CHAPTER 1, GEOGRAPHY

1. Definition of Resources

Anything that's **technologically accessible**, **economically viable**, and **culturally acceptable**, which fulfills human needs. Human beings also play a key role in transforming natural elements into resources.

2. Classification of Resources

According to the textbook, resources are classified based on four criteria:

Basis	Categories
Origin	Biotic (living, e.g., plants, animals) & Abiotic (non-living, e.g., water, minerals)
Exhaustibility	Renewable (e.g., solar, wind, forests) & Non-renewable (e.g., minerals, fossil fuels)
Ownership	Individual, Community, National, International
Development Status	Potential, Developed, Stock, Reserves

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3. Development of Resources & Planning

- Issues: Overuse, concentration in few hands, environmental crises (pollution, global warming, degradation).

- Resource Planning: Involves surveying, mapping, creating institutional and technological frameworks, and integrating with national planning (across all levels). India has pursued this model since its First Five-Year Plan.

- Sustainable Development: Development that meets current needs **without compromising the ability of future generations** to meet theirs.

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4. Land Resources, Land Use & Conservation

- Importance: Land supports life, agriculture, infrastructure, ecosystem.

- Land Use Categories:

- Forests
- Land not available for cultivation (e.g., wasteland, built-up areas)
- Fallow land
- Other uncultivated land
- Net sown area (land under active cultivation

-Determining Factors: Physical (topography, soil, climate) and human (population, technology, culture).

-Causes of Land Degradation: Caused by deforestation, overgrazing, mining, industrial pollution, waterlogging.

- Conservation Methods: Afforestation, shelter belts, stabilizing dunes, orderly waste-land management, mining regulation, and treatment of industrial effluents.

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5. Soil as a Resource: Types & Conservation

Soil Basics:

-A renewable, essential natural resource.

-Formation influenced by parent rock, climate, vegetation, time, and biological/chemical activity.

Types of Soils in India:

-Alluvial Soil: Found in northern plains and eastern coastal deltas; divided into **Bangar** (older, less fertile) and **Khadar** (new, more fertile). Ideal for crops like wheat, paddy, sugarcane.

-Black Soil (Regur): Perfect for cotton, moisture-retentive, rich in calcium, lime, magnesium. Present in Deccan Plateau regions (Maharashtra, Madhya Pradesh, etc.)

-Red & Yellow Soil: From crystalline igneous rocks with low rainfall; red due to iron, yellow when hydrated; found in parts of Deccan and Odisha.

-Laterite Soil: Forms under hot, wet climates; acidic and nutrient-poor; found in Western Ghats, southern India; supports tea and coffee.

-Arid Soil: Sandy, saline, low in humus; contains kankar; found in deserts. Requires irrigation.

-Forest Soil: In hilly regions; loamy in valleys, coarse and acidic at higher altitudes; fertile on terraces.

Soil Erosion:
-Causes: Natural forces (rain, wind, glaciers) and human activities (deforestation, overgrazing, mining) contribute to soil erosion

Types: Gully erosion, sheet erosion, wind erosion; often caused by natural and human actions.

Methods of Soil Conservation:
-Contour Ploughing: Ploughing along elevation contours to slow water flow.
-Terrace Farming: Steps on slopes to reduce runoff, used in hilly regions.
-Strip Cropping: Alternating grass strips with crops to break wind force.
-Shelter Belts: Planting rows of trees to protect soil and stabilize dunes .

- **Resource Development & Sustainability**
  - Rio Earth Summit 1992
  - Agenda 21 (global strategy for sustainable development)
- **Landforms in India**: Plains (~43%), Mountains (~30%), Plateaus (~27%)
- **Soil Distribution & Crop Suitability** — e.g., which soils support which crops
- **Types of Soil Erosion**—sheet, gully, wind explicitly named

Rio de Janeiro Earth Summit – NCERT (Class 10 Geography)
-In **June 1992**, over **100 heads of state** gathered in **Rio de Janeiro, Brazil**, for the **first International Earth Summit**, officially called the **United Nations Conference on Environment and Development (UNCED)**. It was convened to address pressing global issues of **environmental protection** and **socio-economic development** together.

Agenda 21: A global action plan designed to combat environmental degradation, poverty, and disease through **international cooperation**, shared responsibilities, and mutual interests. A key principle emphasized that **every local government** should prepare its own **Local Agenda 21**

CHAPTER 2 FOREST & WILDLIFE

1. Introduction & Key Concepts

- **Forest**: A large area covered with trees and undergrowth; part of the natural vegetation.
- **Wildlife**: All undomesticated living organisms — animals, plants, microbes — living and interacting in natural habitats.
- **Biodiversity (Biological Diversity)**: The variety of life forms — the variety of species, genetic variation within species, and ecosystems. It is essential for ecological stability and human well-being.
- **Flora**: Plant life of a particular area.
- **Fauna**: Animal life of a particular area.

Why forests and wildlife matter

- Forests are primary producers in ecosystems; they support food chains.
- They regulate climate, control floods and soil erosion, maintain water cycle.
- Provide resources: timber, fuelwood, fodder, medicines, resins, gums, etc.
- Habitat and shelter for wildlife; wildlife helps in pollination, seed dispersal, nutrient cycling, pest control, etc.

2. Flora and Fauna in India

- India is among the **mega-diverse** countries of the world.
- It hosts a wide variety of flora and fauna, many of which are **endemic** (found only in India or particular regions).
- Many species are under threat: endangered, vulnerable, rare, etc.

Classification of species (by conservation status)

Category	Meaning	Examples*
Normal species	Stable population; not under serious threat	Cattle, common sal tree, rodents
Endangered species	At serious risk of extinction	Indian rhino, Asiatic lion, some tigers
Vulnerable species	Declining numbers; may become endangered	Indian elephant, blue sheep
Rare species	Very small populations; risk of moving into endangered or vulnerable	Desert fox, Himalayan brown bear
Endemic species	Found in specific regions only	Andaman teal, Nicobar pigeon, Mithun (Arunachal Pradesh)
Extinct species	No longer found anywhere (in the region)	Asiatic cheetah (in India), pink-headed duck

3. Causes of Depletion of Flora & Fauna

Forests and wildlife are under threat from many human activities. Some major causes:

1. **Overexploitation / overuse**
    - Excessive demand for wood, fuelwood, fodder, medicinal plants, barks, etc.
    - Non-timber forest products harvested unsustainably.
2. **Agriculture, urbanization and expansion of infrastructure**
    - Clearing forests to convert land for agriculture.
    - Building roads, railways, dams, highways, industries leads to forest fragmentation and destruction.
    - Large development projects (river valley, mining) cause land submergence or removal of vegetation.
3. **Colonial & commercial exploitation**
    - In British era, forests were heavily harvested for railways, shipbuilding, export timber.
    - Commercial forestry methods leading to monocultures and reduced diversity.
4. **Mining and industrial activities**
    - Mining for minerals leads to deforestation, waste dumping.
    - Industries pollute habitats (air, water, soil), harming flora & fauna.
5. **Habitat destruction / fragmentation**
    - Wildlife corridors broken; animals cannot move between forests.
    - Urban sprawl encroaches into wildlife habitats.
6. **Poaching, hunting, illegal wildlife trade**
    - Animals hunted for skins, horns, bones, medicinal purposes.
    - Trafficking of animals/plants.
7. **Forest fires, natural disasters, climate change**
    - Fires (natural and man-made) destroy vegetation.
    - Changing climate shifts habitats; some species cannot adapt.
8. **Pollution and poisoning**
    - Use of chemicals, pesticides, industrial discharge poison plants and animal life.

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4. Conservation of Forests and Wildlife in India

Conservation is vital to maintain ecological balance, genetic diversity, and life support systems. Key measures include laws, institutions, species-specific programs, and community involvement.

Legal & Institutional Measures

- **Indian Wildlife (Protection) Act, 1972**
  Established to protect wildlife and their habitats, banned hunting of endangered species, regulated trade in wildlife.
- Amendments / Additions in **1980, 1986** to include insects (butterflies, moths, beetles, dragonfly) under protection.
- In **1991**, plants also added in protected lists (initially six species).

- **Forest Conservation Act (1980)** (though sometimes covered under other chapters) regulates diversion of forest land for non-forest uses, requiring compensatory afforestation.
- **National Parks, Wildlife Sanctuaries, Biosphere Reserves**
  Government declares certain areas as protected zones where human activity is restricted or regulated.
- **Project Tiger (1973)**
  - Launched to protect tigers, especially to set aside secure habitats (tiger reserves).
  - Aim: increase tiger numbers, prevent poaching, protect forest ecosystems.
  - Some prominent tiger reserves: Corbett, Sunderbans, Bandhavgarh, Sariska, Manas, Periyar.
- **Project Elephant** (not always in every syllabus) – to protect elephants and their habitats, reduce human-elephant conflict.

Community & Participatory Approaches

- **Joint Forest Management (JFM)**
  Started (formally in 1988 in Odisha) to involve local communities in restoration, protection of degraded forests. Communities share benefits of non-timber forest produce and sometimes timber.
- **Sacred Groves / Nature Worship**
  Many tribal and rural communities consider certain patches of forest sacred, forbidding exploitation (e.g. worship of specific tree species). These act as refuges for biodiversity.
- **Social Movements / Community Action**
  - **Chipko Movement** (Himalayas): Villagers, especially women, hugged trees to prevent felling.
  - **Bhairodev Dakav "Sonchuri"** in Alwar (Rajasthan): Five villages declared ~1,200 hectares as protected forest and banned hunting / encroachment.
  - **Bishnoi community (Rajasthan)**: Known for protecting wildlife (blackbuck, peacocks, etc.), and imposing traditional restrictions on killing animals or cutting certain trees.
- **Awareness & Public Participation**
  Encouraging people to avoid forest destruction, reduce use of harmful chemicals, help rescue wildlife, refrain from poaching.

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5. Types & Distribution of Forest and Wildlife Resources in India

India's forests and wildlife resources are mostly owned or managed by government agencies (Forest Departments). They are classified as:

- **Reserved Forests**
  - The most protected forest category; highest legal protection.
  - Human interference is largely prohibited; only limited access permitted under strict rules.
  - Over half of India's forest area is under reserved forest status.
- **Protected Forests**
  - These are less strictly protected than reserved forests.
  - Some usage by people may be allowed under regulation.
  - Around one-third of India's forest area is under this category.
- **Unclassed Forests / Unclassified Areas**
  - Forests, wastelands, degraded forests belonging to private individuals, communities, or government that are not specially classified.
  - These lands are more vulnerable to degradation and deforestation.

Distribution Patterns

- The reserved, protected, and unclassed forests vary state to state.
  - States like Uttarakhand, Kerala, Tamil Nadu have large reserved forest areas.
  - States in plains or drier zones may have more protected or unclassed forests.
- Wildlife sanctuaries, national parks, and reserves are dispersed across forested regions, hills, wetlands, mangroves (e.g. Sundarbans) etc.

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6. Role of Local Communities & Participatory Conservation

- Local communities live in or near forests; they depend on forest produce for livelihood.
- Instead of excluding communities, many conservation efforts now involve them as partners.
- Examples & benefits:
  - In **Sariska**, villagers resisted mining using Wildlife Protection Act.
  - In **Alwar (Rajasthan)**, the Bhairodev Dakav area is community-protected — no hunting or encroachment allowed.
  - **Chipko Movement**: Demonstrates role of grassroots activism.
  - In **Navdanya / Beej Bachao Andolan** (Tehri region), local groups promote organic farming, biodiversity, resisting destructive practices.
  - **Sacred groves** preserved due to cultural / religious beliefs, often very rich in biodiversity.
  - Through JFM, communities help restore degraded forest lands in exchange for non-timber forest products or share in benefits.

 # The Chipko movement was a non-violent environmental movement in the 1970s in India's Himalayan region, particularly in what is now Uttarakhand, where local people, especially women, "hugged" trees (Chipko means "to hug" or "embrace") to prevent them from being cut down by logging contractors. Led by figures like Sunderlal Bahuguna

CHAPTER -7 LIFELINE OF NATIONAL ECONOMY

• The pace of development of a country depends upon the production of goods and services as well as their movement over space.

• Movement of goods and services can be over three important domains of our earth:

→ Land, → Water → Air

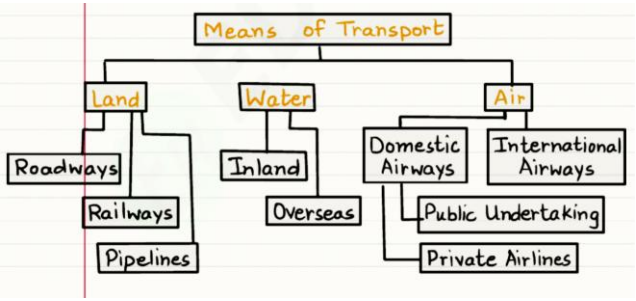
• There are five transport systems in India:

→ Roadways → Railways → Airways

→ Waterways → Pipelines

• With the development in science and technology, the area of influence of trade and transport increased.

TRANSPORT



Roadways

• India has one of the largest road networks in the world, totaling to about 2.3 million km at present.

• Advantages of roadways over railways:

→ Construction cost of roads is much lower than that of railway lines,

→ Roads can traverse comparatively more dissected and undulating topography

→ Roads can negotiate higher gradients of slopes and as such can traverse mountains such as the Himalayas.

→ Road transport is economical in transportation of few persons and relatively smaller amount of goods over short distances.

→ It also provides door-to-door service, thus the cost of loading and unloading is much lower,

→ Road transport is also used as a feeder to other modes of transport such as they provide a link between railway stations, air and sea ports.

• Roads are categorised into six classes:

→ Golden Quadrilateral Super Highways: The project was launched by the government to link Delhi-Kolkata- Chennai-Mumbai and Delhi by six-lane Super Highways. The major objective of these Super Highways is to reduce the time and distance between the mega cities of India. These highway projects are being implemented by the National Highway Authority of India (NHAI).

→ National Highways: These are the primary road systems and are laid and maintained by the Central Public Works Department (CPWD).

→ State Highways: Roads linking a state capital with different district headquarters are known as State Highways. These are constructed and maintained by the State Public Works Department (PWD) in State and Union Territories.

→ District Roads: These roads connect the district headquarters with other places of the district. These roads are maintained by the Zila Parishad.

→ Other Roads: Rural roads, which link rural areas and villages with towns, are classified under this category.

→ Border Roads: Border Roads Organisation constructs and maintains roads in the bordering areas of the country. This organisation was established in 1960 for the development of the roads of strategic importance in the northern and north- eastern border areas.

• Classification of Roads on the basis of the type of material used for their construction:

→ Metalled roads: These roads may be made of cement, concrete or even bitumen of coal.

→ Unmetalled roads: Roads made up of mud and gravel which are generally found in the rural areas.

Road Density

• The length of road per 100 sq. km of area is known as Road Density.

• Density of all roads varies from only 10.04 km in Jammu and Kashmir to 532.27 km in Uttar Pradesh.

• The national average of 125.02 km.

• Problems of Road Transportation:

→ About half of the roads are unmetalled which limits their usage during the rainy season.

→ The National Highways are inadequate too.

→ The roadways are highly congested in cities.

→ Most of the bridges and culverts are old and narrow.

Railways

• Railways are the principal mode of transportation for freight and passengers in India.

• It makes possible to conduct multifarious activities like business, sightseeing, pilgrimage along with transportation of goods over longer distances.

• The Indian Railway is now reorganised into 16 zones.

• The distribution pattern of the Railway network in the country has been largely influenced by physiographic, economic and administrative factors.

• The railways have become more important in our national economy than all other means of transport put together.

• Problems in Railway Transportation:

→ Many passengers travel without tickets.

→ Thefts and damaging of railway property has not yet stopped completely.
→ People stop the trains, pull the chain unnecessarily and this causes heavy damage to the railway.

Pipelines

• Pipeline transport network is new in India.
• These are used for transporting crude oil, petroleum products and natural gas from oil and natural gas fields to refineries, fertilizer factories and big thermal power plants.

• There are three important networks of pipeline transportation in the country.
→ From oil field in upper Assam to Kanpur (Uttar Pradesh), via Guwahati, Barauni and Allahabad. It has branches from Barauni to Haldia, via Rajbandh, Rajbandh to Maurigram and Guwahati to Siliguri.
→ From Salaya in Gujarat to Jalandhar in Punjab, via Viramgam, Mathura, Delhi and Sonipat. It has branches to connect Koyali (near Vadodara, Gujarat) Chakshu and other places.
→ Gas pipeline from Hazira in Gujarat connects Jagdishpur in Uttar Pradesh, via Vijaipur in Madhya Pradesh. It has branches to Kota in Rajasthan, Shahajahanpur, Babrala and other places in Uttar Pradesh.

Waterways

• Waterways are the cheapest means of transport.
→ They are most suitable for carrying heavy and bulky goods.
→ It is a fuel-efficient and environment friendly mode of transport.
• India has inland navigation waterways of 14,500 km in length.
• Waterways that have been declared as the National Waterways by the Government are:
→ The Ganga river between Allahabad and Haldia (1620 km)-N.W. No.1
→ The Brahmaputra river between Sadiya and Dhubri (891 km)-N.W. No.2
→ The West-Coast Canal in Kerala (Kottapurma-Kollam, Udyogamandal and Champakkara canals-205 km) – N.W. No.3
→ Specified stretches of Godavari and Krishna rivers along with Kakinada Puducherry stretch of canals (1078 km) – N.W. No.4
→ Specified stretches of river Brahmani along with Matai river, delta channels of Mahanadi and Brahmani rivers and East Coast Canal (588 km) – N.W. No.5.

• India's trade with foreign countries is carried from the ports located along the coast.
• 95 percent of the country's trade volume (68 percent in terms of value) is moved by sea.

Major Sea Ports

• India has a long coastline of 7,516.6 km with 12 major and 187, notified minor or intermediate ports.
• The major ports handle 95 per cent of India's foreign trade.
• Mumbai is the biggest port with a spacious natural and well-sheltered harbour.

Sea Ports in India

Ports on the western coast

• Kandla port
• The Jawaharlal Nehru port
• New Mangalore port
• Mumbai port
• Marmagao port

Ports on the eastern coast

• Tuticorin port
• Paradwip port
• Chennai port
• Kollkata port
• Vishakhapatnam port
• Haldia port

Airways

• Airways fastest, most comfortable and prestigious mode of transport.
→ It can cover very difficult terrains like high mountains, dreary deserts, dense forests and also long oceanic stretches with great ease.
• The air transport was nationalised in 1953.
• Indian Airlines, Alliance Air, private scheduled airlines and non- scheduled operators provide domestic air services.
• Pawan Hans Helicopters Ltd. provides helicopter services to Oil and Natural Gas Commission in its offshore operations, to inaccessible areas and difficult terrains.

• **There are two types of airports in India:**
→ International
→ Domestic

COMMUNICATION

• The means of communication are of two types:
→ Personal communication: It includes postcards, letters, telegrams, telephones and emails.
→ Mass communication: It includes magazines, newspapers, radio, television, press and films.

• Personal written communications: Indian postal network is the largest in the world.
→ First–class mail: They are airlifted between stations covering both land and air. Cards and envelopes.
→ Second–class mail: They are carried by surface mail, covering land and water transport. Book packets, registered newspapers and periodicals.
• India has one of the largest telecom networks in Asia.
→ Radio: All India Radio (Akashwani) broadcasts a variety of programmes in national, regional and local languages for various categories of people, spread over different parts of the country.
→ Television: Doordarshan, the national television channel of India, is one of the largest terrestrial networks in the world.
→ Magazines: India publishes a large number of newspapers and periodicals annually.
→ Films: India is the largest producer of feature films in the world.

INTERNATIONAL TRADE

• Trade: The exchange of goods among people, states and countries is referred to as trade.
• Market: The market is the place where such exchanges take place.

• International Trade: Trade between two countries is called international trade.
→ It may take place through sea, air or land routes.

• Balance of trade: The balance of trade of a country is the difference between its export and import.
• Favourable balance of trade: When the value of export exceeds the value ofimports, it is called a favourable balance of trade.
• Unfavourable balance of trade: When the value of imports exceeds the value of exports, it is called unfavourable balance of trade.

TOURISM AS A TRADE

• Foreign tourist's arrivals in the country witnessed an increase of 11.8 per cent during the year 2010 as against the year 2009, contributing Rs 64,889 crore of foreign exchange in 2010.
• More than 15 million people are directly engaged in the tourism industry.

Importance of Tourism

• Tourism promotes national integration, provides support to local handicrafts and cultural pursuits.
• It also helps in the development of international understanding about our culture and heritage.

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CHAPTER 3 WATER RESOURCES

Water

• Water is a renewable resource

• Three-fourth of the earth's surface is covered with water but only a small proportion of it accounts for freshwater fit for use.

Some facts and Figures

• 96.5 percent of the total volume of world's water is estimated to exist as oceans and only 2.5 per cent as freshwater.

• India receives nearly 4 percent of the global precipitation and ranks 133 in the world in terms of water availability per person per annum.

• By 2025, it is predicted that large parts of India will join countries or regions having absolute water scarcity.

Water Scarcity and need for water conservation and management

• The lack sufficient water as compared to its demand in a region is known as **Water Scarcity.**

• Causes of Water Scarcity are:

→ over-exploitation

→ excessive use and unequal access to water among different social groups.

→ Large population

DAMS

• A dam is a barrier across flowing water that obstructs, directs or retards the flow, often creating a reservoir, lake or impoundment.

Multi-purpose river projects

• Multi-purpose river projects large dams that serve several purposes in addition to impounding the water of a river and used later to irrigate agricultural fields. For example, the Sutluj-Beas river basin, the Bhakra–Nangal project etc.

Advantages of multi-purpose river projects are:

→ Electricity generation

→ Irrigation

→ Water supply for domestic and industrial uses

→ Flood control

→ Recreation

→ Inland navigation

→ Fish breeding

Disadvantages of Multi-purpose river projects are:

→ It affects the natural flow of river causing poor sediment flow and excessive sedimentation at the bottom of the reservoir.

→ It destroys the habitats for the rivers' aquatic life.

→ It submerges the existing vegetation and soil if created on the floodplains.

→ It displaces the local people of the place where it is created.

→ These are unsuccessful in controlling floods at the time of excessive rainfall.

→ These projects induced earthquakes, caused water- borne diseases and pests and pollution resulting from excessive use of water.

Movements against Mult-purpose river projects

• These projects cause of many new social movements like the 'Narmada Bachao Andolan' and the 'Tehri Dam Andolan' etc.

→ This is due to the large-scale displacement of local communities.

• Inter-state water disputes are also becoming common with regard to sharing the costs and benefits of the multi-purpose project.

RAINWATER HARVESTING

• Rainwater Harvesting refers to the practice of storing and using of rainwater from the surface on which it falls.

• In hill and mountainous regions, people built diversion channels like the 'guls' or 'kuls' of the Western Himalayas for agriculture.

• In Rajasthan, 'Rooftop rain water harvesting' was commonly practised to store drinking water.

• In the flood plains of Bengal, people developed inundation channels to irrigate their fields.

• In arid and semi-arid regions, agricultural fields were converted into rain fed storage structures that allowed the water to stand and moisten the soil.

• In the semi-arid and arid regions of Rajasthan, almost all the houses traditionally had underground tanks or tankas for storing drinking water.

• **How Tankas works**:

→ Tankas were connected to the sloping roofs of the houses through a pipe.

→ Rain falling on the rooftops would travel down the pipe and was stored in these underground 'tankas'.

Advantages of Tankas

- The rainwater can be stored in the tankas.
- Reliable source of drinking water when all other sources are dried up.
- Rainwater, or **palar pani,** as commonly referred to in these parts, is considered the purest form of natural water.
- Many houses constructed underground rooms adjoining the 'tanka' to beat the summer heat as it would keep the room cool.

CHAPTER 4 AGRICULTURE

• India is an agriculturally important country as two-thirds of its population is engaged in agricultural activities.

Types of Farming

• There are various types of farming systems in different parts of India are:

→ **Primitive Subsistence Farming:** It is done with the help of primitive tools like hoe, dao and digging sticks, and family/community labour. The farming depends upon monsoon, natural fertility of the soil and suitability of other environmental conditions to the crops grown.

It is a '**slash and burn'** agriculture. - *a primitive form of farming where farmers clear a plot of land by cutting down vegetation (slash) and burning it (burn), using the ash as a temporary fertilizer*

Slash and burn in India

It is jhumming in north-eastern states like Assam, Meghalaya, Mizoram and Nagaland; Pamlou in Manipur, Dipa in Bastar district of Chhattisgarh, and in Andaman and Nicobar Islands.

Slash and Burn in World

The 'slash and burn' agriculture is known as 'Milpa' in Mexico and Central America, 'Conuco' in Venezuela, 'Roca' in Brazil, 'Masole' in Central Africa, 'Ladang' in Indonesia, 'Ray' in Vietnam.

→ **Intensive Subsistence Farming:** This type of farming is labour-intensive farming, where high doses of biochemical inputs and irrigation are used for obtaining higher production.This method is commonly done where less land holding is available.

→ **Commercial Farming:** This type of farming is done using higher doses of modern inputs, e.g. high yielding variety (HYV) seeds, chemical fertilisers, insecticides and pesticides in order to obtain higher productivity.

• Plantation is also a type of commercial farming.

→ In this type of farming, a single crop is grown on a large area.

Cropping Pattern

• India has three cropping seasons

BASIS	KHARIF	RABI	ZAID
Sowing period	Onset of monsoon (June July)	In winter (October - November)	March April
Harvesting Period	In September – October	Summer (March -April)	May- June
Crops	Paddy, maize, jawar, bajra, tur, moong, cotton, jute, groundnut, soyabean	Wheat, barley, peas, gram, mustard	Watermelon, muskmelon. Cucumber, vegetables, fodder
Irrigation	Rainfall	Western temperate, cyclone and canals	Private source of irrigation, tubewells, lakes wells

MAJOR CROPS

• Major crops grown in India are rice, wheat, millets, pulses, tea, coffee, sugarcane, oil seeds, cotton and jute, etc.

• Rice:

→ Staple food crop

→ Our country is the second largest producer of rice in the world after China.

→ It is a kharif crop which requires high temperature, (above 25°C) and high humidity with annual rainfall above 100 cm.

→ It is grown in the plains of north and north-eastern India, coastal areas and the deltaic regions.

• Wheat:

→ The second most important cereal crop.

→ It is the main food crop, in north and north-western part of the country.

→ This rabi crop requires a cool growing season with 50 to 75 cm of annual rainfall and a bright sunshine at the time of ripening.

→ Wheat growing regions are the Ganga-Satluj plains in the north- west and black soil region of the Deccan.

• Millets:

→ Jowar, bajra and ragi are the important millets grown in India.

→ These have very high nutritional value.

• Pulses:

→ India is the largest producer as well as the consumer of pulses in the world.

→ Major source of protein in a vegetarian diet.

→ These need less moisture and survive even in dry conditions.

→ Major producing states in India are Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra and Karnataka.

Food Crops other than Grains

• Sugarcane:

→ It is a tropical as well as a subtropical crop.

→ It grows well in hot and humid climate with a temperature of 21°C to 27°C and an annual rainfall between 75 cm. and 100 cm.

→ Major producing states are Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Bihar, Punjab and Haryana.

• Oil Seeds:

→ The oil seeds covers approximately 12 percent of the total cropped area of the country.

→ These are used as cooking mediums as well as used as raw material in the production of soap, cosmetics and ointments.

• Tea:

→ Tea cultivation is an example of plantation agriculture.

→ It is an important beverage crop introduced in India initially by the British.

→ It requires warm and moist frost-free climate with frequent showers all through the year.

→ Major producing states are Assam, hills of Darjeeling and Jalpaiguri districts, West Bengal, Tamil Nadu and Kerala.

• Coffee:

→ Indian coffee is known in the world for its good quality.

→ Its cultivation is confined to the Nilgiri in Karnataka, Kerala and Tamil Nadu.

• Horticulture Crops:

→ India is a producer of tropical as well as temperate fruits.

→ India produces about 13 percent of the world's vegetables.

NON-FOOD CROPS

• Rubber:

→ It is an equatorial crop, but under special conditions, it is also grown in tropical and sub-tropical areas.

→ It requires moist and humid climate with rainfall of more than 200 cm. and temperature above 25°C.

→ It is mainly grown in Kerala, Tamil Nadu, Karnataka and Andaman and Nicobar islands and Garo hills of Meghalaya.

• Fibre Crops:

→ Cotton, jute, hemp and natural silk are the four major fibre crops grown in India.

→ Rearing of silk worms for the production of silk fibre is known as sericulture.

• Cotton:

→ It is a kharif crop grows well in drier parts of the black cotton soil of the Deccan plateau.

→ It requires high temperature, light rainfall or irrigation, 210 frost-free days and bright sun-shine for its growth.

→ Major producing states are – Maharashtra, Gujarat, Madhya Pradesh, Karnataka, Andhra Pradesh, Tamil Nadu, Punjab, Haryana and Uttar Pradesh.

• Jute:

→ It grows well on well-drained fertile soils in the flood plains where soils are renewed every year.

→ Major jute-producing states West Bengal, Bihar, Assam, Odisha and Meghalaya.

→ It is used in making gunny bags, mats, ropes, yarn, carpets and other artefacts.

Technological and Institutional Reforms

• More than 60 percent of India's population depends on agriculture.

• After independence, major institutional reforms such as Collectivisation, consolidation of holdings, cooperation and abolition of zamindari, etc. were given priority.

• In 1960s and 1970s, technical reforms such as Green Revolution and White Revolution also introduced to improved the condition of agriculture.

• In 1980s and 1990s, various provisions for crop insurance, establishment of Grameen banks, cooperative societies and banks for providing loan facilities to the farmers at lower rates of interest.

• Kissan Credit Card (KCC), Personal Accident Insurance Scheme (PAIS) are some other schemes introduced by the Government of India for the benefit of the farmers.

• Special weather bulletins and agricultural programmes for farmers were introduced on the radio and television.

• Minimum support price, remunerative and procurement prices for important crops to check the exploitation of farmers by speculators and middlemen.

Contribution of agriculture to the national economy, employment and output

• In 2010-11 about 52 percent of the total workforce of India was employed by the farm sector.

• India's GDP growth rate is increasing over the years but it is not generating sufficient employment opportunities in the country.

Bhoodan - Gramdan Movement

Who was *Vinoba Bhave*? - -Spiritual heir of Mahatma Gandhi, after Gandhi's martyrdom, Vinoba Bhave undertook padyatra to spread Gandhiji's message covered almost the entire country.

-He believed in the idea of Gram Swaraj

Incident of Pochampalli, Andhra Pradesh

- Some poor landless villagers demanded some land for their economic well-being.

Shri Ram Chandra Reddy stood up and offered 80 acres of land to be distributed among 80 land-less villagers.--------BHOODAN MOVEMENT

- Some zamindars, offered to distribute some villages among the landless.

-Gramdan movement ------ These are an example of Bloodless Revolution

CHAPTER 5

Minerals

• Mineral as a "homogenous, naturally occurring substance with a definable internal structure.

- Rocks Minerals - Rocks are combinations of homogenous substances called mineral [One or more than one)
- Formation depends upon the physical and chemical conditions
- These are found in varied forms in nature, ranging from the hardest diamond to the softest talc.

Mode of Occurrence of Minerals

• Minerals are usually found in 'ores'.

→ The accumulation of any mineral mixed with other elements is called ore.

Found in "Ores" [Minerals mixed with other element]

1. Veins and lodes – Ex. Tin, copper and Zinc.
2. Beds and layers – Ex. Coal and gypsum.
3. Residual mass of weathered material – Ex. Bauxite
4. Alluvial deposits – Ex. Gold, silver and tin.
5. Ocean water- Ex. magnesium and bromine.

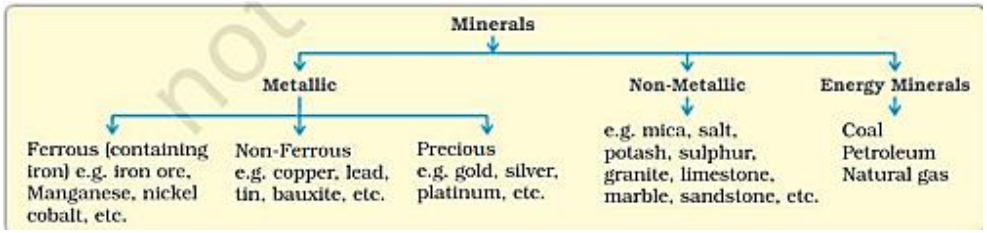
Geographers

• Study mineral as a part of earth crust. - - Area of study - Above the earth

Geologists

Study formation of minerals, their age physical and chemical composition.

Area of study – Below the earth



Metallic Minerals

• These minerals contain metals. --- • These are of three types:

→ Ferrous minerals

♠ These minerals contain iron.

♠ It accounts for about three- fourths of the total value of the production of metallic minerals.

♠ They provide a strong base for the development of metallurgical industries.

Iron Ore

• It is the basic mineral and the backbone of industrial development.

• Magnetite is the finest iron ore with a very high content of iron up to 70 percent.

• Hematite ore is the most important industrial iron ore in terms of the quantity used, but has a slightly lower iron content than magnetite. (50-60 percent).

• India is rich in good quality iron ores.

• The major iron ore belts in India are:

→ Odisha-Jharkhand belt

→ Durg-Bastar-Chandrapur belt in Chhattisgarh and Maharashtra

→ Bellary-Chitradurga-Chikmaglur-Tumkur belt in Karnataka

→ Maharashtra-Goa belt in Goa and Ratnagiri district of Maharashtra.

Manganese

• It is mainly used in the manufacturing of steel and ferro-manganese alloy.

• It is also used in manufacturing bleaching powder, insecticides and paints.

• Orissa is the largest producer of manganese ores in India.

→ Non-Ferrous Minerals

♠ These minerals do not contain iron.

♠ They play role in a number of metallurgical, engineering and electrical industries.

♠ Example of Non-ferrous minerals includes copper, bauxite, lead, zinc and gold.

Copper

• It is malleable, ductile and a good conductor, therefore, copper is mainly used in electrical cables, electronics and chemical industries.

• The Balaghat mines in Madhya Pradesh, Khetri mines in Rajasthan and Singhbhum district of Jharkhand are leading producers of copper.

Bauxite

• It is a clay-like substance from which alumina and later aluminium is obtained.

• Aluminium is an important metal because it combines the strength of metals such as iron, with extreme lightness and also with good conductivity and great malleability.

• In India, mainly found in the Amarkantak plateau, Maikal hills and the plateau region of Bilaspur-Katni.

Non-Metallic Minerals

• These minerals do not contain metal.

Mica

• It is a mineral made up of a series of plates or leaves.

• It can be clear, black, green, red yellow or brown.

• Mica is one of the most indispensable minerals used in electric and electronic industries due to its excellent di-electric strength, low power loss factor, insulating properties and resistance to high voltage,

• Leading producer are northern edge of the Chota Nagpur plateau. Koderma Gaya – Hazaribagh belt of Jharkhand.
• Also produce in Ajmer, Rajasthan. Nellore mica belt of Andhra Pradesh.

Limestone
• Limestone is found in association with rocks composed of calcium carbonates or calcium and magnesium carbonates.
• It is the basic raw material for the cement industry and essential for smelting iron ore in the blast furnace.

Conservation of Minerals ------- Why to conserve minerals?
• Mineral deposits are present in very less quantity in the world i.e. one per cent of the earth's crust.
• The geological processes of mineral formation are so slow while the consumttion rate is very fast therefore, mineral resources are finite and non-renewable.
• So, we have to conserve minerals so that it is available for future generation.

How to conserve minerals?
• A joint effort has to be made in order to use our mineral resources in a planned and sustainable manner.
• Improved technologies need to be constantly evolved to allow use of low grade ores at low costs.
• Recycling of metals, using scrap metals and other substitutes.

Energy Resources
• Energy is needed to cook, to provide light and heat, to propel vehicles and to drive machinery in industries.
• It can be generated from fuel minerals like coal, petroleum, natural gas, uranium and from electricity.
• Energy resources can be classified as
→ Conventional sources: include firewood, cattle dung cake, coal, petroleum, natural gas and electricity
→ Non-conventional sources: include solar, wind, tidal, geothermal, biogas and atomic energy.

Conventional sources of Energy
• Coal
→ It is the most abundantly available fossil fuel.
→ It is used for power generation, to supply energy to industry as well as for domestic needs.
→ Coal is formed due the compression of plant material over millions of years.
→ There are various types of coals (on the degrees of compression and the depth and time of burial):
♠ Peat: Low carbon and high moisture contents and low heating capacity.
♠ Lignite: Low grade brown coal, which is soft with high moisture content.
♠ Bituminous: Buried deep and subjected to increased temperatures. Most popular coal in commercial use.
♠ Anthracite: Highest quality hard coal.

→ Tertiary coals occur in the north eastern states of Meghalaya, Assam, Arunachal Pradesh and Nagaland.

• Petroleum
→ It provides fuel for heat and lighting, lubricants for machinery and raw materials for manufacturing industries.
→ Petroleum refineries act as a "nodal industry" for synthetic textile, fertiliser and numerous chemical industries.
→ About 63 per cent of India's petroleum production is from Mumbai High, 18 per cent from Gujarat and 16 per cent from Assam.

• Natural Gas
→ It is used as a source of energy as well as an industrial raw material in the petrochemical industry.
→ It is considered an environment friendly fuel because of low carbon dioxide emissions.
→ Natural gas have been discovered in the Krishna- Godavari basin, Mumbai High and allied fields, Gulf of Cambay. Andaman and Nicobar islands.

• Electricity
→ It has a wide range of applications in today's world.
→ Electricity is generated mainly in two ways:
♠ by running water which drives hydro turbines to generate hydro electricity
♠ by burning other fuels such as coal, petroleum and natural gas to drive turbines to produce thermal power.
→ Hydro electricity is generated by fast flowing water
♠ It is a renewable resource.
♠ Multi-purpose projects like the Bhakra Nangal, Damodar Valley corporation, the Kopili Hydel Project etc. produce hydro electricity.

→ Thermal electricity is generated by using coal, petroleum and natural gas.
♠ The thermal power stations use non-renewable fossil fuels for generating electricity.

Non-Conventional Sources of Energy
• Nuclear or Atomic Energy
→ It is obtained by altering the structure of atoms.
→ It is used to generate electric power.
→ Uranium and Thorium are available in Jharkhand and the Aravalli ranges of Rajasthan.

→ The Monazite sands of Kerala is also rich in Thorium.

• Solar Energy
→ India is a tropical country, therefore it has enormous possibilities of tapping solar energy.
→ Photovoltaic technology converts sunlight directly into electricity.
→ Solar energy is fast becoming popular in rural and remote areas which help in minimising the dependence of rural households on firewood and dung cakes that will contribute to environmental conservation and adequate supply of manure in agriculture.

• Wind Power
→ India has great potential of wind power.
→ Largest wind farm cluster is located in Tamil Nadu from Nagarcoil to Madurai.
→ Andhra Pradesh, Karnataka, Gujarat, Kerala, Maharashtra and Lakshadweep have important wind farms.
→ Nagarcoil and Jaisalmer are well known for effective use of wind energy in the country.

• Biogas
→ Shrubs, farm waste, animal and human waste are used to produce biogas for domestic consumption in rural areas.
→ Biogas plants using cattle dung are known as 'Gobar gas plants' in rural India.
→ Biogas provide twin benefits to the farmer in the form of energy and improved quality of manure.

• Tidal Energy
→ Oceanic tides can be used to generate electricity.
→ In India the Gulf of Khambhat, the Gulf of Kuchchh in Gujarat on the western coast and Gangetic delta in Sunderban regions of West Bengal provide ideal conditions for utilising tidal energy.

• Geo Thermal Energy
→ The heat and electricity produced by using the heat from the interior of the Earth is called Geo thermal Energy.
→ Groundwater in high tempratures area absorbs heat from the rocks and becomes hot.
♠ It is so hot that when it rises to the earth's surface, it turns into steam.
♠ This steam is used to drive turbines and generate electricity.

Conservation of Resources

• Energy is a basic requirement for economic development.
• There is an urgent need to develop a sustainable path of energy development.
• There are two ways for adopting the path of sustainable development of energy:
→ Promotion of energy conservation
→ increased use of renewable energy sources
• Some steps in this direction are:
→ Using public transport systems instead of individual vehicles
→ Switching off electricity when not in use
→ Using power-saving devices
→ Using non-conventional sources of energy.

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CHAPTER 6

Manufacturing – Production of goods in large quantities after processing from raw material to more valuable products is called manufacturing

-Manufacturing industries fall in the secondary sector.

-The economic strength of a country is measured by the development of manufacturing industries.

Manufacturing is the backbone of development (Explain)

1. Manufacturing industries helps in modernising agriculture, it reduces the dependence of people on agriculture income (provides jobs)

2. Helps in eradication of unemployment and poverty from our country.

3. Manufactured goods are exported which brings much needed foreign exchange.

4. Manufacturing transform raw material in the country into finished goods which provide higher value for goods.

- **Agriculture and industry are not exclusive of each other.**

- The agro-industries in India have given a major boost to agriculture by raising its productivity.

- Industries depend on the agriculture for raw materials and sell their products to farmers.

Industrial Location is influenced by **many Factors.**

- Availability of raw material

- Labour

- Capital

- Market

- Power

Industrialisation and urbanisation goes together – Why?

- Cities provide markets and also provide services such as banking, insurance, transport, labour, consultants and financial advice, etc to the industry.

Concept of <u>Agglomeration economies</u>

AGGLOMERATION ECONOMIES refers to the benefits received by the firms and people when they come together to make use of advantages offered by the urban cities that prove helpful to them.

On the basis source of raw material

1. **Agro based – based on agriculture for raw materials**

- Cotton, woollen, jute, silk textiles, rubber and sugar, tea, coffee, edible oil.

2. **Mineral based- Ind. That use minerals and metals as raw materials.**

- iron and steel, cement, aluminium, machine tools, petrochemicals.

According to their main role

1. **Basic or key industries-**

- Those which supply their product as raw materials to manufacture othewr goods, eg. Iron and steel and copper smelting, aluminium smelting.

2. Consumer Industries –

- That produce goods for direct use by consumer-sugar, toothpaste, paper, sewing machines, fans etc.

On the basis capital investment

1. **Small scale industries- less than one crore (toy industry)**
2. **Large scale Industries- One crore or more (Iron and steel industry)**

*** Limit has changed over a period of time.**

On the basis of ownership

1. **Public sector –**

Owned and operated by government agencies – BHEL, SAIL etc

2. Private sector-

Industries owned and operated by individual or a group of individuals- TISCO, Bajaj Auto ltd etc

3. Joint Sector Industries –

Jointly run by the state and individuals or a group of individuals. Oil India ltd.

4. Cooperative sector industries –

Owned by the producers or suppliers of raw material, workers or both. Ex. Sugar ind. In Maharashtra, Coir industry in Kerala.

Based on the bulk and weight of raw materials and finished goods

1. **Heavy Industries – Iron and steel**
2. **Light Industries – electrical goods.**

Agro Based Industries

• Cotton, jute, silk, woollen textiles, sugar and edible oil, etc. industries are based on agricultural raw materials.

Textile Industry

• It contributes 4 percent towards GDP.

• It is the only industry in the country, which is self-reliant and complete in the value chain i.e., from raw material to the highest value added products.

• It is the second-largest employment generating sector in India after agriculture (directly employing 35 million persons.)

First textile mill was established in Mumbai in 1854

Challenges faced by cotton textile industries in India.

1. **Strong spinning units but weak weaving sector (?)**

- Spinning - centralised in Maharashtra, Gujrat and Tamilnadu

- weaving is decentralised to provide scope of incorporating traditional skills and design.

Problems that cotton textiles industry facing nowadays:
Irregular supply of electricity
Old and outdated machinery
Low output of labour
Tough competition with the synthetic fibre industry

Textile Industry – JUTE TEXTILES
- India is the largest producer of raw jute and jute goods
- Second largest exporter after Bangladesh
- Most of the mills are located in West Bengal. (on the banks of Hugli river)
Factors responsible for the localisation
- Proximity to jute producing area
- Inexpensive water transport.
- Good network of railway and roadways.
- Abundance of water for processing raw jute
- Cheap labour from West Bengal and adjoined areas
- Kolkata urban centre provided banking, insurance and port facilities.

The first jute mill was set up near Kolkata in 1855 at Rishra
After partition in 1947, the jute mills remained in India but three fourth of the jute producing area went to Bangladesh.

National Jute Policy
National Jute Policy was formulated in 2005.
It had increased international demand for jute.
The government had made it mandatory to use jute for packaging.
The objective was to increase productivity/cultivation of jute, improving quality and ensure good prices for the jute farmers.

Sugar Industry:
• India is the second-largest producer of sugar in the world and the largest producer of Gur and Khandsari.
• The raw material used in the sugar industry is heavy and bulky. Due to this, transportation becomes difficult and the sucrose content keeps on decreasing with time.
• 60% mills are in Uttar Pradesh and Bihar.

In recent years, mills are shifted to the southern and western states, especially in Maharashtra because:
• The cane produced here has a higher sucrose content.
• The cooler climate also ensures a long crushing season.
• The cooperatives are more successful in these states.
Challenges faced by the sugar industry:
- Seasonal nature of industry.
-Old and inefficient methods of production.
-Transportation delays.
-Need to maximize the use of baggase.

MINERAL BASED INDUSTRY
Iron and Steetondustry :
• Iron and Steel is the basic industry as all the other industries - heavy, medium and light, depend on it for their machinery.
India's Position:
• India ranks ninth among the world crude steel producers.
• It is the largest producer of sponge iron.

• Chotanagpur plateau region has the maximum
concentration of iron and steel industries because of the fol lowing factors:
(i) Low-cost iron ore
(iii)Cheap labour
(ii) High-grade raw material
(iv)Market
India is an important iron and steel-producing country in the world, yet, we are not able to perform to our full potential largely due to the following reasons:
• High costs and limited availability of coking coal
• Lower productivity of labour
• Irregular supply of energy
• Poor infrastructure

Aluminium Smelting
-Aluminium Smelting is the second most important metallurgical industry in India.
-It is light, resistant to corrosion, a good conductor of heat, malleable and becomes strong when it is mixed with other metals.
-It is used to manufacture aircraft, utensils and wires.
-Aluminium smelting has gained popularity as a substitute for steel, copper, zinc and lead in a number of industries.
-Bauxite is the raw material used in the smelters.
BAUXITE ----→ ALUMINA ----→ ALUMINIUM
Major 8 aluminium smelting plants in country are located in Orissa [NALCO & BALCO], West Bengal, Kerela, Uttar Pradesh, Chhattisgarh, Maharashtra and Tamil Nadu.
• Regular supply of electricity and assured source of raw material at Minimum cost.

Chemical Industries

• The chemical industry comprises both large and small-scale manufacturing units.
• Rapid growth has been recorded in both inorganic and organic sectors.
• Inorganic chemicals include sulphuric acid, nitric acid, alkalies, soda ash and caustic soda.
• Organic chemicals include petrochemicals, which are used for manufacturing synthetic fibres, synthetic rubber, plastics, dye-stuffs, drugs and pharmaceuticals.
• The chemical industry is its own largest consumer.

Fertiliser Industry

• The fertilizer industries are centered around the production of nitrogenous fertilizers (mainly urea), phosphatic fertilizers and ammonium phosphate (DAP) and complex fertilizers, which have a combination of nitrogen, phosphate, and potash.
• Potash is imported in our country because no reserves of commercially usable potash or potassium compounds.
• India is the third largest producer of nitrogenous fertilisers.

Fertiliser Indutry ---Expanded after Green revolution.
• Main states having this industry are Gujarat, Tamil Nadu,
Uttar Pradesh, Punjab and Kerela.

Cement Industry

Cement is essential for construction activities such as building houses, factories, bridges, roads, airports, dams and other commercial establishments.
- This industry requires bulky and heavy raw materials like limestone, silica and gypsum.
-Situated in Gujarat and Coastal area because of accessibility to Gulf Countries.
-The first cement plant was set up in Chennai in 1904.

Automobile, Industry

• This industry deals with the manufacturing of trucks, buses, cars, motorcycles, scooters, three-wheelers and multi-utility vehicles.
• With the increase in competition, this industry also experienced a rapid growth in last 15 years.
• Foreign Direct Investment brought in new technology and aligned the industry with global developments.
• These industries are located around Delhi, Gurugram, Mumbai, Pune, Chennai, Kolkata, Lucknow, Indore, Hyderabad, Jamshedpur and Bengaluru.

Information Technology & Electronic Industry

-The electronics industry covers a wide range of products, from transistor sets to television, telephones, cellular telecom, telephone exchange, radars, computers.
- Bengaluru is known as the electronic capital of India.
- Other important centres for electronic goods are Mumbai, Delhi, Hyderabad, Pune, Chennai, Kolkata, Lucknow and Coimbatore.
- 18 software technology park - Single window service and High Data Communication facility.
- Contribution in Employment is very satisfactory.
- 30% people employed in this sector are women.
• This industry has been a major foreign exchange earner in the last two or three years because of its fast growing Buisness Processes Outsourcing (BPO) sector.

Industrial Pollution and Environmental Degradation

Industries contribute significantly to India's economic growth and development but also causes pollution of land, water, air, noise, and resulting degradation of the environment.

Industries are responsible for 4 types of pollution:
Air Water Thermal Noise

Air pollution

• It is caused by the presence of a high proportion of undesirable gases, such as sulphur dioxide and carbon monoxide.
• Dust, spray and smoke are emitted by chemical and paper factories, brick kilns, refineries and smelting plants, and the burning of fossil fuels leads to air pollution.
• It adversely affects human health, animals, plants, buildings and the atmosphere as a whole.

Water pollution

• It is caused by organic and inorganic industrial wastes and effluents discharged into rivers.
Main culprits:
• Paper, pulp, chemical, textile and dyeing, petroleum refineries, tanneries and electroplating industries.
• These industries dump substances like dyes, detergents, acids, salts and heavy metals like lead and mercury, pesticides and fertilisers, plastic and rubber.
Fly-ash, phospo-gypsum and iron and steel slags are the major solid waste.

Thermal pollution

• It occurs when hot water from factories and thermal plants is drained into rivers and ponds before cooling.
Impact : Waste dumped is highly toxic and leads to cancers, birth defects and Miscarriages. It harms the aquatic life.

Noise pollution

• Noise pollution is the propagation of noise with a harmful impact on the activity of human or animal life.

• It is caused due to industrial and construction activities. Machinery, factory equipment, generators, saws and pneumatic and electric drills.

• Impact : It results in irritation, anger, cause hearing impairment, and increased heart rate and blood pressure.

Control of Environmental Degradation

• Minimising the use of water by reusing and recycling it.

• Harvesting rainwater to meet water requirements.

• Treating hot water and effluents before releasing them in rivers and ponds.

• Industrial effluents can be treated in three ways:

a. Primary treatment by Mechanical means.

b. Secondary treatment by Biological process.

c. Tertiary treatment by chemical, physical and biological process.

• Using of groundwater reserves by industries should be regulated legally.

• Particulate matter in the air can be reduced by fitting smoke stacks to factories with electrostatic precipitators, fabric filters, scrubbers and inertial separators.

-Smoke can be reduced by using oil or gas instead of coal in factories.

-Machinery and equipment can be used and generators should be fitted with silencers.

-Noise-absorbing material may be used apart from personal use of earplugs and earphones.

NTPC shows the way

• National Thermal Power Corporation as ISO certification for Environment Management System (EMS).

• NTPC has taken pro-active approach for preserving the natural environment and resources.

Steps taken :

I.Adopting the latest techniques and upgrading existing equipment.

2.Minimising waste generation by maximise ash utilisation.

3.Providing green belts for nurturing ecological balance (Afforestation).

4.Ash pond management, ash water recycling system and liquid waste management to reduce environmental pollution.

5.Ecological monitoring, reviews and online database management for all its power station.