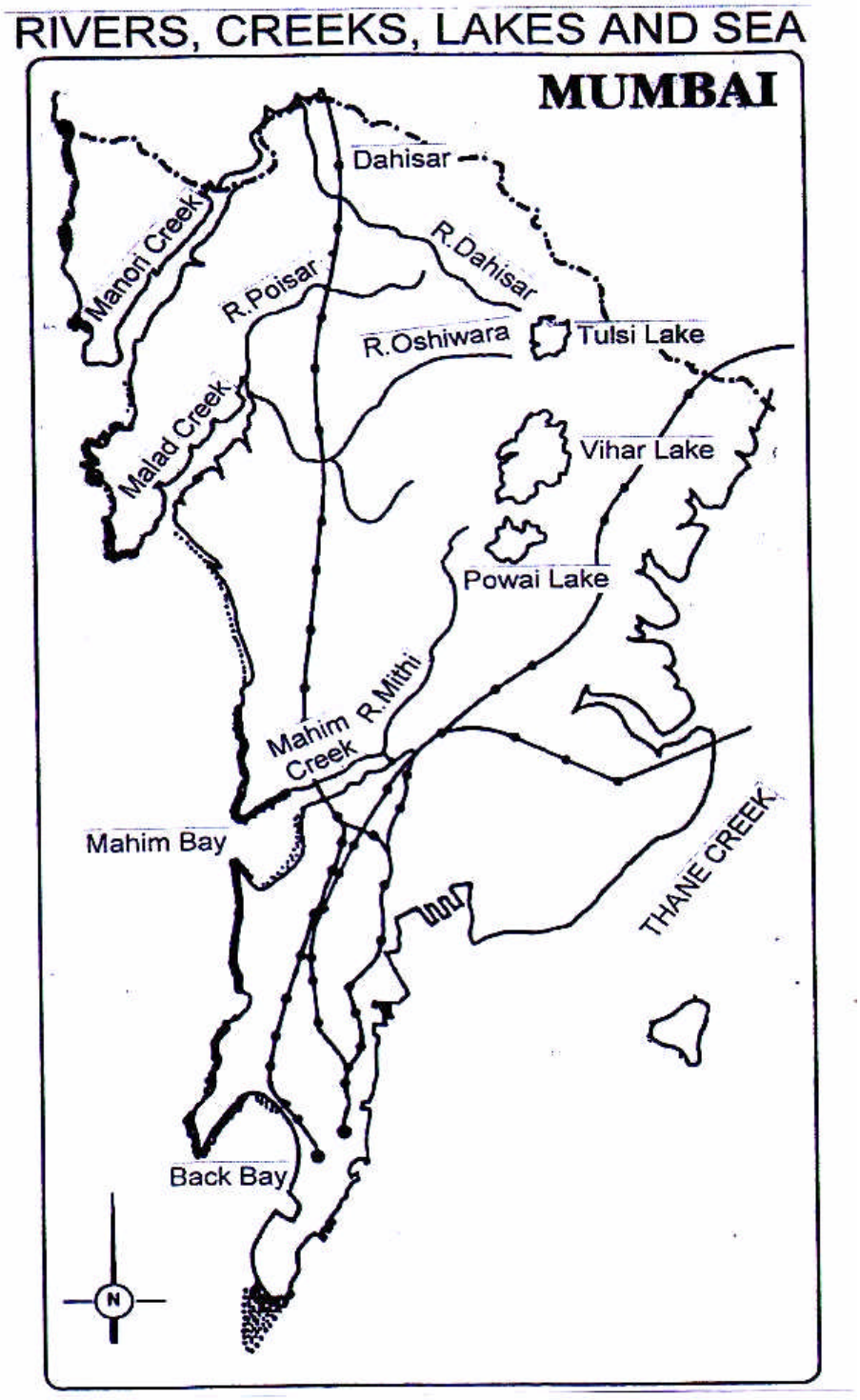
नकाशा प्रमाणानुसार नाही
फक्त शैक्षणिक उपयोगासाठी

Map not to the scale
For Education purpose only

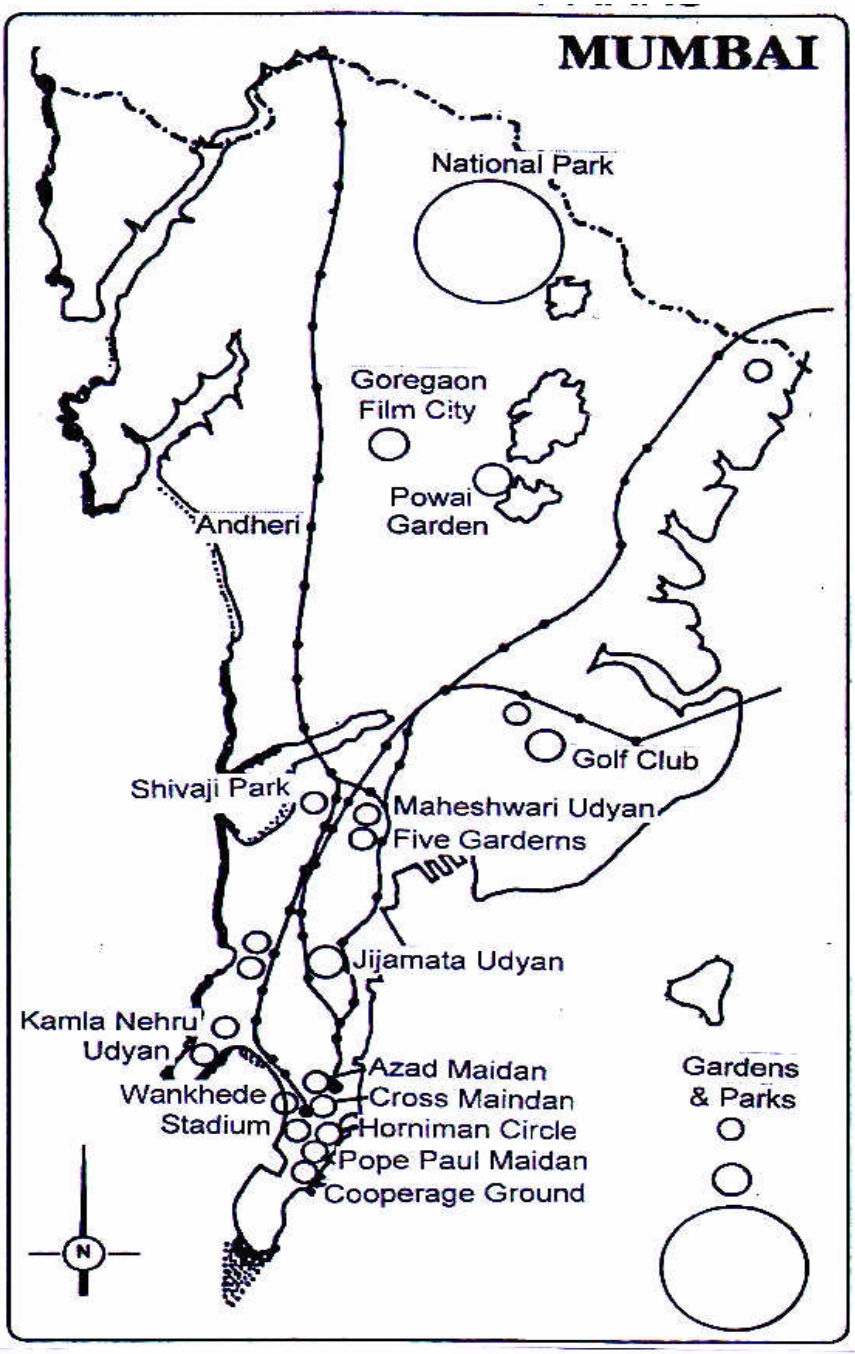


MAP 5MAP 6

SECTION - IV MUMBAI
Mumbai Administrative Divisions (मुंबई प्रशासकीय विभाग)



(नद्या, खाड्या, तलाव आणि समुद्र)



GARDENS AND PARKS (बागा आणि उद्याने)

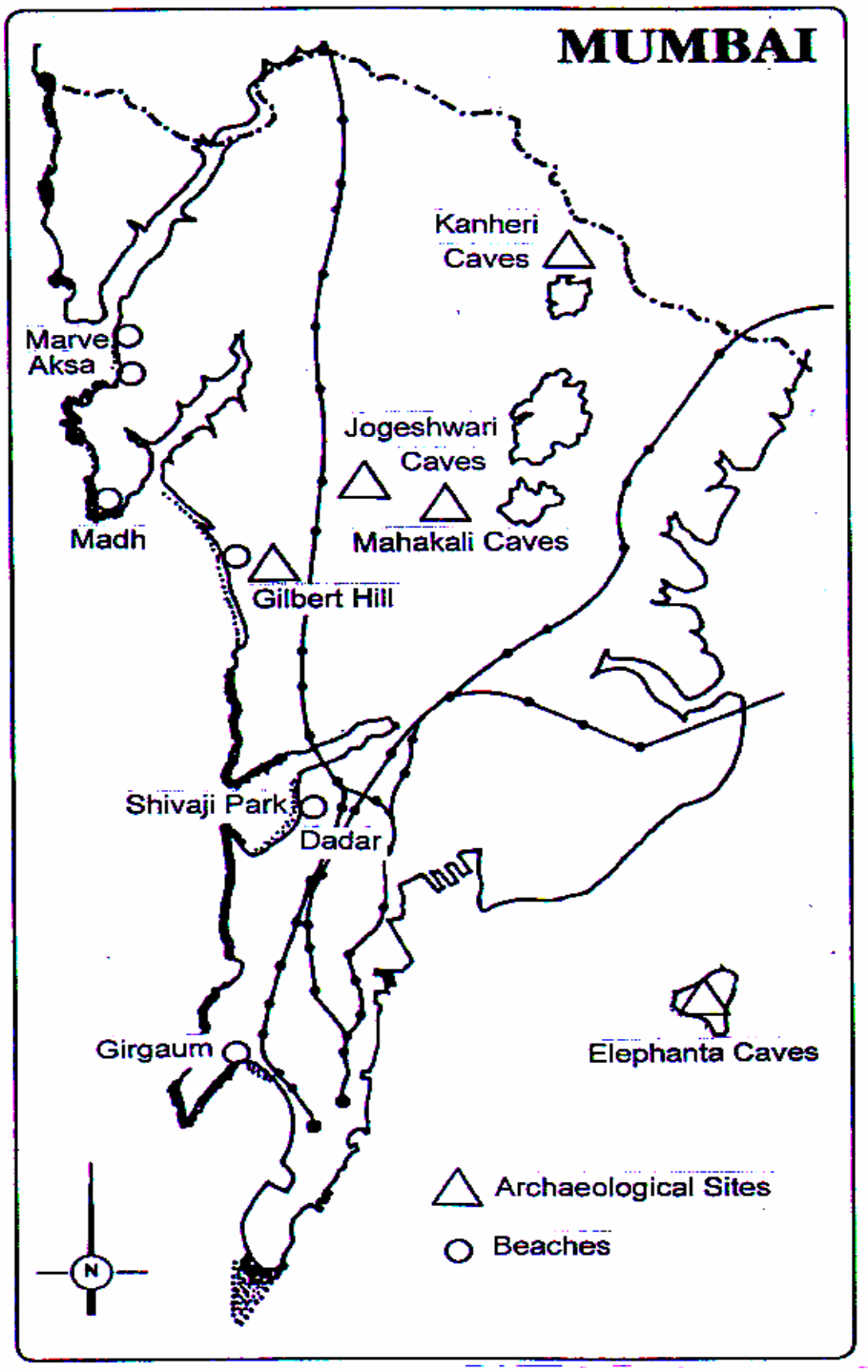
बागा (Gardens)

○ उद्याने (Parks)

◯ राष्ट्रीय उद्यान (National Park)

Map not to the scale For Education purpose only

बंदरे विमानतळ



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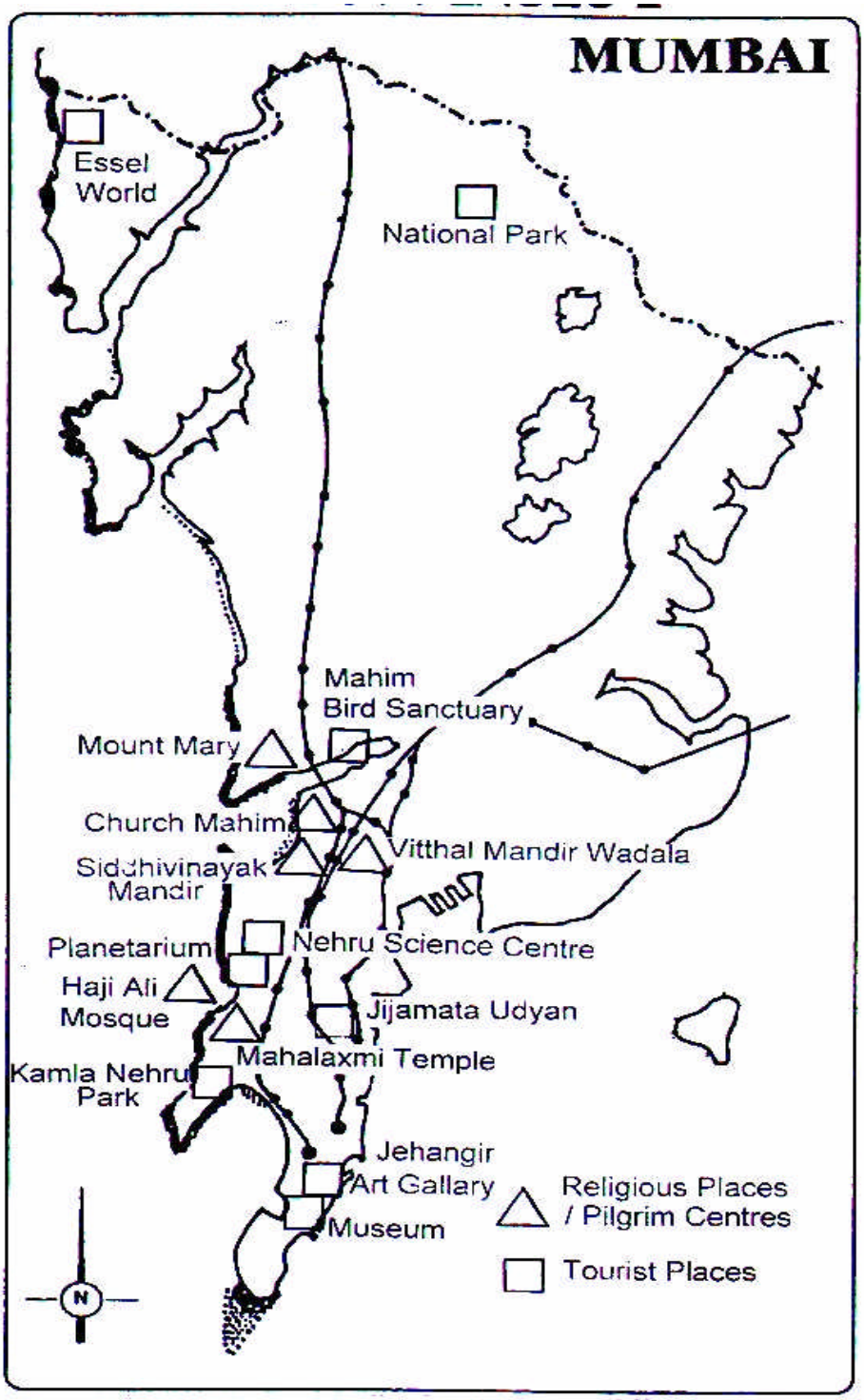
For Education purpose only

नकाशा प्रमाणानुसार नाही
फक्त शैक्षणिक उपयोगासाठी

△ पुरातन ठिकाणे ○ किनारे



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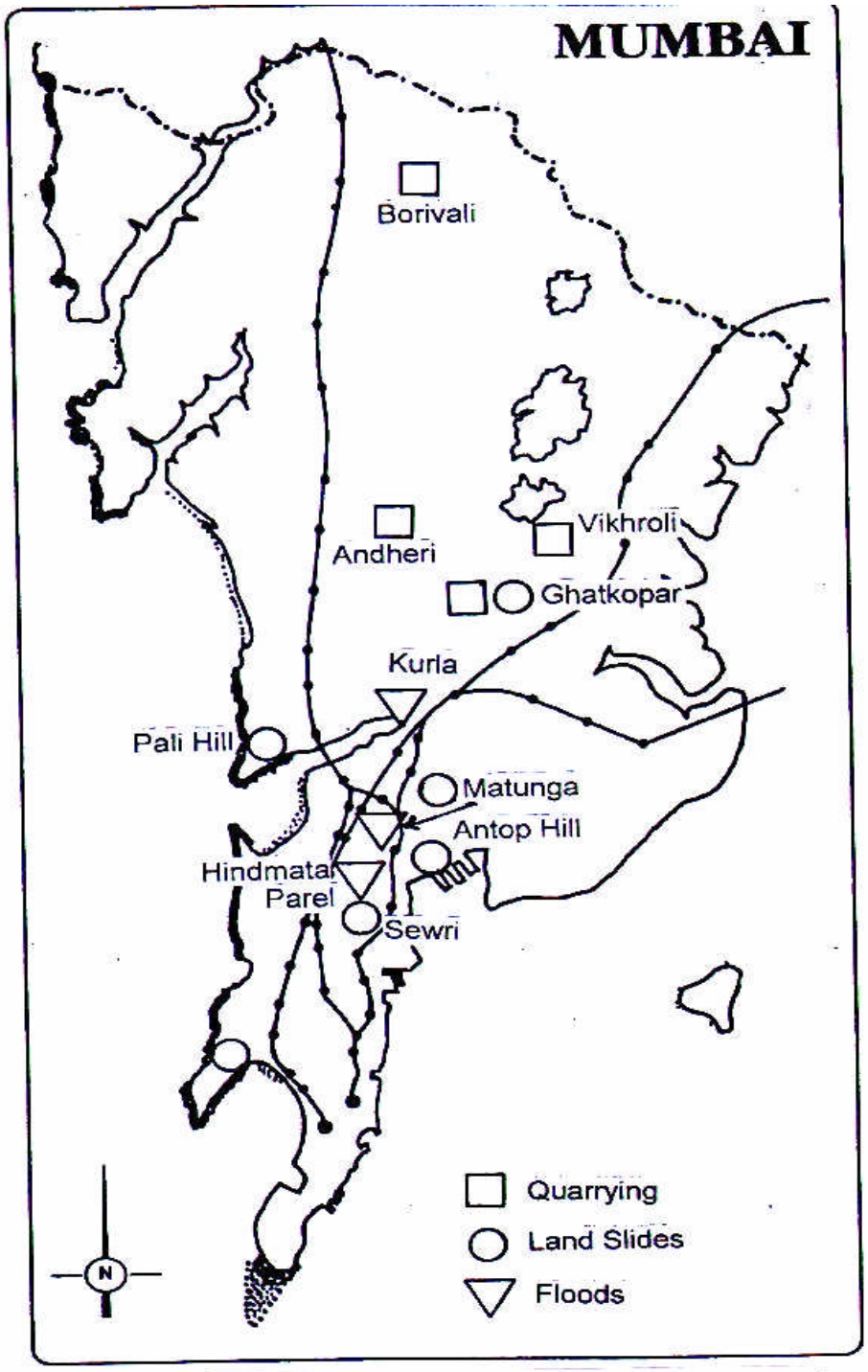
For Education purpose only

नकाशा प्रमाणानुसार नाही
फक्त शैक्षणिक उपयोगासाठी

△ धार्मिक स्थळे □ पर्यटन स्थळे



Map not to the scale
For Education purpose only

नकाशा प्रमाणानुसार नाही
फक्त शैक्षणिक उपयोगासाठी

☐ उत्खनन ○ दरड कोसळणे ▽ पूर

ADDITIONAL EXERCISES MAP OF MUMBAI

7. a) Mark and name the following on the outline map of Mumbai supplied to you : (5)

i) Creek lies between Mumbai suburb and the main land.

ii) The northern most hill of Mumbai.

iii) Highly polluted river flowing nearer from International Airport of Mumbai.

iv) Locate any one suburban railway station on central railway between C.S.T. and Kurla stations.

v) Mark the largest lake of Mumbai.

7) a) Mark and name the following on the outline map of MUMBAI :

i) Lake Vihar

ii) An area of bird sanctuary Forest area of Mumbai

iii) Area of air pollution due to chemical industry A place well

iv) known for dumping of solid waste

7) a) Mark and name the following on the outline map of MUMBAI :

i) Railway route from Churchgate to Andheri

ii) Sahar

iii) Kanheri Caves Elephanta

iv) Haji Ali Thane Creek

7) a) Mark and name following efn the map of MUMBAI : Creek

i) between Mumbai City and Suburban

ii) Hill at the Northern Border of Greater Mumbai Large

iii) Green Forest to the North of Mumbai Famous Sea-beach

iv) at N.W. Mumbai.

International Airport of Mumbai.

EXERCISES - MUMBAI

Mark & Name following features in the Map of Mumbai.

City area (Mumbai City District) (Map 1)
Mumbai Suburban District (Map 1)
Kanheri hills (Map 1)
Largest lake in Mumbai Suburban District (Virar) (Map 2)
Tulsi Lake (Map 2)

Powai Lake (Map 2)
Manori Creek (Map 2)
Malad Creek (Map 2)
Gilbert Hill (Map 2)
Bandra Headland (Map 2)
Cumbala Hill (Map 2)
Malabar Hill (Map 2)
Elephanta (Map 2)
Antop Hill (Map 2)
Worli Headland (Map 2)
Hill near Andheri Railway Station (Gilbert) (Map 2)
Hills at Trombay (Map 2)
Major river in the Central Part (Mithi) (Map 3)
Mahin Bay (Map 3)
Back Bay (Map 3)
Creek to the East of Mumbai (Map 3)
River Dahisar (Map 3)
River Poisar (Map 3)
Largest Green area in Mumbai Suburban (National Park) (Map 4)
Largest Green area in Mumbai City (Jijamata Udyan) (Map 4)
Largest Green area in the northern part of greater Mumbai (National Park) (Map 4)
Goregaon Film City (Map 4)
Kamla Nehru Udyan (Map 4)
Golf Club (Map 4)
Shivaji Park (Map 4)
Green area near Mahim bay (Shivaji Park) (Map 4)
Green area between CST and Churchgate (Azad Maidan or Cross Maidan) (Map 4)
Terminal Station of Central Railway (CST) (Map 5)
Terminal Station of Western Railway (Churchgate) (Map 5)
Metro - Connecting Andheri and Ghatkopar (Map 5)
Railway Route from Dahisar to Bandra (Map 5)
Railway Route from Mulund to Ghatkopar (Map 5)
International Airport (Map 6)
Eastern Express Highway (Map 6)
S.V. Road (Map 6)
Ali Yavar Jung Marg (Map 6)
Mazgaon Dock (Map 6)
Sasoon Dock (Map 6)
Ballard Pier (Map 6)

Girgaum Beach (Map 7)

Juhu Beach (Map 7)

Jogeshwari Caves (Map 7)

Mahakali Caves (Map 7)

Shivaji Park Beach (Map 7)

Aksa Beach (Map 7)

Largest entertainment centre in the Northern part of Mumbai (Essel World) (Map 8)

Bird Sanctuary in the Central part of Mumbai (Mahim Bird Sanctuary) (Map 8)

Important tourist places to the South of Churchgate (Jehangir Art Gallery & Museum) (Map 8)

Haji Ali (Map 8)

Mount Mary (Map 8)

Mahalaxmi Mandir (Map 8)

Nehru Science Centre (Map 8)

Planetarium (Map 8)

Major Pilgrim Centre for Christans (Mount Mary) (Map 8)

Major Pilgrim Centre for Muslims (Haji Ali) (Map 8)

Major Pilgrim Centre for Hindus (Siddhivinayak Mandir) (Map 8)

Flood affected area near Kurla (Map 9)

Flood affected areas in the Mumbai City (Matunga & Hindmata) (Map 9)

Quarrying in North Mumbai (Borivali) (Map 9)

Landslide area near Central Railway (Ghatkopar) (Map 9)

Saki Naka (Map 10)

Slum area near Ghatkopar (Ramabai Colony) (Map 10)

Largest Slum in Asia (Dharavi) (Map 10)

Mankhurd (Map 10)

Shivaji Nagar (Map 10)

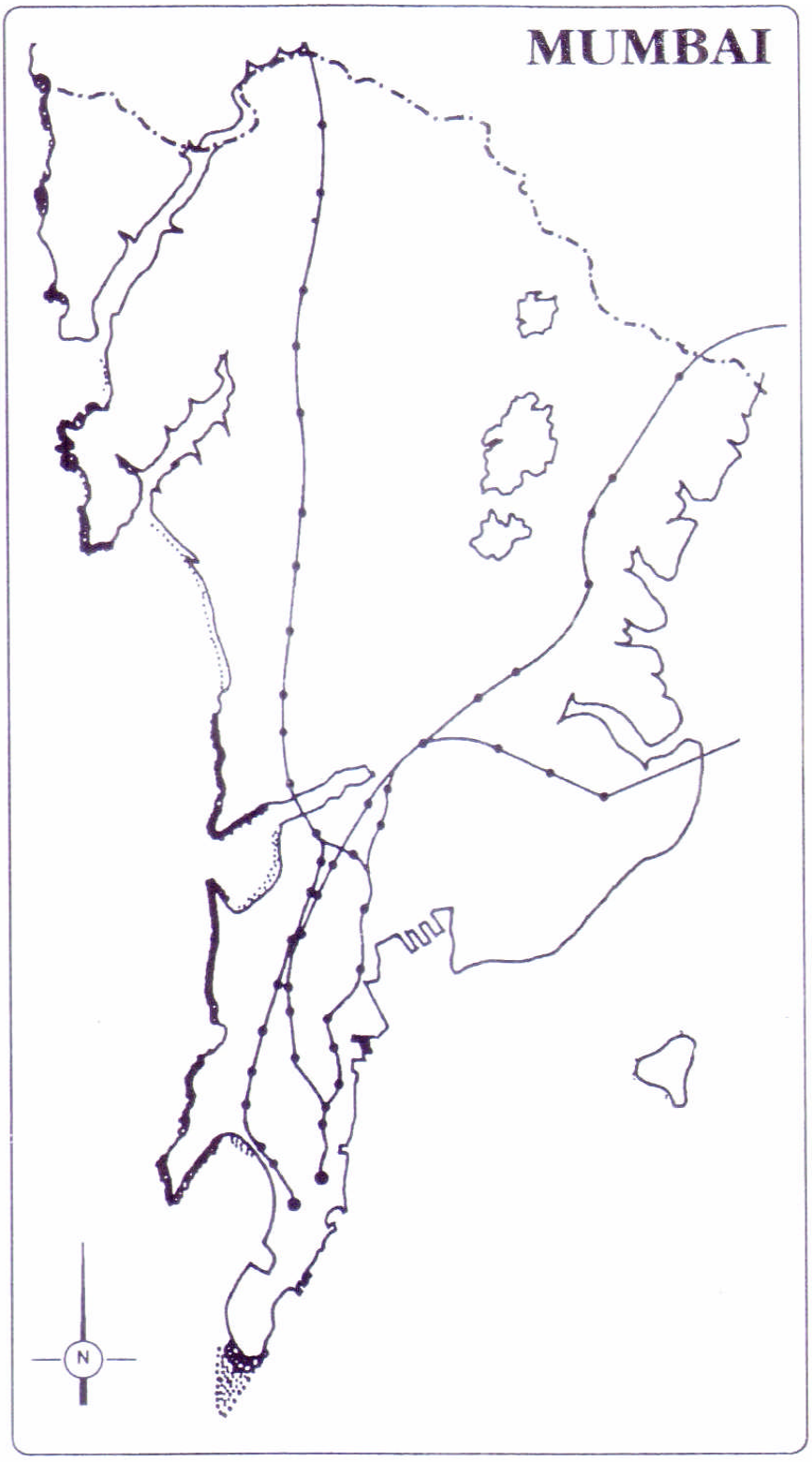
Air Pollution in the Eastern Suburbs (Chembur) (Map 10)

Water Pollution near Mankhurd (Map 11)

Noise Pollution near Bandra (Map 11)

Noise Pollution near Dadar (Map 11)

Noise Pollution near South Mumbai (Map 11)



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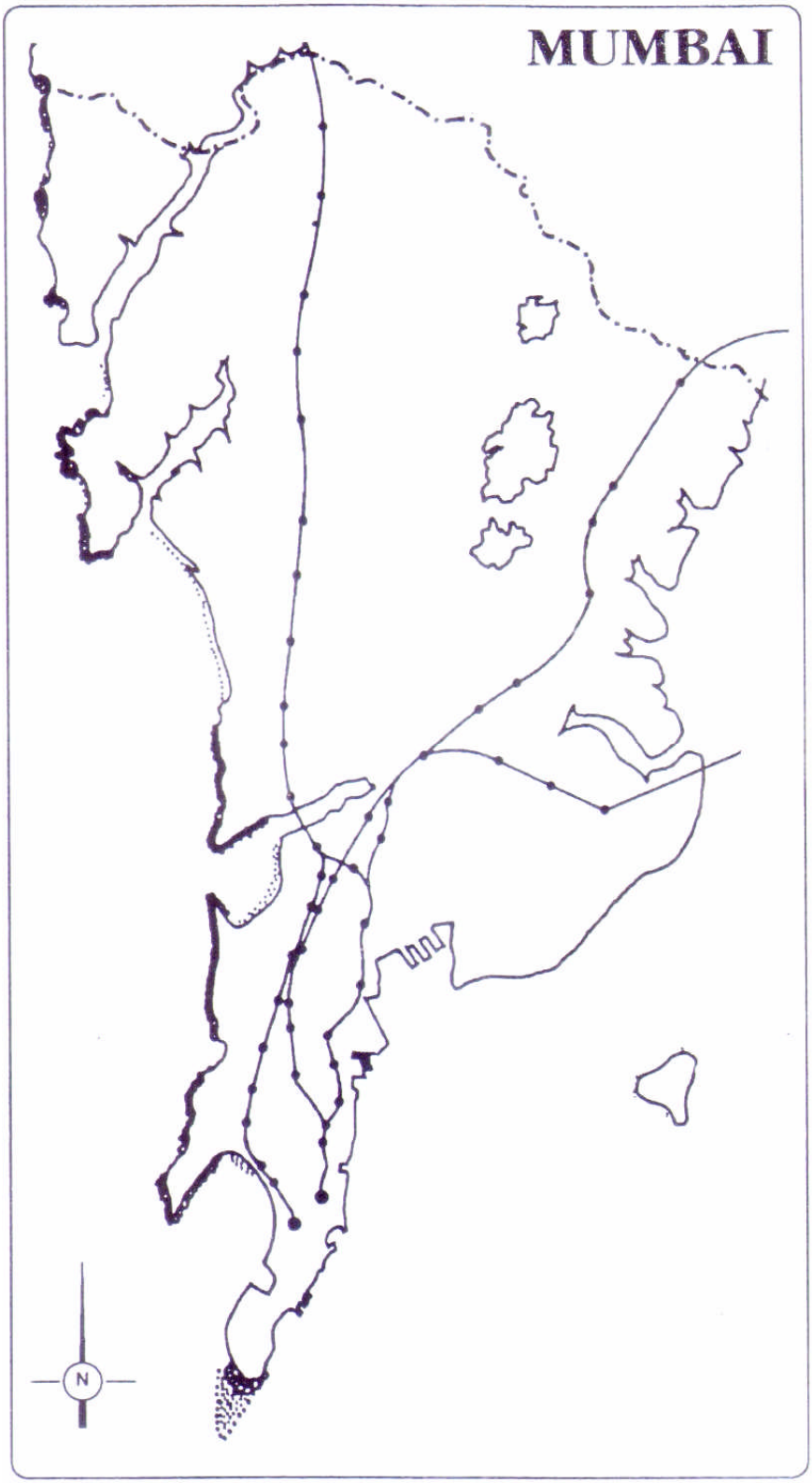

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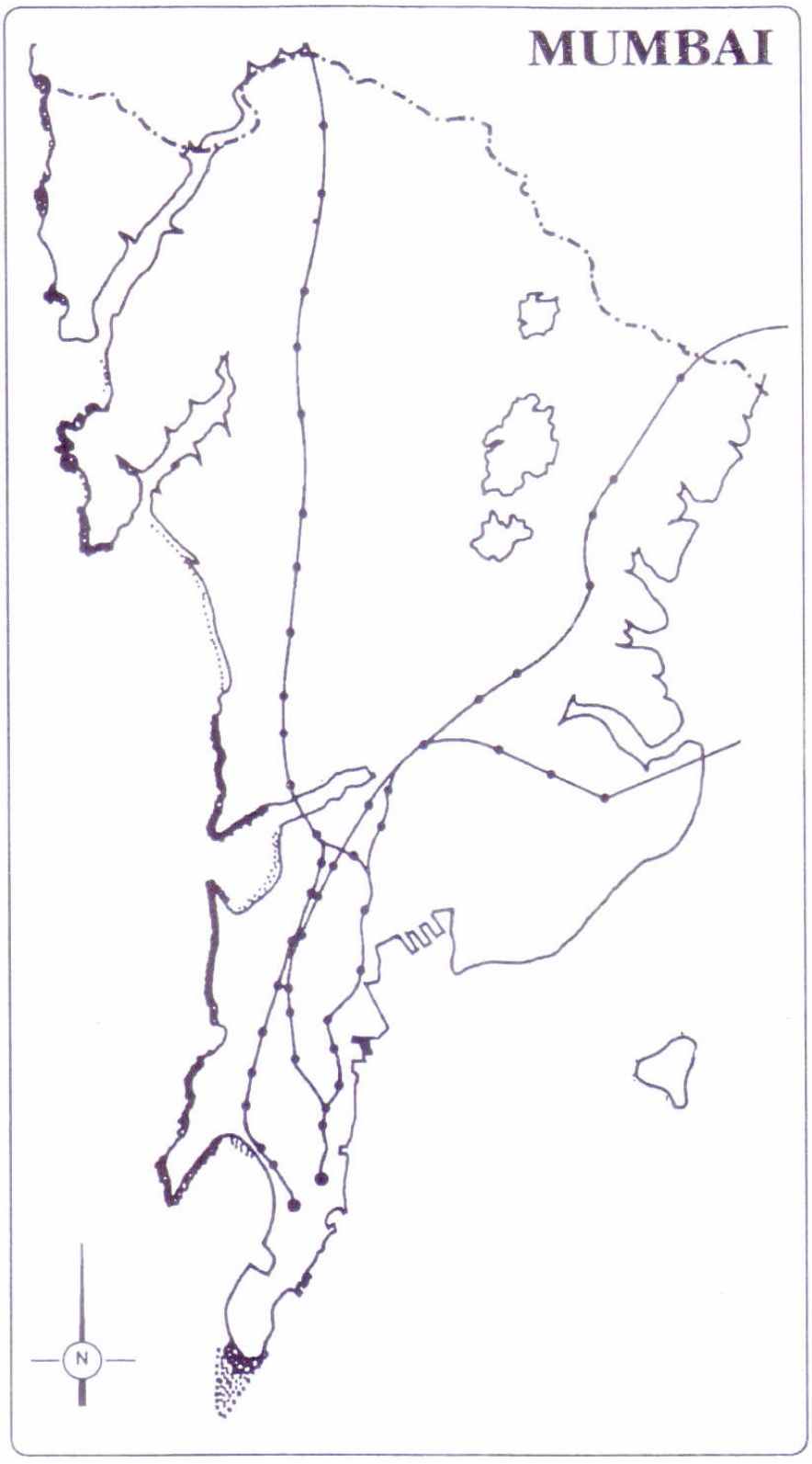

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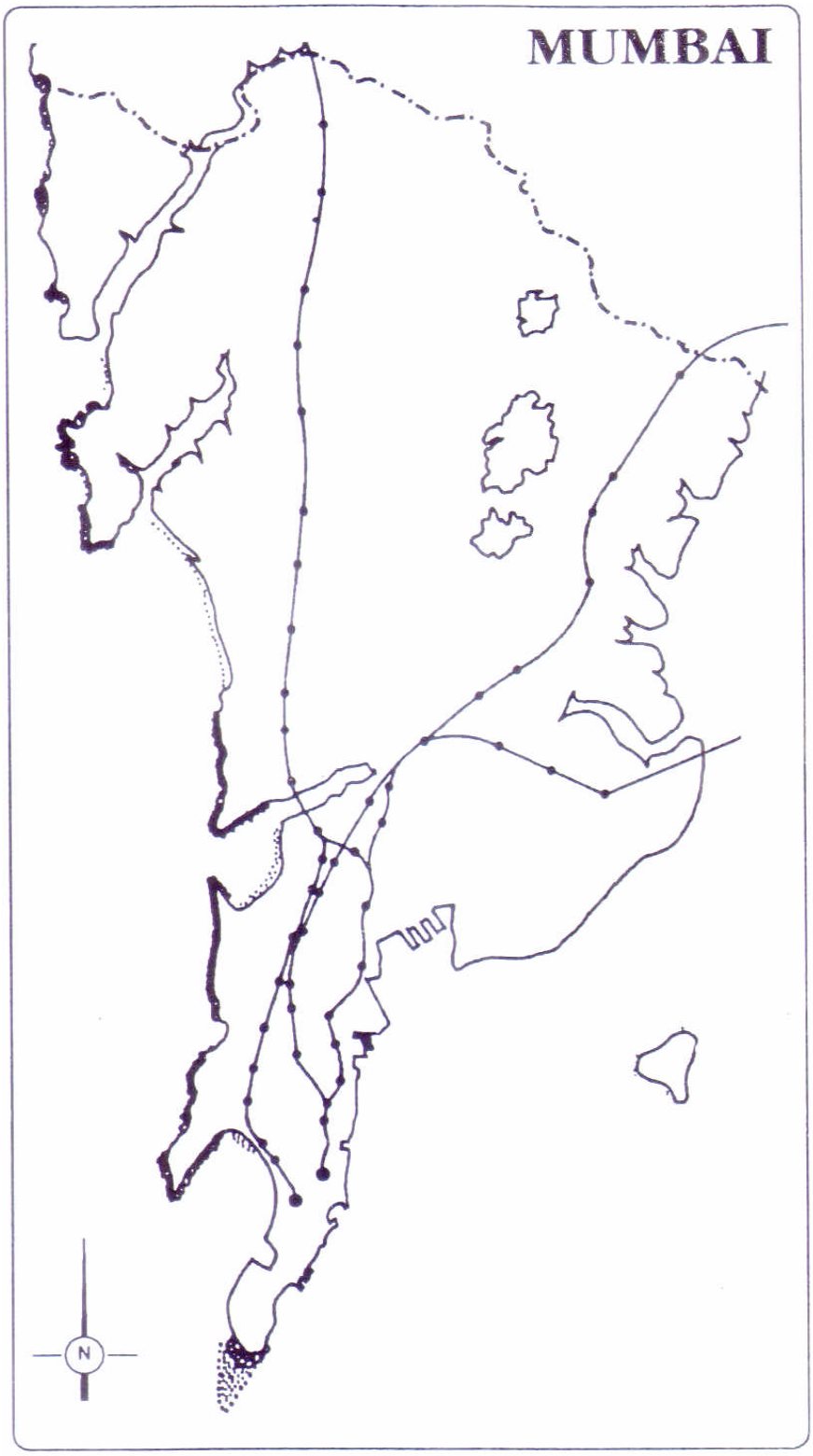

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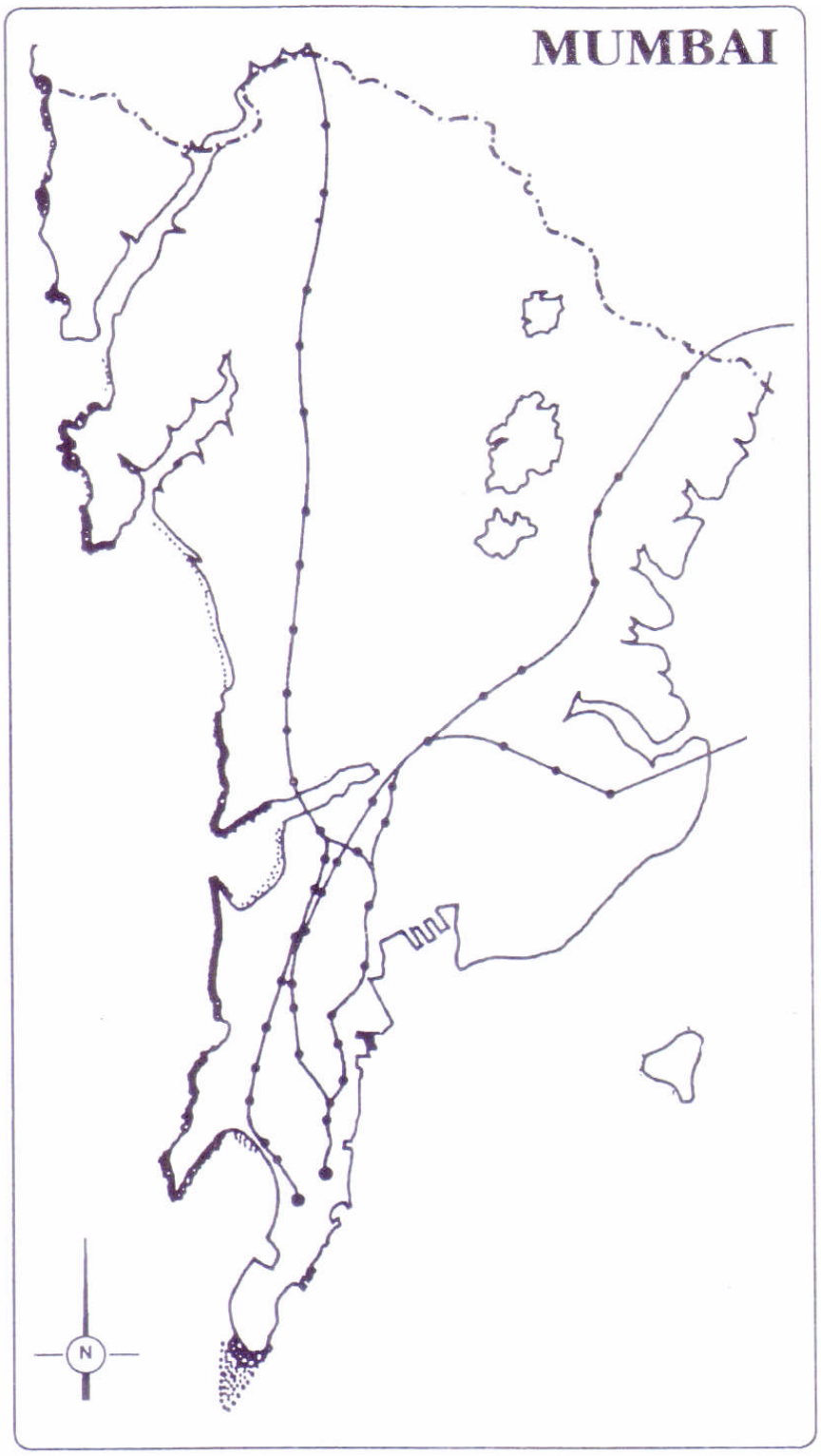

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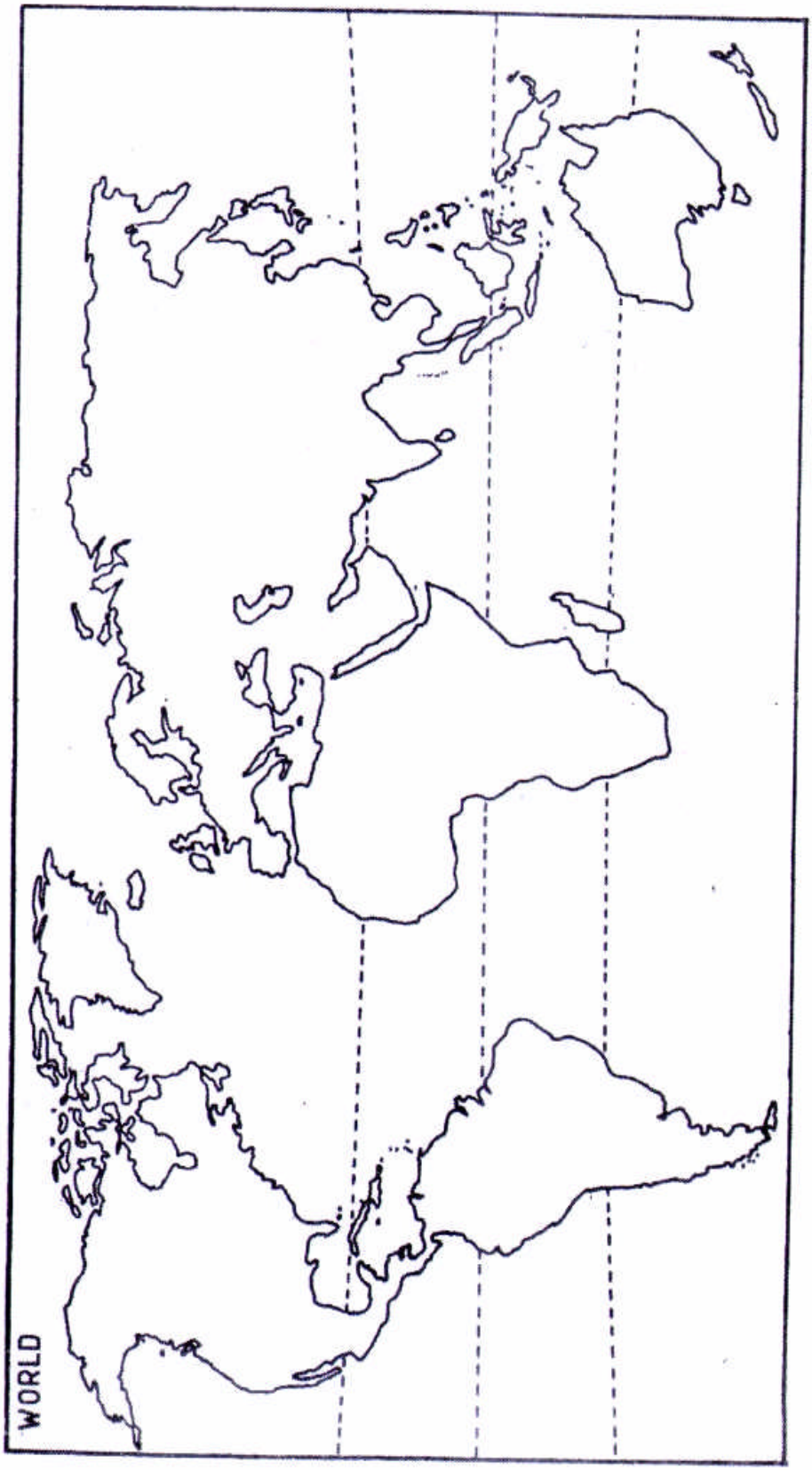
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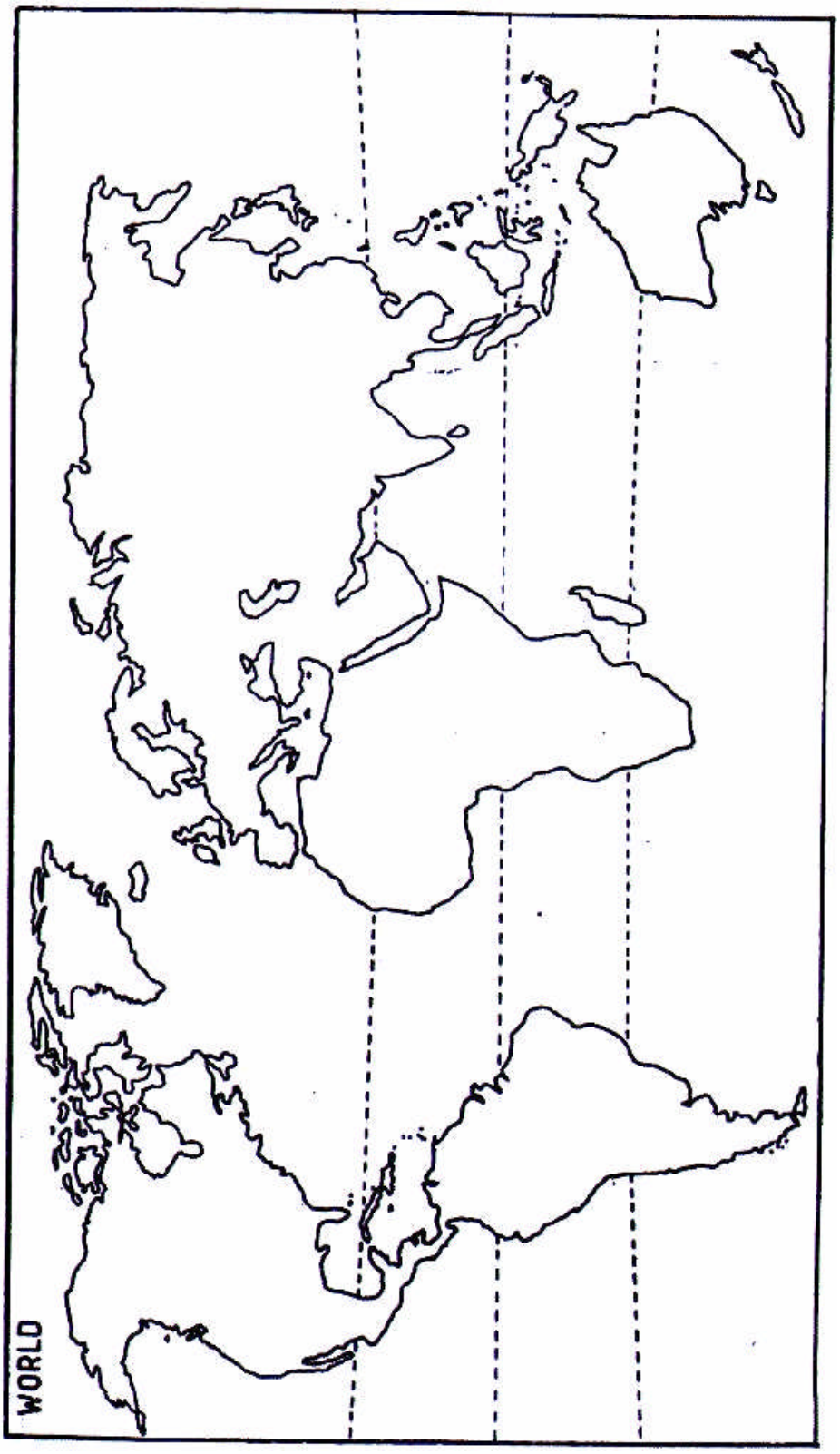
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