

ECONOMICS

INDIA PEOPLE AND ECONOMY- XII

Contents

Unit I

- Population : Distribution, Density, Growth and Composition
- Migration : Types, Causes and Consequences
- Human Development

Unit II

- Human Settlements

Unit III

- Land Resources and Agriculture
- Water Resources
- Mineral and Energy Resources
- Manufacturing Industries
- Planning and Sustainable Development in Indian Context Unit IV
- Transport and Communication
- International Trade

Unit V

- Geographical Perspective on Selected Issues and Problems.

CHAPTER 1

POPULATION: DISTRIBUTION, DENSITY, GROWTH AND COMPOSITION

Distribution of Population

- India has a highly uneven pattern of population distribution
- Uttar Pradesh has the highest population followed by Maharashtra, Bihar, West Bengal and Andhra Pradesh
- Climate along with terrain and availability of water largely determines the pattern of the population distribution
- Evolution of settled agriculture and agricultural development;
- Pattern of human settlement; development of transport network, industrialization and urbanization

Density of population,

- is expressed as number of persons per unit area.
- State has high density of population – Bihar (1102).
- State has low density of population- Arunachal Pradesh (17).
- The density of population is a crude measure of human and land relationship.
- Physiological density = total population / net cultivated area.
- **Agricultural density = total agricultural population / net cultivable area.**
- Agricultural population includes cultivators and agricultural labourers and their family members.

Growth of population

- The change in the number of people living in a particular area between two points of time. Its rate is expressed in percentage.
- Population growth has two components namely; natural and induced.
- Natural growth is analysed by assessing the crude birth and death rates, induced components are explained by the volume of inward and outward movement of people in any given area.
- The annual growth rate of India's population is 2.4 per cent
- The growth rate of population in India over the last one century has been caused by annual birth rate and death rate and rate of migration and thereby shows different trends.

Four distinct phases of growth identified.

Phase I - (1901-1921)

- Growth rate was very low, even recording a negative growth rate during 1911-1921.
- Both the birth rate and death rate were high keeping the rate of increase low
- Poor health and medical services, illiteracy of people at large and inefficient distribution system of food and other basic necessities were largely responsible for a high birth and death rates in this period.

Phase II : (1921 -1951)

- Steady population growth.
- Overall improvement in health and sanitation throughout the country brought down the mortality rate.
- At the same time better transport and communication system improved distribution system.
- The crude birth rate remained high in this period leading to higher growth rate than the previous phase.

- This is impressive at the backdrop of Great Economic Depression, 1920s and World War II.

Phase III : (1951-1981)

- population explosion in India, caused by a rapid fall in the mortality rate but a high fertility rate of population in the country.
- The average annual growth rate was as high as 2.2 per cent.
- Developmental activities were introduced through a centralized planning process and economy started showing up ensuring the improvement of living condition of people at large.
- Consequently, there was a high natural increase and higher growth rate. Besides, increased international migration bringing in Tibetans, Bangladeshis, Nepalis and even people from Pakistan contributed to the high growth rate.

Phase IV : (post 1981 till present)

- the growth rate of country's population though remained high, has started slowing down gradually
- A downward trend of crude birth rate is held responsible for such a population growth.
- This was, in turn, affected by an increase in the mean age at marriage, improved quality of life particularly education of females in the country

Regional Variation in Population Growth

- The States like Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Orissa, Puducherry, and Goa show a low rate of growth not exceeding 20 per cent over the decade.
- Kerala registered the lowest growth rate (9.4) not only in this group of states but also in the country as a whole. (Y?)
- A continuous belt of states from west to east in the north-west, north, and north central parts of the country has relatively high growth rate than the southern states. It is in this belt comprising Gujarat, Maharashtra, Rajasthan, Punjab, Haryana, Uttar Pradesh, Uttarakhand, Madhya Pradesh, Sikkim, Assam, West Bengal, Bihar, Chhattisgarh, and Jharkhand, the growth rate on the average remained 20-25 per cent. (Y?)

The National Youth Policy -is one example which has been designed to look into the overall development of our large youth and adolescent population

- launched in 2003,
- All-round improvement of the youth and adolescents enabling them to shoulder responsibility towards constructive development of the country.
- Aims at reinforcing the qualities of patriotism and responsible citizenship.
- Youth empowerment in terms of their effective participation in decision making and carrying the responsibility of an able leader.
- Special emphasis was given in empowering women and girl child to bring parity in the male-female status.
- Health, sports and recreation, creativity and awareness about new innovations in the spheres of science and technology.

Population Composition

Rural – Urban Composition.

- 72 per cent of total population lives in villages.
- Both at intra-State and inter -State levels, the relative degree of urbanization and extent of rural urban migration regulate the concentration of rural population.

- Increase of urban population. This indicates both development of urban areas in terms of socio-economic conditions and an increased rate of rural-urban migration
- Rural-urban migration is conspicuous in the case of urban areas along the main road links and railroads.

Linguistic Composition

- India is a land of linguistic diversity. According to Grierson (Linguistic Survey of India, 1903 – 1928) there were 179 languages and as many as 544 dialects in the country.
- 18 scheduled languages (1991 census) and a number of non-scheduled languages.

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among the scheduled languages, the speakers of Hindi have the highest percentage (40.42). The smallest language groups are Kashmiri and Sanskrit speakers (0.01 per cent each).

Linguistic Classification

- The speakers of major Indian languages belong to four language families.

Family	Sub-Family	Branch/Group	Speech Areas
Austrie (Nishada) 1.38%	Austro-Asiatic	Austro-Asiatic Mon-Khmer Munda	Meghalaya, Nicobar Islands West Bengal, Bihar, Orissa, Assam, Madhya Pradesh, Maharashtra outside India
Dravidian (Dravida) 20%		South-Dravidian Central Dravidian North Dravidian	Tamil Nadu, Karnataka, Kerala Andhra Pradesh, M.P., Orissa, Maharashtra Bihar, Orissa, West Bengal, Madhya Pradesh
Sino-Tibetan (Kirati) 16.5%	Myanmari Chinese	Sino-Tibetan Himalayan North Assam- Myanmari	Jammu & Kashmir, Himachal Pradesh, Sikkim Arunachal Pradesh Assam, Nagaland, Manipur, Mizoram, Tripura, Meghalaya
Indo – European (Aryan) 47%		Iranian Dardic Indo- Aryan	Outside India Jammu & Kashmir Jammu & Kashmir, Punjab, Himachal Pradesh, U.P., Rajasthan, Haryana, M.P., Bihar, Orissa, West Bengal, Assam, Gujarat, Maharashtra, Goa.

Religious Composition

- Hindus are distributed as a major group in many states (ranging from 70 - 90 per cent and above) except the districts of states along Indo- Bangladesh border, Indo-Pak border, Jammu & Kashmir, Hill States of North-East and in scattered areas of Deccan Plateau and Ganga Plain.
- Muslims, the largest religious minority, are concentrated in Jammu & Kashmir, certain districts of West Bengal and Kerala, many districts of Uttar Pradesh, in and around Delhi and in Lakshadweep.
- They form majority in Kashmir valley and Lakshadweep.

Composition of Working Population

- divided into three groups, namely; main workers, marginal workers and non- workers.
- Main Worker is a person who works for atleast 183 days in a year.
- Marginal Worker is a person who works for less than 183 days in a year
- The proportion of workers (both main and marginal) is only 39 per cent (2001) leaving a vast majority of 61 per cent as non-workers.

What is work participation rate?

- The states with larger percentages of workers are Himachal Pradesh, Sikkim, Chhattisgarh, Andhra Pradesh, Karnataka, Arunachal Pradesh, Nagaland, Manipur and Meghalaya. Among the Union Territories, Dadra and Nagar Haveli and Daman and Diu have higher participation rate (Y?)
- Because the work participation rate tends to be higher in the areas of lower levels of economic development since number of manual workers are needed to perform the subsistence or near subsistence economic activities.

Occupational composition population- (which actually means engagement of an individual in farming, manufacturing trade, services or any kind of professional activities)

- Shows a large proportion of primary sector workers compared to secondary and tertiary sectors.
- About 58.2 percent of total working population are cultivators and agricultural labourers,
- whereas only 4.2% of workers are engaged in household industries and
- 37.6 % are other workers including non-household industries, trade, commerce, construction and repair and other service.

Questions.

- A. The number of female workers is relatively high in primary sector(Y?)
- B. Explain the role of climate on the distribution of population?

CHAPTER 2

MIGRATION TYPES, CAUSES AND CONSEQUENCES.

Indian Diaspora

The first wave of Migrants

- During colonial period (British period) millions of the indentured labourers were sent to Mauritius, Caribbean islands (Trinidad, Tobago and Guyana), Fiji and South Africa by British from Uttar Pradesh and Bihar;
 - to Reunion Island, Guadeloupe, Martinique and Surinam by French and Dutch and
 - By Portuguese from Goa, Daman and Diu to Angola, Mozambique to work as plantation workers.
- All such migrations were covered under the time-bound contract known as GIRMIT Act (Indian Emigration Act).

The second wave of migrants

- professionals, artisans, traders and factory workers, in search of economic opportunities to Thailand, Malaysia, Singapore, Indonesia, Brunei and African countries, etc. and the trend still continues.
- There was a steady out flow of India's semi-skilled and skilled labour in the wake of the oil boom in West Asia in the 1970's. There was also some outflow of entrepreneurs, storeowners, professionals, businessmen to Western Countries.

Third wave, of migrant

- Professionals like doctors, engineers (1960s onwards), software engineers, management consultants, financial experts, media persons (1980s onwards), and others migrated to countries such as USA, Canada, UK, Australia, New Zealand and Germany, etc.
- These professionals enjoy the distinction of being one of highly educated, the highest earning and prospering groups.
- After liberalization, in the 90s education and knowledge-based Indian emigration has made Indian

Diaspora one of the most powerful diaspora as in the world.

- In all these countries, Indian diaspora has been playing an important role in the development of the respective countries.

Migration-

- Census in India contains information about migration in the country
- Migration was recorded beginning from the first Census of India conducted in 1881.
- Data were recorded on the basis of place of birth
- First major modification was introduced in 1961 Census by bringing in two additional components viz; place of birth i.e. village or town and duration of residence (if born elsewhere).
- Further in 1971, additional information on place of last residence and duration of stay at the place of enumeration were incorporated. Information on reasons for migration were incorporated in 1981 Census and modified in consecutive Censuses.

¶ In the Census of India migration is enumerated on two bases :

- i. Place of birth: If the place of birth is different from the place of enumeration (known as life-time migrant).
- ii. Place of Residence: If the place of last residence is different from the place of enumeration (known as migrant by place of last residence).

Streams of Migration-

- Internal migration (within the country)
 - rural to rural (R-R);
 - rural to urban (R-U);
 - urban to urban (U-U); and
 - urban to rural (U-R).
- The stream was dominated by female migrants. Most of these were migrants related to marriage
- men predominate the rural to urban stream of inter-state migration due to economic reasons
- International migration (out of the country and into the country from other countries)
 - Than 5 million people have migrated to India from other countries.
 - Bangladesh (3.0 million) followed by Pakistan (0.9 million) and Nepal (0.5 million)
 - 20 million people of Indian Diaspora spread across 110 countries.
- Maharashtra occupied first place in the list with 2.3 million net in-migrants (interstate), followed by Delhi, Gujarat and Haryana.

- On the other hand, Uttar Pradesh (-2.6 million) and Bihar (-1.7 million) were the states, which had the largest number of net out-migrants from the state

Causes of Migration

- **Push factor**, these cause people to leave their place of residence or origin
 - People migrate from rural to urban areas mainly due to poverty, high population pressure on the land, lack of basic infrastructural facilities like health care, education, etc.
 - natural disasters such as, flood, drought, cyclonic storms, earthquake,
- **Pull factors**, which attract the people from different places
 - The rural migrants to urban areas are the better opportunities, availability of regular work and relatively higher wages.
 - Better opportunities for education, better health facilities and sources of entertainment, etc.

Consequences of Migration

Economic Consequences-

- A major benefit for the source region is the **remittance sent by migrants**. Remittances from the international migrants are one of the major sources of foreign exchange.
- Migration from rural areas of Eastern Uttar Pradesh, Bihar, Madhya Pradesh and Orissa to the rural areas of Punjab, Haryana, Western Uttar Pradesh accounted for the success of their green revolution strategy for agricultural development.
- Development of slums in industrially developed states such as Maharashtra, Gujarat, Karnataka, Tamil Nadu and Delhi is a negative consequence.

Demographic Consequences

- Rural urban migration is one of the important factors contributing to the population growth of cities.
- Age, sex and skill selective out migration from the rural area have adverse effect on the rural demographic structure.

Social Consequences

- *Migrants act as agents of social change.*
- The new ideas related to new technologies, family planning, girl's education, etc. Get diffused from urban to rural areas through them.
- **Intermixing of people from diverse cultures.** It has positive contribution such as evolution of composite culture and breaking through the narrow considerations and widens up the mental horizon of the people at large.
- But it also has serious negative consequences such as anonymity, which creates social vacuum and sense of dejection among individuals. Continued feeling of dejection may motivate people to fall in the trap of anti-social activities like crime and drug abuse

Environmental Consequences

- Put pressure on the existing social and physical infrastructure in the urban areas.
- This ultimately leads to unplanned growth of urban settlement and formation of slums shanty colonies.
- Apart from this, due to over-exploitation of natural resources, cities are facing the acute problem of depletion of ground water, air pollution, and disposal of sewage and management of solid wastes.

Other Consequences

- Migration (even excluding the marriage migration) affects the status of women directly or indirectly.
- In the rural areas, male selective out migration leaving their wives behind puts extra physical as well mental pressure on the women.
- Migration of „women“ either for education or employment enhances their autonomy and role in the economy but also increases their vulnerability.
- If remittances are the major benefits of migration from the point of view of the source region, the loss of human resources particularly highly skilled people is the most serious cost.
- The market for advanced skills has become truly a global market and the most dynamic industrial economies are admitting and recruiting significant proportions of the highly trained professionals from poor regions. Consequently, the existing underdevelopment in the source region gets reinforced.

CHAPTER.3

HUMAN DEVELOPMENT

- A process of enlarging the range of people’s choices, increasing their opportunities for education, health care, income and empowerment and covering the full range of human choices from a sound physical environment to economic, social and political freedom.”
- Thus, enlarging the range of people’s choices is the most significant aspect of human development. People’s choices may involve a host of other issues, but, living a long and healthy life, to be educated and have access to resources needed for a decent standard of living including political freedom, guaranteed human rights and personal self-respect, etc. are considered some of the non-negotiable aspects of the human development.
- First Human Development Report by United Nations development Program (UNDP) in 1990 Since then, this organization has been bringing out World Human Development Report every year
- This report define human development, make amendments and changes its indicators and ranks all the countries
- Human Development Report 1993, " progressive democratization and increasing empowerment of people are seen as the minimum conditions for human development". It also mentions that "development must be woven around people, not the people around development".

Human Development in India

- Ranked 135 (2014)- Norway topped among the countries of the world in terms of the Human Development Index(HDI). With the composite HDI value of 0.602.
- HDI-Scale (0-1) 1 is good and 0 is bad
- Lack of sensitivity to the **historical factors** like colonization, imperialism and neo-imperialism, **socio-cultural factors** like human rights violation, social discrimination on the basis of race, religion, gender and caste, social problems like crimes, terrorism, and war and **political factors** like nature of the state, forms of the government (democracy or dictatorship) level of empowerment are **some factors that are very crucial in determining the nature of human development.**
- The Planning Commission of India also prepared the Human Development Report for India. It used states and the Union Territories as the units of analysis
- Kerala with the composite index value of 0.638 is placed at the top rank followed by Punjab(0.537),Tamil Nadu(0.531) Maharashtra (0.523) and Haryana (0.509). As expected, states like

Bihar (0.367), Assam(0.386), Uttar Pradesh (0.388), Madhya Pradesh (0.394) and Orissa (0.404) are at the bottom among the 15 major states in India

Indicators of Economic Attainments

- Rich resource base and access to these resources by all, particularly the poor, down trodden and the marginalised is the key to productivity, well-being and human development.
- Gross National Product (GNP) and its per capita availability are taken as measures to assess the resource base/ endowment of any country
- consumption and expenditure rate
- population living below the poverty line
- Employment rate

Indicators of a Healthy Life

- Life free from illness and ailment and living a reasonably long life span are indicative of a healthy life.
- Availability of pre and post natal health care facilities in order to reduce infant mortality and post-delivery deaths among mothers, old age health care, adequate nutrition and safety of individual are some important measures of a healthy and reasonably long life.
- India has done reasonably well in some of the health indicators like decline in death rate from 25.1 per thousand in 1951 to 8.1 per thousand in 1999 and **infant mortality from 148 per thousand to 70 during** the same period.
- Increase in life expectancy at birth from 37.1 years to 62.3 years for males and 36.2 to 65.3 years for females from 1951 to 1999.
- Decrease in birth rate from 40.8 to 26.1 during the same years, but it still is much higher than many developed countries.
- India has recorded declining female sex ratio.

Indicators of Social Empowerment

- “Development is freedom”. Freedom from hunger, poverty, servitude, bondage, ignorance, illiteracy and any other forms of domination is the key to human development.
- **Freedom in real sense of the term is possible only with the empowerment and participation** of the people in the exercise of their capabilities and choices in the society
- **Literacy** is the beginning of access to such a world of knowledge and freedom.

Population, Environment and Development

- The UNDP in its Human Development Report 1993 this report recognized greater constructive role of Civil Societies in bringing about peace and human development.
- The civil society should work for building up opinion for reduction in the military expenditure, demobilization of armed forces, transition from defence to production of basic goods and services and particularly disarmament and reduction in the nuclear warheads by the developed countries.
- **Neo-Malthusians, environmentalists and radical ecologists** believe that for a happy and peaceful social life proper balance between populations and resources is a necessary condition.

- It is not the availability of resources that is as important as their social distribution

Indian culture and civilization

- Have been very sensitive to the issues of population, resource and development for a long time.
- The ancient scriptures were essentially concerned about the balance and harmony among the elements of nature.
- Mahatma Gandhi in the recent times advocated the reinforcement of the harmony and balance between the two.
- In his opinion, austerity for individual, trusteeship of social wealth and non- violence are the key to attain higher goals in the life of an individual as well as that of a nation. His views were also re-echoed in the Club of Rome Report “Limits to Growth” (1972), Schumachers book “Small is Beautiful” (1974), Brundt and Commission’s Report “Our Common Future” (1987) and finally in the “Agenda-21 Report of the Rio Conference” (1993).

CHAPTER.4

HUMAN SETTLEMENTS

- Human Settlement means cluster of dwellings of any type or size where human beings live
- the process of settlement inherently involves grouping of people and apportioning of territory as their resource base

The basic differences between rural and urban settlements are as follows

- The rural settlements derive their life support or basic economic needs from land based primary economic activities, whereas, urban settlements, depend on processing of raw materials and manufacturing of finished goods on the one hand and a variety of services on the other.
- Cities act as nodes of economic growth; provide goods and services not only to urban dwellers but also to the people of the rural settlements in their hinterl and sin return for food and raw materials. This functional relationship between the urban and rural settlements takes place through transport and communication network.
- Rural and urban settlements differ in terms of social relationship, attitude and outlook. Rural people are less mobile and therefore, social relations among them are intimate. In urban areas, on the other hand, way of life is complex and fast, and social relations are formal.

Types of Rural Settlement

- **Factors and conditions responsible** for having different types of rural settlements in India. These include: (i) physical features – nature of terrain, altitude, climate and availability of water (ii) cultural and ethnic factors – social structure, caste and religion (iii) security factors -defence against thefts and robberies.

- **four types:**

- Clustered, agglomerated or nucleated,
Semi-clustered or fragmented,
Hamleted, and
Dispersed or isolated

Clustered Settlements

- The clustered rural settlement is a compact or closely built up area of houses.
- In this type of village the general living area is distinct and separated from the surrounding farms, barns and pastures.
- The closely built-up area and its intervening streets present some recognizable pattern or geometric shape, such as rectangular, radial, linear, etc.
- Such settlements are generally found in fertile alluvial plains and in the north eastern states.
- Sometimes, people live in compact village for security or defence reasons, such as in the Bundelkhand region of central India and in Nagaland.
- In Rajasthan, scarcity of water has necessitated compact settlement for maximum utilisation of available water resources.

Semi-Clustered Settlements

- result from tendency of clustering in a restricted area of dispersed settlement.
- one or more sections of the village society choose or is forced to live a little away from the main cluster or village.
- the land-owning and dominant community occupies the central part of the main village, whereas people of lower strata of society and menial workers settle on the outer flanks of the village. Such settlements are widespread in the Gujarat plain and some parts of Rajasthan.

Hamleted Settlements

- Sometimes settlement is fragmented into several units physically separated from each other bearing a common name.
- These units are locally called *panna*, *para*, *palli*, *nagla*, *dhani*, etc. in various parts of the country.
- This segmentation of a large village is often motivated by social and ethnic factors. Such villages are more frequently found in the middle and lower Ganga plain, Chhattisgarh and lower valleys of the Himalayas.

Dispersed Settlements

- Dispersed or isolated settlement pattern in India appears in the form of isolated huts or hamlets of few huts in remote jungles, or on small hills with farms or pasture on the slopes.
- Extreme dispersion of settlement is often caused by extremely fragmented nature of the terrain and land resource base of habitable areas. Many areas of Meghalaya, Uttaranchal, Himachal Pradesh and Kerala have this type of settlement.

Urban Settlements

- **Evolution of Towns in India** - at the time of Indus valley civilisation, towns like Harappa and Mohanjodaro were in existence. The following period has witnessed evolution of towns. It continued with periodic ups and downs until the arrival of Europeans in India in the eighteenth century.
- On the basis of their evolution in different periods, Indian towns may be classified as:

Ancient towns, Medieval towns, and Modern towns.

Ancient Towns

- There are number of towns in India having historical background spanning over 2000 years. Most of them developed as religious and cultural centres.
- Varanasi is one of the important towns among these. Prayag (Allahabad), Pataliputra (Patna), Madurai are some other examples of ancient towns in the country.

Medieval Towns

- About 100 of the existing towns have their roots in the medieval period. Most of them developed as headquarters of principalities and kingdoms.
- These are fort towns which came up on the ruins of ancient towns. Important among them are Delhi, Hyderabad, Jaipur, Lucknow, Agra and Nagpur.

Modern Towns

- The British and other Europeans have developed a number of towns in India. **Starting their foothold on coastal locations, they first developed some trading ports such as Surat, Daman, Goa, Pondicherry, etc.**
- The British later consolidated their hold around three principal nodes – Mumbai (Bombay), Chennai (Madras), and Kolkata (Calcutta) –and built them in the British style.

Urbanization in India.

- The level of urbanization is measured in terms of percentage of urban population to total population. The level of urbanization in India in 2001 was 28 per cent
- Enlargement of urban centres and emergence of new towns have played a significant role in the growth of urban population and urbanization in the country.
- growth rate of urbanization has slowed down during last two decades.

Classification of Towns on the basis of Population Size

- Census of India classifies urban centres into six classes Urban centre with
- population of more than one lakh is called a city or class I town.
- Cities accommodating population size between one to five million are called metropolitan cities and
- More than five million are megacities. Majority of metropolitan and mega cities are urban agglomerations.

- An urban agglomeration may consist of any one of the following three combinations: (i) a town and its adjoining urban outgrowths, (ii) two or more contiguous towns with or without their outgrowths, and (iii) a city and one or more adjoining towns with their outgrowths together forming a contiguous spread

Functional Classification of Towns

- On the basis of dominant or specialized functions, Indian cities and towns can be broadly classified as follows:

Administrative towns and cities

- Towns supporting administrative head quarters of higher order are administrative towns, such as Chandigarh, New Delhi, Bhopal, Shillong, Guwahati, Imphal, Srinagar, Gandhinagar, Jaipur Chennai, etc.

Industrial towns

- Industries constitute prime motive force of these cities such as Mumbai, Salem, Coimbatore, Modinagar, Jamshedpur, Hugli, Bhilai, etc.

Transport Cities

- They may be ports primarily engaged in export and import activities such as Kandla, Kochchi, Kozhikode, Vishakhapatnam, etc. or
- hubs of inland transport such as Agra, Dhulia, MughalSarai, Itarsi, Katni, etc.

Commercial towns

- Towns and cities specialising in trade and commerce are kept in this class. Kolkata, Saharanpur, Satna, etc. are some examples.

Mining towns

- These towns have developed in mineral rich areas such as Raniganj, Jharia, Digboi, Ankaleshwar, Singrauli, etc.

Garrison Cantonment towns

- These towns emerged as garrison towns such as Ambala, Jalandhar, Mhow, Babina, Udhampur, etc.

Educational towns

- Starting as centres of education, some of the towns have grown into major campus towns such as Roorki, Varanasi, Aligarh, Pilani, Allahabad etc.

Religious and cultural towns

- Varanasi, Mathura, Amritsar, Madurai, Puri, Ajmer, Pushkar, Tirupati, Kurukshetra, Haridwar, Ujjain came to prominence due to their religious/cultural significance.

Tourist towns

- Nainital, Mussoorie, Shimla, Pachmarhi, Jodhpur, Jaisalmer, Udagamandalam (Ooty), Mount Abu are some of the tourist destinations.

CHAPTER. 5

LAND RESOURCES AND AGRICULTURE.

Land Use Categories

Land-use records are maintained by land revenue department as:-

- **Forests:** area under actual forest cover is different from area classified as forest. The latter is the area which the Government has identified and demarcated for forest growth. The land revenue records are consistent with the latter definition.
- **Land put to Non-agricultural Uses:** Land under settlements (rural and urban), infrastructure (roads, canals, etc.), industries, shops, etc. are included in this category.
- **Barren and Waste lands :** The land which may be classified as a wasteland such as barren hilly terrains, desert lands, ravines, etc. normally cannot be brought under cultivation with the available technology.
- **Area under Permanent Pastures and Grazing Lands :** Most of this type land is owned by the village , Panchayat'or the Government. Only a small proportion of this land is privately owned. The land owned by the village panchayat comes under „Common Property Resources“.
- **Area under Miscellaneous Tree Crops and Groves(Not included is Net sown Area) :** The land under orchards and fruit trees are included in this category. Much of this land is privately owned.
- **Culturable Waste-Land:** Any land which is left fallow (uncultivated) for **more than five years** is included in this category. It can be brought under cultivation after improving it through reclamation practices.
- **Current Fallow:** This is the land which is left without cultivation **for one or less than one agricultural year**. Following is a cultural practice adopted for giving the land rest. The land recoups the lost fertility through natural processes.
- **Fallow other than Current Fallow:** This is also a cultivable land which is left uncultivated for **more than a year but less than five years**. If the land is left uncultivated for more than five years, it would be categorised as culturable wasteland.
- **Net Area Sown:** The physical extent of land on which crops are sown and harvested is known as net sown area.

Land-use Changes in India

- Three types of changes that an economy undergoes, which affect land-use.

- The size of the economy
- The composition of the economy
- **Though the contribution of the agricultural activities reduces over time, the pressure on land for agricultural activities does not decline.** The reasons for continued pressure on agricultural land are:
 - In developing countries, the share of population dependent on agriculture usually declines much more slowly compared to the decline in the sector's share in GDP.
 - The number of people that the agricultural sector has to feed is increasing day by day.
- **The rate of increase is the highest in case of area under non-agricultural uses.** This is due to the changing structure of Indian economy. The area under non-agricultural uses is increasing at the expense of waste land and agricultural land.
- **The increase in the share under forest**, as explained before, can be accounted for by increase in the demarcated area under forest rather than an actual increase in the forest cover in the country.
- **The increase in the current fallow** cannot be explained from information pertaining to only two points. The trend of current fallow fluctuates a great deal over years, depending on the variability of rainfall and cropping cycles.
- **The wastelands and culturable wastelands have witnessed decline** over time due to the pressure on land increased, both from the agricultural and non- agricultural sectors.
- **The decline in net area sown is** a recent phenomenon that started in the late nineties, before which it was registering a slow increase. There are indications that most of the decline has occurred due to the increases in area under non-agricultural use.
- **The decline in land under pastures and grazing lands** can be explained by pressure from agricultural land. Illegal encroachment due to expansion of cultivation on common pasture lands is largely responsible for this decline.

Common Property Resources

- According to its ownership can broadly be classified under two broad heads – **private land and common property resources (CPRs)**
- CPRs provide fodder for the livestock and fuel for the households along with other minor forest products like fruits, nuts, fibre, medicinal plants, etc.
- CPRs also are important for women as most of the fodder and fuel collection is done by them in rural areas
- CPRs can be defined as community's natural resource, where every member has the right of access and usage with specified obligations, without anybody having property rights over them. Community forests, pasture lands, village water bodies and other public spaces where a group larger than a household or family unit exercises rights of use and carries responsibility of management are examples of CPRs.

Agricultural Land Use in India

- Lack of access to land is directly correlated with incidence of poverty in rural areas.
- Quality of land has a direct bearing on the productivity of agriculture, which is not true for other activities.
- In rural areas, aside from its value as a productive factor, **land ownership has a social value** and serves as a security for credit, natural hazards or life contingencies, and also adds to the social Status.
- The total stock of agricultural land resources (i.e. total cultivable land can be arrived at by adding up net sown area, all fallow lands and culturable wasteland.

- **the scope for bringing in additional land under net sown area in India is limited. There is, thus, an urgent need to evolve and adopt land-saving technologies.**
- Such technologies can be classified under two heads- those which raise the yield of any particular crop per unit area of land and those which increase the total output per unit area of land-use intensity.
- The advantage of the latter kind of technology is that along with increasing output from limited land, it also increases the demand for labour significantly.
- For a land scarce but labour abundant country like India, a high cropping intensity is desirable not only for fuller utilisation of land resource, but also for reducing unemployment in the rural economy.
- The cropping intensity (CI)

Cropping Seasons in India

Three crop seasons in the northern and interior parts of country, namely kharif, rabi and zaid

Cropping Season	Major Crops Cultivated	
	Northern States	Southern States
Kharif June-September	Rice, Cotton, Bajra, Maize, Jowar, Tur	Rice, Maize, Ragi, Jowar, Groundnut
Rabi October – March	Wheat, Gram, Rapeseeds and Mustard, Barley, Vegetables, Fruits, Fodder	Millet, Ragi, Groundnut, Jowar Rice, Vegetables, Fodder

Types of Farming

- On the basis of main source of moisture for crops, the farming can be classified as **irrigated** and **rain fed** (barani).
- The objective of **protective irrigation** is to protect the crops from adverse effects of soil moisture deficiency which often means that irrigation acts as a supplementary source of water over and above the rainfall
- **Productive irrigation** is meant to provide sufficient soil moisture in the cropping season to achieve high productivity. **In such irrigation the water input per unit area of cultivated land is higher than protective irrigation.**
- **Rain fed farming** is further classified on the basis of adequacy of soil moisture during cropping season into dry land and wetland farming. In India, the
- **Dry land farming** is largely confined to the regions having annual rainfall less than 75cm. These regions grow hardy and drought resistant crops such as ragi, bajra, moong, gram and guar (fodder crops) and practice various measures of soil moisture conservation and rainwater harvesting.
- In **wetland farming**, the rainfall is in excess of soil moisture requirement of plants during rainy season. Such regions may face flood and soil erosion hazards. These areas grow various water intensive crops such as rice, jute and sugarcane and practise aquaculture in the fresh water bodies.

Food grains

- The importance of food grains in Indian agricultural economy may be gauged from the fact these crops occupy about two-third of total cropped area in the country. On the basis of the structure of grain

the food grains are classified as **cereals and pulses**.

Cereals

- The cereals occupy about 54 per cent of total cropped area in India.
- The country produces about 11 per cent cereals of the world and ranks third in production after China and U.S.A.
- India produces a variety of cereals, which are classified as fine grains (rice, wheat) and coarse grains (jowar, bajra, maize, ragi), etc.

Rice

- Rice is a staple food for the overwhelming majority of population in India.
- Though, it is considered to be a crop of tropical humid areas,
- These are successfully grown from sea level to about 2,000 m altitude and from humid areas in eastern India to dry
- But irrigated areas of Punjab, Haryana, western U.P. and northern Rajasthan.
- In southern states and West Bengal the climatic conditions allow the cultivation of two or three crops of rice in an agricultural year. In West Bengal farmers grow three crops of rice called, aus, aman and „boro “.
- But in Himalayas and north western parts of the country, it is grown as a kharif crop during southwest Monsoon season.

- India contributes 22 per cent of rice production in the world and ranks second after China.

- About one-fourth of the total cropped area in the country is under rice cultivation.

- West Bengal, Punjab, Uttar Pradesh, Andhra Pradesh and Tamil Nadu were five leading rice producing states in the country in 2002-03.

- They yield level of rice is high in Punjab, Tamil Nadu, Haryana, Andhra Pradesh, West Bengal and Kerala.
- Punjab and Haryana are not traditional rice growing areas. Rice cultivation in the irrigated areas of Punjab and Haryana was introduced in 1970's following the Green Revolution. Genetically improved varieties of seed, relatively high usage of fertilisers and pesticides and lower levels of susceptibility of the crop to pests due to dry climatic conditions are responsible for higher yield of rice in this region.
- The yield of this crop is very low in rainfed areas of Madhya Pradesh, Chhattisgarh and Orissa.

Wheat

- Wheat is the second most important cereal crop in India after rice. India produces about 12 percent of total wheat production of world. It is primarily a crop of temperate zone. Hence, its cultivation in India is done during winter i.e. rabi season.
- About 85 per cent of total area under this crop is concentrated in north and central regions of the country i.e. Indo-Gangetic Plain, Malwa Plateau and Himalayas up to 2,700 m altitude. Being a rabi crop, it is mostly grown under irrigated conditions.
- But it is a rain fed crop in Himalayan highlands and parts of Malwa plateau in Madhya Pradesh.
- About 14 per cent of the total cropped area in the country is under wheat cultivation. Uttar Pradesh, Punjab, Haryana, Rajasthan and Madhya Pradesh are five leading wheat producing states. The yield level of wheat is very high (above 4,000 k.g. per ha) in Punjab and Haryana whereas, Uttar Pradesh, Rajasthan and Bihar have moderate yields.

Jowar

- The coarse cereals together occupy about 16.50 per cent of total cropped area in the country.
- Among these, jowar or sorghum alone accounts for about 5.3 per cent of total cropped area. It is main food crop in semi-arid areas of central and southern India.
- Maharashtra alone produces more than half of the total jowar production of the

country. Other leading producer states of jowar are Karnataka, Madhya Pradesh and Andhra Pradesh. It is sown in both kharif and rabi seasons in southern states. But it is a kharif crop in northern India where it is mostly grown as a fodder crop.

Bajra

- Bajra is sown in hot and dry climatic conditions in north western and western parts of the country.
- It is a hardy crop which resists frequent dry spells and drought in this region. It is cultivated alone as well as part of mixed cropping.
- Leading producers of bajra are the states of Maharashtra, Gujarat, Uttar Pradesh, Rajasthan and Haryana.
- Being a rain fed crop, the yield level of this crop is low in Rajasthan and fluctuates a lot from year to year. Yield of this crop has increased during recent years in Haryana and Gujarat due to introduction of drought resistant varieties and expansion of irrigation under it.

Maize

- Maize is a food as well as fodder crop grown under semi-arid climatic conditions and over inferior soils.
- This crop occupies only about 3.6 per cent of total cropped area.
- Maize cultivation is not concentrated in any specific region. It is sown all over India except eastern and north-eastern regions.
- The leading producers of maize are the states of Madhya Pradesh, Andhra Pradesh, Karnataka, Rajasthan and Uttar Pradesh.
- Yield level of maize is higher than other coarse cereals. It is high in southern states and declines towards central parts.

Pulses

- Pulses are a very important ingredient of vegetarian food as these are rich sources of proteins.
- These are legume crops which increase the natural fertility of soils through nitrogen fixation.
- India is a leading producer of pulses and accounts for about one-fifth of the total production of pulses in the world.
- The cultivation of pulses in the country is largely concentrated in the dry lands of Deccan and central plateaus and north western parts of the country.
- Pulses occupy about 11 per cent of the total cropped area in the country.
- Being the rain fed crops of dry lands, the yields of pulses are low and fluctuate from year to year.
- Gram and tur are the main pulses cultivated in India.

Gram

- Gram is cultivated in subtropical areas. It is mostly a rain fed crop cultivated during rabi season in central, western and north western parts of the country.
- Just one or two light showers or irrigations are required to grow this crop successfully.
- It has been displaced from the cropping pattern by wheat in Haryana, Punjab and northern Rajasthan following the green revolution.
- Madhya Pradesh, Uttar Pradesh, Maharashtra, Andhra Pradesh and Rajasthan are the main producers of this pulse crop. The yield of this crop continues to be low and fluctuates from year to year even in

irrigated areas.

Tur (Arhar)

- Tur is the second important pulse crop in the country. **It is also known as red gram or pigeon pea.**
- It is cultivated over marginal lands and under rain fed conditions in the dry areas of central and southern states of the country.
- Maharashtra alone contributes about one-third of the total production of tur
- Per hectare output of this crop is very low and its performance is inconsistent.

Oilseeds

- Groundnut, rapeseed and mustard, soya bean and sunflower are the main oilseed crops grown in India

1. Groundnut

- India produces about 17 per cent the total of groundnut production in the world.
- It is largely a rain fed kharif crop of dry lands. But in southern India, it is cultivated during rabi season as well.
- Gujarat, Tamil Nadu, Andhra Pradesh, Karnataka and Maharashtra are the leading producers.
- Yield of groundnut is comparatively high in Tamil Nadu where it is partly irrigated. But its yield is low in Andhra Pradesh and Karnataka.

2. Rapeseed and Mustard

- Rapeseed and mustard comprise several oilseeds as rai, sarson, toria and taramira.
- These are subtropical crops cultivated during rabi season in north-western and central parts of India.
- These are frost sensitive crops and their yields fluctuate from year to year. But with the expansion of irrigation and improvement in seed technology, their yields have improved and stabilized to some extent. About two-third of the cultivated area under these crops is irrigated.
- Rajasthan contributes about one-third production while other leading producers are Uttar Pradesh, Haryana, West Bengal and Madhya Pradesh.
- Yields of these crops are comparatively high in Haryana and Rajasthan.

3. Other Oilseeds

- Soyabean and sunflower are other important oilseeds grown in India.

Soyabean is mostly grown in Madhya Pradesh and Maharashtra

- It is a minor crop in northern parts of the country where its yield is high due to irrigation.

Fibre Crops

These crops provide us fibre for preparing cloth, bags, sacks and a number of other items. Cotton and jute are two main fibre crops grown in India.

1. Cotton

- Cotton is a tropical crop grown in kharif season in semi-arid areas of the country.

India lost a large proportion of cotton growing area to Pakistan during partition. However, its acreage has increased considerably during the last 50 years.

- India grows both short staple (Indian)cotton as well as long staple (American) cotton called , narma" in north-wester n parts of the country. Cotton requires
- Clear sky during flowering stage.

- India ranks fourth in the world in the production of cotton after China, U.S.A. and Pakistan.
- Cotton growing areas, i.e. parts of Punjab, Haryana and northern Rajasthan in north-west, Gujarat and Maharashtra in the west and plateaus of in south. Leading producers of this crop are Maharashtra,

Gujarat, Andhra Pradesh, Punjab and Haryana.

- Per hectare output of cotton is high under irrigated conditions in north-western region of the country. Its yield is very low in Maharashtra where it is grown under rain fed conditions.

2. Jute

- Jute is used for making coarse cloth, bags, sacks and decorative items.
- It is a cash crop in West Bengal and adjoining eastern parts of the country. India lost large jute growing areas to East Pakistan (Bangladesh) during partition.
- At present, India produces about three-fifth of jute production of the world. West Bengal accounts for about three-fourth of the production in the country. Bihar and Assam are other jute growing areas

Other Crops

Sugarcane, tea and coffee are other important crops grown in India.

1. Sugarcane

- Sugarcane is a crop of tropical areas. Under rain fed conditions, it is cultivated in sub-humid and humid climates. But it is largely an irrigated crop in India.
- India is the second largest producer of sugarcane after Brazil.
- Uttar Pradesh produces about two-fifth of sugarcane of the country.
- Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh are other leading producers of this crop where yield level of sugarcane is high.
- Its yield is low in northern India.

Tea

Tea is a plantation crop used as beverage. Black tea leaves are fermented whereas green tea leaves are unfermented.

Tea leaves have rich content of caffeine and tannin. It is an indigenous crop of hills in northern China. It is grown over undulating topography of hilly areas and well-drained soils in humid and sub-humid tropics and sub-tropics.

In India, tea plantation started in 1840s in Brahmaputra valley of Assam which still is a major tea growing area in the country.

Later on, its plantation was introduced in the sub-Himalayan region of West Bengal (Darjiling, Jalpaiguri and Cooch Bihar districts). Tea is also cultivated on the lower slopes of Nilgiri and Cardamom hills in Western Ghats.

- India is a leading producer of tea .
- India's share in the international market of tea has declined substantially. At present, it ranks third among tea exporting countries in the world after Sri Lanka and China.
- Assam accounts for about 53.2 per cent of the total cropped area and contributes more than half of total production of tea in the country. West Bengal

and Tamil Nadu are the other leading producers of tea.

Coffee

- Coffee is a tropical plantation crop. Its seeds are roasted, ground and are used for preparing a beverage.
- There are three varieties of coffee arabica, robusta and liberica.

- India mostly grows superior quality coffee, arabica, which is in great demand in International market.
- But India produces only about 4.3 per cent coffee of the world and ranks sixth after Brazil, Vietnam, Colombia, Indonesia and Mexico.
- Coffee is cultivated in the highlands of Western Ghats in Karnataka, Kerala and Tamil Nadu. Karnataka alone accounts for more than two- third of total production of coffee in the country

Agricultural Development in India

Strategy of Development

- During partition about one-third of the irrigated land in undivided India went to Pakistan. This reduced the proportion of irrigated area in Independent.
- After Independence, the immediate goal of the Government was to increase food grains production by (i) switching over from cash crops to food crops; (ii) intensification of cropping over already cultivated land; and (iii) increasing cultivated area by bringing cultivable and fallow land under plough.
- agricultural production stagnated during late 1950s.
- To overcome this problem, Intensive Agricultural District Programme (IADP) and Intensive Agricultural Area Programme (IAAP) were launched.
- New seed varieties of wheat (Mexico) and rice (Philippines) known as high yielding varieties (HYVs) were available for cultivation by mid-1960s.
- India took advantage of this and introduced package technology comprising HYVs, along with chemical fertilizers in irrigated areas of Punjab, Haryana, Western Uttar Pradesh, Andhra Pradesh and Gujarat.

Assured supply of soil moisture through irrigation was a basic pre-requisite for the success of this new agricultural technology.

- This strategy of agricultural development paid dividends instantly and increased the food grains production at very fast rate. This spurt of agricultural growth came to be known as, **Green Revolution**“.
- But green revolution was initially confined to irrigated areas only. This led to regional disparities in agricultural development in the country till the seventies, after which the technology spread to the Eastern and Central parts of the country.
- The Planning Commission of India initiated agro-climatic planning in 1988 to induce regionally balanced agricultural development in the country.
- It also emphasized the need for diversification of agriculture and harnessing of resources for development of dairy farming, poultry, horticulture, livestock rearing and aquaculture.
- Initiation of the policy of liberalisation and free market economy in 1990s is likely to influence the course of development of Indian agriculture.
- Lack of development of rural infrastructure, withdrawal of subsidies and price support, and impediments in availing of the rural credits may lead to inter- regional and inter -personal disparities in rural areas.

Growth of Agricultural Output and Technology

- India ranks first in the production of pulses, tea, jute, cattle and milk. It is the second largest producer of rice, wheat, groundnut, sugarcane and vegetables.
- Expansion of irrigation has played a very crucial role in enhancing agricultural output in the country. It provided basis for introduction of modern agricultural technology such as high yielding varieties of seeds, chemical fertilizers, pesticides and farm machinery.
- The net irrigated area in the country has increased from 20.85 to 54.66 million have over the period 1950-51 to 2000-01.

consumption of chemical fertilizers in India was 91 kg which was equal to its average consumption in the world (90 kg).

But in the irrigated areas of Punjab and Haryana the consumption of chemical fertilizers per unit area is three to four times higher than that of the national average.

Since the high yielding varieties are highly susceptible to pests and diseases, the use of pesticides has increased significantly since 1960s.

Problems of Indian Agriculture

Dependence on Erratic Monsoon

- Irrigation covers only about 33 per cent of the cultivated area in India.
- Poor performance of south-west Monsoon also adversely affects the supply of canal water for irrigation.
- Even the areas receiving high annual rainfall experience considerable fluctuations.
- This makes them vulnerable to both droughts and floods.
- Drought is a common phenomenon in the low rainfall areas which may also experience occasional floods.

Low productivity

- The yield of the crops in the country is low in comparison to the international level.
- Per hectare output of most of the crops such as rice, wheat, cotton and oilseeds in India is much lower than that of U.S.A., Russia and Japan.
- Because of the very high pressure on the land resources, the labour productivity in Indian agriculture is also very low in comparison to international level. The vast rain fed areas of the country, particularly dry lands which mostly grow coarse cereals, pulses and oilseeds have very low yields.

Constraints of Financial Resources and Indebtedness and Lack of Land Reforms

- Indian peasantry had been exploited for along time as there had been unequal distribution of land.
- Among the three revenue systems operational during British period i.e. Mahalwari, Ryotwari and Zamindari, the last one was most exploitative for the peasants.
- Lack of implementation of land reforms has resulted in continuation of inequitable distribution of cultivable land which is detrimental to agricultural development.

Small Farm Size and Fragmentation of Landholdings

- More than 60 per cent of the ownership holdings have a size smaller than one (ha).
- average size of land holding is shrinking further under increasing population pressure.
- the land holdings are mostly fragmented. **There are some states where consolidation of holding has not been carried out even once.**
- The small size fragmented landholdings are uneconomic

Lack of Commercialization

- A large number of farmers produce crops for self-consumption.
- Most of the small and marginal farmers grow food grains, which are meant for their own family consumption. Modernisation and commercialisation of agriculture have however, taken place in the irrigated areas.

Vast Under-employment

- There is a massive under-employment in the agricultural sector in India, particularly in the un-irrigated tracts.
- there is a seasonal unemployment ranging from 4 to 8 months. Even in the cropping season work is not available throughout, as agricultural operations are not labour intensive.

Degradation of Cultivable Land

- One of the serious problems that arises out of faulty strategy of irrigation and agricultural development is degradation of land resources.
- This is serious because it may lead to depletion of soil fertility. The situation is particularly alarming in irrigated areas. A large tract of agricultural land has lost its fertility due to alkalisation and salinisation of soils and water logging.
- Excessive use of chemicals such as insecticides and pesticides has led to their concentration in toxic amounts in the soil profile.
- Leguminous crops have been displaced from the cropping pattern in the irrigated areas and duration of fallow has substantially reduced owing to multiple cropping. This has obliterated the process of natural fertilization such as nitrogen fixation.
- Rain fed areas in humid and semi-arid tropics also experience degradation of several types like soil erosion by water and wind erosion which are often induced by human activities.

CHAPTER. 6 WATER RESOURCES

Water Resources of India

- India accounts for about 2.45 per cent of world's surface area, 4 per cent of the world's water resources and about 16 per cent of world's population.
- The total water available from precipitation in the country in a year is about 4,000 cubic km.

Surface Water Resources

- There are four major sources of surface water. These are rivers, lakes, ponds, and tanks.
- In the country, there are about 10,360 rivers and their tributaries longer than 1.6 km each. The mean annual flow in all the river basins in India is estimated to be 1,869 cubic km.
- Water flow in a river depends on size of its catchment area or river basin and rainfall within its catchment area.
- Much of the annual water flow in south Indian rivers like the Godavari, the Krishna, and the Kaveri has been harnessed, but it is yet to be done in the Brahmaputra and the Ganga basins.

Groundwater Resources

- The level of groundwater utilisation is relatively high in the river basins lying in north-western region and parts of south India.

- The groundwater utilisation is very high in the states of Punjab, Haryana, Rajasthan, and Tamil Nadu.

Lagoons and Backwaters

- India has a vast coastline and the coast is very indented in some states. Due to this, a number of lagoons and lakes have formed.
- The States like Kerala, Orissa and West Bengal have vast surface water resources in these lagoons and lakes. Although, water is generally brackish in these water-bodies, it is used for fishing and irrigating certain varieties of paddy crops, coconut.

Water Demand and Utilisation

- India's water demand at present is dominated by irrigational needs.
- Agriculture accounts for most of the surface and ground water utilisation, it accounts for 89 per cent of the surface water and 92 per cent of the groundwater utilisation.
- While the share of industrial sector is limited to 2 per cent of the surface water utilisation and 5 per cent of the ground-water,
- The share of domestic sector is higher (9 per cent) in surface water utilisation as compared to groundwater.

1. Demand of Water for Irrigation

- In agriculture, water is mainly used for irrigation. Irrigation is needed because of spatio-temporal variability in rainfall in the country. The large tracts of the country are deficient in rainfall and are drought prone.
- Water need of certain crops also makes irrigation necessary. water requirement of rice, sugarcane, jute, etc. is very high which can be met only through irrigation.
- Provision of irrigation makes multiple cropping possible. It has also been found that irrigated lands have higher agricultural productivity than un irrigated land.
- The high yielding varieties of crops need regular moisture supply, which is made possible only by a developed irrigation systems. In fact, this is why that green revolution strategy of agriculture development in the country has largely been successful in Punjab, Haryana and western Uttar Pradesh.
- In Punjab, Haryana and Western Uttar Pradesh more than 85 per cent of their net sown area is under irrigation.
- Of the total net irrigated area 76.1per cent in Punjab and 51.3 per cent in Haryana are irrigated through wells and tube wells. This shows that these states utilise large proportion of their ground water potential which has resulted in ground water depletion in these states.

2. Emerging Water Problems

- The per capita availability of water is dwindling day by day due to increase in population.
- The available water resources are also getting polluted with industrial, agricultural and domestic effluents, and this, in turn, is further limiting the availability of usable water resources.

3. Deterioration of Water Quality

- Water quality refers to purity of water, or water without unwanted foreign substances. Water gets polluted by foreign matters such as micro-organisms, chemicals, industrial and other wastes.
- The Ganga and the Yamuna are the two highly polluted rivers in the country

Water Conservation and Management

- Water availability from sea/ocean, due to high cost of desalinisation, is considered negligible, India has to take quick steps and make effective policies and laws, and adopt effective measures for its conservation.

- Besides developing water saving technologies and methods, attempts are also to be made to prevent the pollution.
- There is need to encourage watershed development, rainwater harvesting, water recycling and reuse, and conjunctive use of water for sustaining water supply in long run.

4. Prevention of Water Pollution

- The Central Pollution Control Board (CPCB) in collaboration with State Pollution Control Boards has been monitoring water quality of national aquatic resources at 507 stations.
- The data obtained from these stations show that organic and bacterial contamination continues to be the main source of pollution in rivers. The Yamuna river is the most polluted river in the country between Delhi and Etawah.
- Ground water pollution has occurred due to high concentrations of heavy/toxic metals, fluoride and nitrates at different parts of the country.
- The legislative provisions such as the Water (Prevention and Control of Pollution) Act 1974, and Environment Protection Act 1986 have not been implemented effectively.
- The Water Cess Act, 1977, meant to reduce pollution has also made marginal impacts.
- There is a strong need to generate public awareness about importance of water and impacts of water pollution.

5. Recycle and Reuse of Water

- Another way through which we can improve fresh water availability is by recycle and reuse.
- Use of water of lesser quality such as reclaimed waste-water would be an attractive option for industries for cooling and fire fighting to reduce their water cost.

6. Watershed Management

- Watershed management basically refers to efficient management and conservation of surface and groundwater resources.
- It involves prevention of runoff and storage and recharge of groundwater through various methods like percolation tanks, recharge wells, etc.
- However, in broad sense watershed management includes conservation, regeneration and judicious use of all resources – natural (like land, water, plants and animals) and human with in a watershed.
- Watershed management aims at bringing about balance between natural resources on the one hand and society on the other. The success of watershed development largely depends upon community participation
- **Haryali** is a watershed development project sponsored by the Central Government

which aims at enabling the rural population to conserve water for drinking, irrigation, fisheries and afforestation. The Project is being executed by Gram Panchayats with people's participation.

- **Neeru-Meeru** (Water and You) programme (in Andhra Pradesh) and **Arvary Pani Sansad** (in Alwar, Rajasthan) have taken up constructions of various water- harvesting structures such as percolation tanks, dug out ponds (*Johad*), check dams, etc. through people's participation.

Rain water Harvesting

- Rain water harvesting is a method to capture and store rainwater for various uses. It is also used to recharge groundwater aquifers.
- It is a low cost and eco-friendly technique for preserving every drop of water by guiding the rain water to bore well, pits and wells.
- Rainwater harvesting increases water availability, checks the declining ground water table, improves the quality of groundwater through dilution of contaminants like fluoride and nitrates, prevents soil

erosion, and flooding and arrests salt water intrusion in coastal areas if used to recharge aquifers.

Highlights of India's National Water Policy, 2002

- The National Water Policy 2002 stipulates water allocation priorities broadly in the following order: drinking water; irrigation, hydro-power, navigation, industrial and other uses. The policy stipulates progressive new approaches to water management. Key features include:
- Irrigation and multi-purpose projects should invariably include drinking water component, wherever there is no alternative source of drinking water.
- Providing drinking water to all human beings and animals should be the first priority.
- Measures should be taken to limit and regulate the exploitation of groundwater.
- Both surface and groundwater should be regularly monitored for quality. A phased programme should be undertaken for improving water quality.
- The efficiency of utilisation in all the diverse uses of water should be improved.
- Awareness of water as a scarce resource should be fostered.
- Conservation consciousness should be promoted through education, regulation, incentives and disincentives.

CHAPTER.7

MINEARAL AND ENERGY RESOURCES.

- A mineral is a natural substance of organic or inorganic origin with definite chemical and physical properties.

Types of Mineral Resources

- On the basis of chemical and physical properties, minerals may be grouped under two main categories of metallics and non-metallics.
- Metallic minerals are the sources of metals. Iron ore, copper, gold produce metal and are included in this category.
- Metallic minerals are further divided into ferrous and non-ferrous metallic minerals.
- All those minerals which have iron content are ferrous such as iron ore itself and those which do not have iron content are non-ferrous such as copper, bauxite, etc.
- Non-metallic minerals are either organic in origin such as fossil fuels also known as mineral fuels which are derived from the buried animal and plant life such as coal and petroleum. Other type of non-metallic minerals are inorganic in origin such as mica, limestone and graphite, etc.

Agencies involved in the exploration of minerals

- In India, systematic surveying, prospecting and exploration for minerals is undertaken by the Geological Survey of India (GSI), Oil and Natural Gas Commission (ONGC), Mineral Exploration Corporation Ltd. (MECL), National Mineral Development Corporation (NMDC), Indian Bureau of Mines (IBM), Bharat Gold Mines Ltd. (BGML), Hindustan Copper Ltd. (HCL), National Aluminium Company Ltd. (NALCO) and the Departments of Mining and Geology in various states.

Distribution of Minerals in India

- Most of the metallic minerals in India occur in the peninsular plateau region in the old crystalline rocks.
- Over 97 per cent of coal reserves occur in the valleys of Damodar, Sone, Mahanadi and Godavari.
- Petroleum reserves are located in the sedimentary basins of Assam, Gujarat and Mumbai High i.e. off-shore region in the Arabian Sea.
- New reserves have been located in the Krishna-Godavari and Kaveri basins.
- Most of the major mineral resources occur to the east of a line linking Mangalore and Kanpur.
- Minerals are generally concentrated in three broad belts in India. belts are :

The North-Eastern Plateau Region

- This belt covers Chotanagpur (Jharkhand), Orissa Plateau, West Bengal and parts of Chhattisgarh
- It has variety of minerals viz. iron ore coal, manganese, bauxite, mica.

The South-Western Plateau Region

- This belt extends over Karnataka, Goa and contiguous Tamil Nadu uplands and Kerala. This belt is rich in ferrous metals and bauxite.
- It also contains high grade iron ore, manganese and limestone.
- This belt packs in coal deposits except Neyveli lignite.
- This belt does not have as diversified mineral deposits as the north-eastern belt. Kerala has deposits of monazite and thorium, bauxite clay. Goa has iron ore deposits.

The North-Western Region

- This belt extends along Aravali in Rajasthan and part of Gujarat and minerals are associated with Dharwar system of rocks.
- Copper, zinc have been major minerals.
- Rajasthan is rich in building stones i.e. sandstone, granite, marble. Gypsum and Fuller's earth deposits are also extensive.
- Dolomite and limestone provide raw materials for cement industry. Gujarat is known for its petroleum deposits

Ferrous Mineral

- Ferrous minerals such as iron ore, manganese, chromite, etc., provide a strong base for the development of metallurgical industries.
- Our country is well-placed in respect of ferrous minerals both in reserves and production.

1. Iron Ore

- India is endowed with fairly abundant resources of iron ore. It has the largest reserve of iron ore in Asia.
- The two main types of ore found in our country are *haematite* and *magnetite*. It has great demand in international market due to its superior quality.
- The iron ore mines occur in close proximity to the coal fields in the north-eastern plateau region of the country which adds to their advantage.
- reserves of iron ore is located in the States of Orissa, Jharkhand, Chhattisgarh, Karnataka, Goa, Andhra Pradesh and Tamil Nadu.
- In Orissa, iron ore occurs in a series of hill ranges in Sundergarh, Mayurbhanj and Jhar.

- The important mines are Gurumahisani, Sulaipet, Badampahar (Mayurbhaj), Kiruburu (Kendujhar) and Bonai (Sundergarh).
- Similar hill ranges, Jharkhand has some of the oldest iron ore mines and most of the iron and steel plants are located around them.
- Goa has also emerged as an important producer of iron ore.

2. Manganese

- Manganese is an important raw material for smelting of iron ore and also used for manufacturing ferro alloys.
- Manganese deposits are found in almost all geological formations, however, it is mainly associated with Dharwar system.
- Orissa is the leading producer of Manganese. Karnataka is another major producer
- The disadvantage of Maharashtra mines is that they are located far from steel plants.

Non-Ferrous Minerals

India is poorly endowed with non-ferrous metallic minerals except bauxite.

3. Bauxite

- Bauxite is the ore which is used in manufacturing of aluminium.
- Bauxite is found mainly in tertiary deposits and is associated with laterite rocks occurring extensively either on the plateau or hill ranges of peninsular India and also in the coastal tracts of the country.
- Orissa happens to be the largest producer of Bauxite. Kalahandi and Sambalpur are the leading producers. The other two areas which have been increasing their production are Bolangir and Koraput. The pat lands of Jharkhand in Lohardaga have rich deposits.
- Gujarat, Chhattisgarh, Madhya Pradesh and Maharashtra are other major producers.

4. Copper

- Copper is an indispensable metal in the electrical industry for making wires, electric motors, transformers and generators.
- It is alloy able, malleable and ductile. It is also mixed with gold to provide strength to jewellery.
- The Copper deposits mainly occur in Singhbhum district in Jharkhand, Balaghat district in Madhya Pradesh and Jhunjhunu and Alwar districts in Rajasthan.\

Non-metallic Minerals

Among the non-metallic minerals produced in India, mica is the important one. The other minerals extracted for local consumption are limestone, dolomite and phosphate.

1. Mica

- Mica is mainly used in the electrical and electronic industries. It can be split into very thin sheets which are tough and flexible.
- Mica in India is produced in Jharkhand, Andhra Pradesh and Rajasthan followed by Tamil Nadu, West Bengal and Madhya Pradesh.
- In Jharkhand high quality mica is obtained in a belt extending over a distance of about 150 km, in length and about 22 km, in width in lower Hazaribagh plateau. In Andhra Pradesh. Nellore district produces the best quality mica.

- In Rajasthan mica belt extends for about 320 kms from Jaipur to Bhilwara and around Udaipur. Mica deposits also occur in Mysore and Hasan districts of Karnataka, Coimbatore, Tiruchirapalli, Madurai and Kanniyakumari in Tamil Nadu, Alleppey in Kerala, Ratnagiri in Maharashtra, Purulia and Bankura in West Bengal.

Energy Resources

- Mineral fuels like coal, petroleum and natural gas (known as fossil fuels), nuclear energy minerals, are the conventional sources of energy. These conventional sources are exhaustible resources.

1. Coal

- One of the important minerals which is mainly used in the generation of thermal power and smelting of iron ore. Coal occurs in rock sequences mainly of two geological ages, namely Gondwana and tertiary deposits.
- About 80 per cent of the coal deposits in India is of bituminous type and is of non-coking grade.
- The most important Gondwana coal fields of India are located in Damodar Valley. They lie in Jharkhand-Bengal coal belt and the important coal fields in this region are Raniganj, Jharia, Bokaro, Giridih, Karanpura.
- Jharia is the largest coal field followed by Raniganj.
- Tertiary coals occur in Assam, Arunachal Pradesh, Meghalaya and Nagaland.
- Besides, the brown coal or lignite occur in the coastal areas of Tamil Nadu, Pondicherry, Gujarat and Jammu and Kashmir.

2. Petroleum

- **Crude petroleum** consists of hydrocarbons of liquid and gaseous states varying in chemical composition, colour and specific gravity.
- It is an essential source of energy for all internal combustion engines in automobiles, railways and aircraft. Its numerous by-products are processed in petrochemical industries such as fertiliser, synthetic rubber, synthetic fibre, medicines, vaseline, lubricants, wax, soap and cosmetics.
- Crude petroleum occurs in sedimentary rocks of the tertiary period.
- Oil exploration and production was systematically taken up after the **Oil and Natural Gas Commission was set up in 1956.**
- In recent years, new oil deposits have been found at the extreme western and eastern parts of the country. In Assam, Digboi, Naharkatiya and Moran are important oil producing areas. The major oil fields of Gujarat are Ankaleshwar, Kalol, Mehsana, Nawagam, Kosamba
- Mumbai High which lies 160 km off Mumbai was discovered in 1973 and production commenced in 1976. Oil and natural gas have been found in exploratory wells in Krishna-Godavari and Kaveri basin on the east coast.
- Oil extracted from the wells needs to be refined. There are two types of refineries in India: (a) field based and (b) market based.
- Digboi is an example of field based and Barauni is an example of market based refinery.
- There are 18 refineries in India

3. Natural Gas

- The Gas Authority of India Limited was set up in 1984 as a public sector undertaking to transport and market natural gas.
- It is obtained along with oil in all the oil fields but exclusive reserves have been located along the eastern coast as well as (Tamil Nadu, Orissa and Andhra Pradesh), Tripura, Rajasthan and off-shore wells in Gujarat and Maharashtra

Non-Conventional Energy Sources

- Sustainable energy resources are only the renewable energy sources like solar, wind, hydro-geothermal and biomass. These energy sources are more equitably distributed and environmental friendly.
- The non-conventional energy sources will provide more sustained, eco-friendly cheaper energy after the initial cost is taken care of.

Nuclear Energy Resources

- Important minerals used for the generation of nuclear energy are uranium and thorium.
- Uranium deposits occur in the Dharwar rocks.
- Geographically, uranium ores are known to occur in several locations along the Singhbhum Copper belt. It is also found in Udaipur, Alwar and Jhunjhunu districts of Rajasthan, Durg district of Chhattisgarh, Bhandara district of Maharashtra and Kullu district of Himachal Pradesh.
- Thorium is mainly obtained from monazite and ilmenite in the beach sands along the coast of Kerala and Tamil Nadu.
- World's richest monazite deposits occur in Palakkad and Kollam districts of Kerala, near Vishakhapatnam in Andhra Pradesh and Mahanadi river delta in Orissa.
- Atomic Energy Commission was established in 1948, progress could be made only after the establishment of the Atomic Energy Institute at Trombay in 1954 which was renamed as the Bhabha Atomic Research Centre in 1967.
- The important nuclear power projects are Tarapur (Maharashtra) Rawat bhata near Kota (Rajasthan), Kalpakkam (Tamil Nadu), Narora (Uttar Pradesh), Kaiga (Karnataka) and Kakrapar (Gujarat)

Solar Energy

- Sun rays tapped in photovoltaic cells can be converted into energy, known as solar energy.
- The two effective processes considered to be very effective to tap solar energy are photo voltaics and solar thermal technology.
- Solar thermal technology has some relative advantages over all other non-renewable energy sources. It is cost competitive, environment friendly and easy to construct.
- Solar energy is 7 per cent more effective than coal or oil based plants and 10 per cent more effective than nuclear plants. It is generally used more in appliances like heaters, crop dryers, cookers, etc.
- The western part of India has greater potential for the development of solar energy in Gujarat and Rajasthan.(Y)

Wind Energy

- Wind energy is absolutely pollution free, inexhaustible source of energy.
- The mechanism of energy conversion from blowing wind is simple. The kinetic energy of wind, through turbines is converted into electrical energy.
- The permanent wind systems such the trade winds, westerlies and seasonal wind like monsoon have been used as source of energy. Besides these, local winds, land and sea breezes can also be used to produce electricity.
- In India, already has started generating wind energy. It has an ambitious programme to install 250 wind-driven turbines with a total capacity of 45 megawatts, spread over 12 suitable locations, specially in coastal areas.
- In Rajasthan, Gujarat, Maharashtra and Karnataka, favourable conditions for wind energy exist.
- Wind power plant at Lamba in Gujarat in Kachchh is the largest in Asia. Another, wind power plant is located at Tuticorin in Tamil Nadu.

Tidal and Wave Energy

- Ocean currents are the store-house of infinite energy..
- Large tidal waves are known to occur along the west coast of India. Hence, India has great potential for the development of tidal energy along the coasts but so far these have not yet been utilised.

Geothermal Energy

- When the magma from the interior of earth, comes out on the surface, tremendous heat is released. This heat energy can successfully be tapped and converted to electrical energy. Apart from this, the hot water that gushes out through the geyser wells is also used in the generation of thermal energy. It is popularly known as Geothermal energy.
- This energy is now considered to be one of the key energy sources which can be developed as an alternate source.

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The hot springs and geysers are being used since medieval period. In India, a geothermal energy plant has been commissioned at Manikaran in Himachal Pradesh.

Bio-energy

- Bio-energy refers to energy derived from biological products which includes agricultural residues, municipal, industrial and other wastes.
- Bio-energy is a potential source of energy conversion. It can be converted into electrical energy, heat energy or gas for cooking.
- It will also process the waste and garbage and produce energy. This will improve economic life of rural areas as in developing countries, reduce environmental pollution, enhance self-reliance and reduce pressure on fuel wood.
- One such project converting municipal waste into energy is Okhla in Delhi.

Conservation of Mineral Resources:

- The alternative energy sources like solar power, wind, wave, geothermal energy are inexhaustible resource. These should be developed to replace the exhaustible resources.
- In case of metallic minerals, use of scrap metals will enable recycling of metals.
- Use of scrap is especially significant in metals like copper, lead and zinc in which India's reserves are meagre. Use of substitutes for scarce metals may also reduce their consumption.
- Export of strategic and scarce minerals must be reduced, so that the existing reserve may be used for a longer period

CHAPTER.8

MANUFACTURING INDUSTRIES

Types of Industries:

- **On the basis of ownership, industries are categorised as:**
(i) public sector, (ii) private sector, and (iii) joint and cooperative sector,

- **Industries are also classified on the basis of the use of their products such as :**
(i) basic goods industries, (ii) capital goods industries (iii) intermediate goods industries, and (iv) consumer goods industries.

- **On the basis of raw materials used by them:**
 - i. Agriculture-based industries,
 - ii. Forest-based industries
 - iii. Mineral-based industries, and
 - iv. Industrially processed raw material- based industries.

- **Based on the nature of the manufactured products.**
(1) Metallurgical Industries, (2) Mechanical Engineering Industries, (3) Chemical and Allied Industries, (4) Textile Industries, (5) Food Processing Industries, (6) Electricity Generation, (7) Electronics and (8) Communication Industries.

- Foot loose industries. What are these? Have they any relationship with raw material location or not?

Locations of Industries

- Location of industries is influenced by several factors like access to raw materials, power, market, capital, transport and labour, etc. Relative significance of these factors varies with time and place. There is strong relationship between raw material and type of industry.

Raw Materials

- Industries using weight-losing raw materials are located in the regions where raw materials are located.
- Example-sugar mills in India located in sugarcane growing areas Similarly, the locations of pulp industry, copper smelting and pig iron industries are located near their raw materials.
- In iron and steel industries, iron ore and coal both are weight-losing raw materials. Therefore, an optimum location for iron and steel industries should be near raw material sources. This is why most of the iron and steel industries are located either near coalfields (Bokaro, Durgapur, etc.) or near sources of iron ore (Bhadravati, Bhilai, and Rourkela).
- Similarly, industries based on perishable raw materials are also located close to raw material sources.

Power

- Power provides the motive force for machines, and therefore, its supply has to be ensured before the location of any industry.
- certain industries, like aluminium and synthetic nitrogen manufacturing industries tend to be located near sources of power because they are power intensive and require huge quantum of electricity.

Market

- Markets provide the outlets for manufactured products. Heavy machine, machine tools, heavy chemicals are located near the high demand areas as these are market orientated.
- Cotton textile industry uses a non-weight-losing raw material and is generally located in large urban centre, Mumbai, Ahmedabad, Surat, etc.
- Petroleum refineries are also located near the markets as the transport of crude oil is easier and several products derived from them are used as raw material in other industries. Koyali, Mathali and Barauni refineries are typical examples. e.i. Ports also play a crucial role in the location of oil refineries.

Transport

- the reasons for the concentration of industries in Mumbai, Chennai, Delhi and in and around Kolkata.
- It was because of the fact that they initially became the nodal point having transport links.
- The industries shifted to interior locations, only when railway lines were laid. All major industrial plants are located on the trunk rail routes.

Labour

- Industries require skilled labour. In India, labour is quite mobile and is available in large numbers due to our large population.

Historical Factors

- the reasons for emerging Mumbai, Kolkata and Chennai as industrial nodes is that These locations were greatly influenced by our colonial past. During the initial phase of colonisation, manufacturing activities received new impetus provided by the European traders.
- Places like Murshidabad, Dhaka, Bhadohi, Surat, Vadodara, Kozhikode, Coimbatore, Mysore, etc. emerged as important manufacturing centres.
- In the subsequent industrial phase of colonialism, these manufacturing centres experienced rapid growth due to competition from the goods manufactured in Britain and the discriminatory policies of colonial power.

Industrial Policy

- Establishment of iron and steel industry in Bhilai and Rourkela were based on decision to develop backward tribal areas of the country.
- At present, government of India provides lots of incentives to industries locating in backward areas.

MAJOR INDUSTRIES

1. The Iron and Steel Industry

- The development of the iron and steel industry opened the doors to rapid industrial development in India.
- Almost all sectors of the Indian industry depend heavily on the iron and steel industry for their basic infrastructure.

- The other raw materials besides iron ore and coking coal, essential for iron and steel industry are limestone, dolomite, manganese and fire clay. All these raw materials are gross (weight losing), therefore, the best location for the iron and steel plants is near the source of raw materials.(reason for location of these industries)
- The Indian iron and steel industry consists of large integrated steel plants as well as mini steel mills. It also includes secondary producers, rolling mills ancillary industries.

Integrated Steel Plants

1. TISCO

- The Tata Iron and Steel plant lies very close to the Mumbai-Kolkata railway line and about 240 km away from Kolkata, which is the nearest port for the export of steel.
- The rivers Subarnarekha and Kharkai provide water to the plant. The iron ore for the plant is obtained from Noamundi and Badam Pahar and coal is brought from Joda mines in Orissa.
- Coking coal comes from Jharia and west Bokaro coalfields.

2. IISCO

- The Indian Iron and Steel Company (IISCO) set up its first factory at Hirapur and later on another at Kulti.
- In 1937, the Steel corporation of Bengal was constituted in association with IISCO and set up another iron and steel producing unit at Burnpur (West Bengal).
- All the three plants under IISCO are located very close to Damodar valley coal fields(Raniganj Jharia, and Ramgarh).
- Iron ore comes from Singhbhum in Jharkhand. Water is obtained from the Barakar River, a tributary of the Damodar. All the plants are located along the Kolkata- Asansol railway line.
- Unfortunately, steel production from IISCO fell considerably in 1972-73 and the plants were taken over by the government.

3. Visvesvaraiya Iron and Steel Works Ltd. (VISL)

- The third integrated steel plant, the Visvesvaraiya Iron and Steel Works, initially called the Mysore Iron and Steel Works, is located close to an ironore producing area of Kemangundi in the Bababudan hills.
- Limestone and manganese area also locally available. But this region has no coal.
- electric furnaces were installed which use hydroelectricity from the Jog Falls hydel power project. The Bhadravati river supplies water to the plant. This plant produces specialised steels and alloys.

4. Second Five Year Plan (1956-61).

- Three new integrated steel plants were set up with foreign collaboration: Rourkela in Orissa, Bhilai in Chhattisgarh and Durgapur in West Bengal. These were public sector plants under Hindustan Steel Limited (HSL). In 1973, the Steel Authority of India Limited (SAIL) was created to manage these plants.

5. Rourkela Steel Plant.

- The Rourkela Steel plant was set up in 1959 in the Sundargarh district of Orissa in collaboration with Germany.
- The plant was located on the basis of proximity to raw materials, thus, minimising the cost of transporting weight losing raw material.
- This plant has a unique locational advantage, as it receives coal from Jharia (Jharkhand) and iron ore from Sundargarh and Kendujhar. The Hirakud project supplies power for the electric furnaces and

water is obtained from the Koel and Sankh rivers.

6. Bhilai Steel Plant.

- The Bhilai Steel Plant was established with Russian collaboration in Durg District of Chhattisgarh and started production in 1959.
- The iron ore comes from Dalli-Rajhara mine , coal comes from Korba and

Kargali coal fields. The water comes from the Tanduladam and the power from the Korba Thermal Power Station.

- This plant also lies on the Kolkata-Mumbai railway route. The bulk of the steel produced goes to the Hindustan Shipyard at Vishakhapatnam.

7. Durgapur Steel Plant

- Durgapur Steel Plant, in West Bengal, was set up in collaboration with the government of the United Kingdom and started production in 1962.
- This plant lies in Raniganj and Jhariacoal belt and gets iron ore from Noamundi
- Durgapur lies on the main Kolkata-Delhi railway route. Hydel power and water is obtained from the Damodar Valley Corporation (DVC).

8. Bokaro Steel Plant

- This steel plant was set up in 1964 at Bokaro with Russian collaboration.
- This plant was set up on the principle of transportation cost minimisation by creating Bokaro-Rourkela combine.
- It receives iron ore from the Rourkela region and the wagons on return take coal to Rourkela.
- Other raw materials come to Bokaro from within a radius of about 350 km. Water and Hydel power is supplied by the Damodar Valley Corporation.

9. Other Steel Plants

- New steel plants which were set up in the Fourth Plan period are away from the main raw material sources.
- All the three plants are located in South India.
- The Vizag Steel Plant, in Vishakhapatnam in Andhra Pradesh is the first port based plant which started operating in 1992. Its port location is of advantage.
- The Vijaynagar Steel Plant at Hospet in Karnataka was developed using indigenous technology. This uses local iron ore and limestone. The Salem Steel Plant in Tamil Nadu was commissioned in 1982.

The Cotton Textile Industry

- The cotton textile industry is one of the traditional industries of India.
- India was famous worldwide for the production of muslin, a very fine variety of cotton cloth, calicos, chintz and other different varieties of fine cotton cloth.
- The development of this industry in India was due to several factors.
- One, it is a tropical country and cotton is the most comfortable fabric for a hot and humid climate.
- Second, large quantity of cotton was grown in India.
- Abundant skilled labour required for this industry was available in this country.

- In fact, in some areas the people were producing cotton textiles for generations and transferred the skill from one generation to the other and in the process perfected their skills.
- In 1854, the first modern cotton mill was established in Mumbai. This city had several advantages as a cotton textile manufacturing centre. It was very close to the cotton producing areas of Gujarat and Maharashtra.
- Raw cotton used to be brought to Mumbai port to be transported to England. Therefore, cotton was available in Mumbai city itself.
- Mumbai even then was the financial centre and the capital needed to start an industry was available there.
- Hence, cheap and abundant labour too was available locally. The machinery required for a cotton textile mill could be directly imported from England.
- After partition, and this industry suffered a major recession. This was due to the fact that the most of the good quality cotton growing areas had gone to West Pakistan and India was left with 409 mills and only 29 per cent of the cotton producing area.
- The cotton textile industry in India can be broadly divided into two sectors, the organised sector and the unorganised sector.
- The production of the organised sector has drastically fallen from 81 per cent in the mid-twentieth century to only about 6 per cent in 2000.
- Decentralised sector includes cloth produced in handlooms (including *Khadi*) and powerlooms. The powerlooms on the decentralised sector produce more than 59 per cent and the handloom sector produces about 19 per cent of all cotton cloth produced in the country.
- Cotton is a “pure” raw material which does not lose weight in the manufacturing process. So other factors, like, power to drive the looms, labour, capital or market may determine the location of the industry.
- At present the trend is to locate the industry at or close to markets, as it is the market that decides what kind of cloth is to be produced.
- Also the market for the finished products is extremely variable, therefore, it becomes important to locate the mills close to the market.
- The rapid development of this industry in Tamil Nadu is the result of the abundant availability of hydel power for the mills.
- Presently, the major centres of the cotton textile industry are Ahmedabad, Bhiwandi, Solapur, Kolhapur, Nagpur, Indore and Ujjain. All these centres are the traditional centres and are located close to the cotton producing regions.
- Maharashtra, Gujarat and Tamil Nadu are the leading cotton producing states
- Tamil Nadu has the largest number of mills and most of them produce yarn rather than cloth. Coimbatore has emerged as the most important centre with nearly half the mills located there.

Sugar Industry

- the second most important agro-based industry in the country.
- India is the largest producer of both sugarcane and cane sugar
- Besides, *khandasari* and *guro* or jaggery are also prepared from sugarcane.
- This industry provides **employment for more than 4 lakh persons directly and a large number of farmers indirectly.**
- Sugar industry is a seasonal industry because of the seasonality of raw materials.
- 1903, a sugar mill was started in Bihar. Subsequently, sugar mills were started in other parts of Bihar and Uttar Pradesh.

Location of the Sugar Industry

- Sugarcane is a weight-losing crop. **The ratio of sugar to sugarcane varies between 9 to 12 per cent depending on its variety.**
- Its sucrose content begins to dry during haulage after it has been harvested from the field. Better recovery of sugar is dependent upon its being crushed within 24 hours of its harvesting. Sugar factories hence, are located within the cane producing regions.
- Maharashtra has emerged as a leading sugar producer in the country and

produces more than one-third of the total production of the sugar in the country.

- There are 87 mills in the cooperative sector.
- Uttar Pradesh is the second largest producer.

Petrochemical Industries:

- This group of industries has been growing very fast in India. A variety of products come under this category of industries.
- In 1960s, demand for organic chemicals increased so fast that it became difficult to meet this demand. At that time, petroleum refining industry expanded rapidly. Many items are derived from crude petroleum, which provide raw materials for many new industries, these are collectively known as petrochemical industries.
- This group of industries is divided into four sub-groups:
 - (i) polymers, (ii) synthetic fibres, (iii) elastomers, and (iv) surfactant intermediate.
- Mumbai is the hub of the petrochemical industries. Cracker units are also located in Auraiya (Uttar Pradesh), Jamnagar, Gandhinagar and Hajira (Gujarat), Nagothane, Ratnagiri (Maharashtra), Haldia (West Bengal) and Vishakhapatnam (Andhra Pradesh).
- Three organizations are working in the petrochemical sector under the administrative control of the Department of Chemicals and Petrochemicals.
- First is the Indian Petrochemical Corporation Limited (IPCL), a public sector undertaking. It is responsible for the manufacture and distribution of the various petrochemicals like polymers, chemicals, fibres and fibre intermediates.
- Second is the Petrofils Cooperative Limited (PCL), a joint venture of the Government of India and Weaver's Cooperative Societies. It produces polyester filament yarn and nylon chips at its two plants located at Vadodara and Naldhari in Gujarat.
- Third is the Central Institute of Plastic Engineering and Technology (CIPET), involved in imparting training in petro-chemical industry.
- Polymers are made from ethylene and propylene. These materials are obtained in the process of refining crude oil. Polymers are used as raw materials in the plastic industry.
- Among polymers, polyethylene is a widely used thermoplastic.
- The National Organic Chemicals Industries Limited (NOCIL), established in private sector in 1961, started the first naphtha based chemical industry in Mumbai.
- About 75 per cent of these units are in small scale sector. The industry also uses recycled plastics, which constitutes about 30 per cent of the total production.
- Synthetic fibres are widely used in the manufacturing of fabrics because of their inherent strength, durability, washability, and resistance to shrinkage.
- Industries manufacturing nylon and polyester yarns are located at Kota, Pimpri, Mumbai, Modinagar, Pune, Ujjain, Nagpur and Udhna. Acrylic staple fibre is manufactured at Kota and Vadodara.

Knowledge Based Industries

- The Information Technology (IT) revolution opened up new possibilities of economic and social transformation.

- The IT and IT enabled business process outsourcing (ITES- BPO) services continue to be on a robust growth path.
- Indian software industry has emerged as one of the fastest growing sectors in the economy.
- The software industry has surpassed electronic hardware production. The Indian

government has created a number of software parks in the country.

- The IT software and services industry account for almost 2 per cent of India's GDP.
- A majority of the multinational companies operating in the area of information technology have either software development centres or research development centres in India.
- A major impact of this growth has been on employment creation, which is almost double every year.

Liberalization, Privatization, Globalization (LPG) and Industrial Development in India.

- The new Industrial Policy was announced in 1991. The major objectives of this policy were to build on the gains already made, correct the distortions or weaknesses that have crept in, maintain a sustained growth in productivity and gainful employment and attain international competitiveness.
 - Within this policy, measures initiated are :
 - (1) abolition of industrial licensing, (2) free entry to foreign technology, (3) foreign investment policy, (4) access to capital market, (5) open trade, (6) abolition of phased manufacturing programme, and (7) liberalised industrial location programme.
- The policy has three main dimensions: **liberalisation, privatisation and globalisation.**
 - The industrial licensing system has been abolished for all except six industries related to security, strategic or environmental concerns.
 - At the same time, the number of industries reserved for public sector since 1956 have been reduced from 17 to 4.
 - The threshold limits of assets have been scrapped and no industry requires prior approval for investing in the delicensed sector. They only need to submit a memorandum in the prescribed format.
 - In the new industrial policy, Foreign Direct Investment (FDI) has been seen as a supplement to the domestic investment for achieving a higher level of economic development.
 - FDI benefits the domestic industry as well as the consumers by providing technological upgradation, access to global managerial skills and practices, optimum use of natural and human resources, etc.
 - The government has also announced changes in the industrial location policies.

Globalisation means integrating the economy of the country with the world economy. In Indian context, this implies:

- opening of the economy to foreign direct investment by providing facilities to foreign companies to invest in different fields of economic activity in India;
- removing restrictions and obstacles to the entry of multi-national companies in India;
- allowing Indian companies to enter into foreign collaboration in India and also encouraging them to set up joint ventures abroad;
- carrying out massive import liberalisation programmes by switching over from quantitative restrictions to tariffs in the first place, and then bringing down the level of import duties considerably; and
- instead of a set of export incentives, opting for exchange rate adjustments for promoting export.

INDUSTRIAL REGIONS

Major Industrial Regions(8)

1. Mumbai-Pune Region, 2. Hugli Region, 3. Bangalore-Tamil Nadu Region, 4. Gujarat Region, 5. Chotanagpur Region, 6. Vishakhapatnam-Guntur Region, 7. Gurgaon- Delhi-Meerut Region, and 8. Kollam-Thiruvananthapuram Region.

Minor Industrial Regions(13)

1. Ambala-Amritsar, 2. Saharanpur-Muzaffarnagar-Bijnor, 3. Indore-Dewas-Ujjain, 4. Jaipur-Ajmer, 5. Kolhapur-South Kannada, 6. Northern Malabar, 7. Middle Malabar, 8. Adilabad-Nizamabad, 9. Allahabad-Varanasi-Mirzapur, 10. Bhojpur- Munger, 11. Durg-Raipur, 12. Bilaspur-Korba, and 13. Brahmaputra valley

Industrial Districts (15)

1. Kanpur, 2. Hyderabad, 3. Agra, 4. Nagpur, 5. Gwalior, 6. Bhopal, 7. Lucknow, 8. Jalpaiguri, 9. Cuttack, 10. Gorakhpur, 11. Aligarh, 12. Kota, 13. Purnia, 14. Jabalpur, and 15. Bareilly.

Mumbai-Pune Industrial Region

- extends from Mumbai-Thane to Pune and adjoining districts of Nashik and Solapur.
- Besides, industrial development has been rapid in Kolaba, Ahmednagar, Satara, Sangli and Jalgaon districts. Development of this region started with the location of cotton textile industry in Mumbai.
- Mumbai, with cotton hinter land and moist climate favoured the location of cotton textile industry.
- Opening of the Suez Canal in 1869 provided impetus to the growth of Mumbai port. Machineries were imported through this port.
- Hydro-electricity was developed in the Western Ghat region to meet the requirements of this industry.
- chemical industry also developed. Opening of the Mumbai High petroleum field and erection of nuclear energy plants added additional pull to this region.

Hugli Industrial Region

- Located along the Hugli river, this region extends from Bansberia in the north to Birlanagar in the south for a distance of about 100 km.
- Historically, geographical, economic and political factors have contributed much to its development. It developed with the opening of river port on Hugli.
- Kolkata emerged as a leading centre of the country.
- Development of tea plantations in Assam and northern hills of West Bengal, the processing of indigo earlier and jute later coupled with the opening of coalfields of the Damodar Valley and iron ore deposits of the Chotanagpur plateau, contributed to the industrial development of the region.
- Cheap labour available from thickly populated part of Bihar, eastern Uttar Pradesh and Orissa also contributed to its development.
- Kolkata, being the capital city of British India (1773-1911), attracted the British

capital. The establishment of first jute mill at Rishra in 1855 ushered in the era of modern industrial clustering in this region.

- Location of petroleum refinery at Haldia has facilitated the development of a variety of industries.
- However, industrial growth of this region has slowed down in comparison to other regions. Decline of the jute industry is one of the reasons.

Bangalore-Chennai Industrial Region

- This region witnessed most rapid industrial growth in post-Independence period.
- Since, this region is away from the coalfields, its development is dependent on the Pykara hydroelectric plant, which was built in 1932.
- Cotton textile industry was the first to take roots due to the presence of cotton growing areas. Along with cotton mills, loom industry spread very rapidly. Several heavy engineering industries converged at Bangalore. Aircraft (HAL), machine tools, telephone (HTL) and Bharat Electronics are industrial landmarks of this region. Important industries are textiles, rail wagons, diesel engines, radio, light engineering goods, rubber goods, medicines, aluminium, sugar, cement, glass, paper, chemicals, film, cigarette, match box, leather goods, etc.
- Petroleum refinery at Chennai, iron and steel plant at Salem and fertiliser plants are recent developments.

Gujarat Industrial Region

The nucleus of this region lies between Ahmedabad and Vadodara but this region extends upto Valsad and Surat in the south and to Jamnagar in the west.

- Development of this region is also associated with the location of the cotton textile industry since 1860s.
- This region became an important textile region with the decline of the cotton textile industry at Mumbai.
- Located in cotton growing area, this region has double advantage of the proximity of raw materials as well as of market.
- The discovery of oil fields led to the establishment of petrochemical industries around Ankleshwar, Vadodara and Jamnagar.
- The port at Kandla helped in the rapid growth of this region. Petroleum refinery at Koyali provided raw materials to a host of petrochemical industries.

Chotanagpur Region

- This region extends over Jharkhand, northern Orissa and western West Bengal and is known for the heavy metallurgical industries.
- This region owes its development to the discovery of coal in the Damodar Valley and metallic and non-metallic minerals in Jharkhand and northern Orissa.
- Proximity of coal, iron ore and other minerals facilitated the location of heavy industries in this region.
- Six large integrated iron and steel plants at Jamshedpur, Burnpur-Kulti, Durgapur, Bokaro and Rourkela are located within this region.
- To meet the power requirement, thermal and hydroelectric plants have been constructed in the Damodar Valley.
- Densely populated surrounding regions provide cheap labour and Hugli region provides vast market for its industries.
- Heavy engineering, machine tools, fertilisers, cement, paper, locomotives and heavy electricals are some of the important industries in this region. Important centres are Ranchi, Dhanbad, Chaibasa, Sindri, Hazaribag, Jamshedpur, Bokaro, Rourkela, Durgapur, Asansol and Dalmianagar.

Vishakhapatnam-Guntur Region

- This industrial region extends from Vishakhapatnam district to Kurnool and Prakasam districts in the south.
- Industrial development of this region hinges upon Vishakhapatnam and Machilipatnam ports and developed agriculture and rich reserves of minerals in their hinterlands.
- Coalfields of the Godavari basin provide energy.
- Ship building industry was started at Vishakhapatnam in 1941.
- Petroleum refinery based on imported petroleum facilitated the growth of several petrochemical industries.
- One lead-zinc smelter is functioning in Guntur district.

Gurgaon-Delhi-Meerut Region

- Industries located in this region have shown very fast growth in the recent past.
- This region is located far away from the mineral and power resources, and therefore, the industries are light and market-oriented.
- Electronics, light engineering and electrical goods are major industries of this region. Besides, there are cotton, woollen and synthetic fabrics, hosiery, sugar, cement, machine tools, tractor, cycle, agricultural implements, chemical and vanaspati industries which have developed on large scale.
- Software industry is a recent addition. To the south lies the Agra-Mathura industrial area which specialises in glass and leather goods.
- Mathura with an oil refinery is a petrochemical complex. Among industrial centres, mention be made of Gurgaon, Delhi, Shahdara, Faridabad, Meerut, Modinagar, Ghaziabad, Ambala, Agra and Mathura.

Kollam-Thiruvananthapuram Region

- This industrial region is spread over Thiruvananthapuram, Kollam, Alwaye, Ernakulam and Alappuzha districts.
- Plantation agriculture and hydropower provide industrial base to this region.
- Located far away from the mineral belt of the country, agricultural products processing and market oriented light industries predominate the region.
- Among them, cotton textile, sugar, rubber, matchbox, glass, chemical fertiliser and fish-based industries are important. Food processing, paper, coconut coir products, aluminium and cement industries are also significant.
- Location of petroleum refinery at Kochchi has added a vista of new industries to this region.

PLANNING AND SUSTAINABLE DEVELOPMENT IN INDIAN CONTEXT.

- Planning involves the process of thinking, formulation of a scheme or programme and implementation of a set of actions to achieve some goal.
- Two approaches to planning, i.e. sectoral planning and regional planning.
- The sectoral planning means formulation and implementation of the sets of schemes or programmes aimed at development of various sectors of the economy such as agriculture, irrigation, manufacturing, power, construction, transport, communication, social infrastructure and services.
- There is no uniform economic development over space in any country. Some areas are more developed and some lag behind. This uneven pattern of development over space necessitates that the planners have a spatial perspective and draw the plans to reduce regional imbalance in development. This type of planning is termed as regional planning.

Target Area Planning

- The planning process has to take special care of those areas which have remained economically backward.
- sometimes resource-rich region also remain backward. The economic development also requires technology as well as investment besides there source.
- In order to arrest the accentuation of regional and social disparities, the Planning Commission introduced the *target area*’ and *target group* approaches to planning.
- Some of the examples of programmes directed towards the development of target areas are *Command Area Development Programme, Drought Prone Area Development Programme, Desert Development Programme, Hill Area Development Programme.*
- *The Small Farmers Development Agency (SFDA) and Marginal Farmers Development Agency (MFDA)* which are the examples of target group programme.
- In the 8th Five year Plan special area programmes were designed to develop infrastructure in hill areas, north-eastern states, tribal areas and backward areas.

Hill Area Development Programme

- Initiated during Fifth Five Year Plan covering 15 districts comprising all the hilly districts of Uttar Pradesh (present Uttarakhand), Mikir Hill and North Cachar hills of Assam, Darjiling district of West Bengal and Nilgiri district of Tamil Nadu.

⇒ The National Committee on the Development of Backward Area in 1981 recommended that all the hill areas in the country having height above 600 m and not covered under tribal sub-plan be treated as backward hill areas.

- Plan is based on topographical, ecological, social and economic conditions.
- These programmes aimed at harnessing the indigenous resources of the hill areas through development of horticulture, plantation agriculture, animal husbandry, poultry, forestry and small-scale and village industry.

Drought Prone Area Programme

- Initiated during the Fourth Five Year Plan with the objectives of providing employment to the people in drought-prone areas and creating productive assets.
- Initially this programme laid emphasis on the construction of labour-intensive civil works. But later on, it emphasised on irrigation projects, land development programmes, afforestation, grassland development and creation of basic rural infrastructure such as electricity, roads, market, credit and services.
- The other strategies of development of these areas include adoption of integrated watershed development approach at the micro-level.
- The restoration of ecological balance between water, soil, plants, and human and animal population should be a basic consideration in the strategy of development of drought-prone areas.
- **Planning Commission of India (1967)** identified 67 districts (entire or partly) of the country prone to drought. *Irrigation Commission (1972)* introduced the criterion of 30 per cent irrigated area and demarcated the drought prone areas..

Sustainable Development

- The notion of sustainable development emerged in the wake of general rise in the awareness of environmental issues in the late 1960s in Western World.
- United Nations established a *World Commission on Environment and Development (WCED)* headed by the Norwegian Prime Minister Gro Harlem Brundtland. The Commission gave its report (also known

as *Brundtland Report*)entitled „*Our Common Future*“ in 1987.

- The report defines sustainable development as a “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*”
- Sustainable development takes care of ecological, social and economic aspects of development during the present times and pleads for conservation of resources to enable the future generations to use these resources. It takes into account the development of whole human kind which have common future.

Case Study(Optional to read)

- **Indira Gandhi Canal (Nahar) Command Area**
 - Indira Gandhi Canal, previously known as the Rajasthan Canal, is one of the largest canal systems in India.
 - Conceived by Kanwar Sain in 1948, the canal project was launched on 31 March, 1958.
 - The canal originates at Harike barrage in Punjab and runs parallel to Pakistan border at an average distance of 40 km in Thar Desert (Marusthali) of Rajasthan.
 - The total planned length of the system is 9,060 km catering to the irrigation needs of a total culturable command area of 19.63 lakh hectares.
 - Out of the total command area, about 70 per cent was envisaged to be irrigated by flow system and the rest by lift system. The construction work of the canal system has been carried out through two stages.
 - The command area of Stage-I lies in Ganganagar, Hanumangarh and northern part of Bikaner districts. It has a gently undulating topography and its culturable command area is 5.53 lakh hectares.
 - The command area of Stage-II is spread over Bikaner, Jaisalmer, Barmer, Jodhpur, Nagaur and Churu districts covering culturable command area of 14.10 lakh ha.
 - It comprises desert land dotted with shifting sand dunes and temperature soaring to 50°C in summers.
 - In the lift canal, the water is lifted up to make it to flow against the slope of the land. All the lift canals of Indira Gandhi Canal system originate at the left bank of main canal while all the canals on the right bank of main canal are flow channels.
 - The introduction of canal irrigation in this dry land has transformed its ecology, economy and society.
 - It has influenced the environmental conditions of the region both positively as well as negatively. The availability of soil moisture for a longer period of time and various afforestation and pastured development programmes under CAD have resulted in greening the land. This has also helped in reducing wind erosion and siltation of canal systems.
 - But the intensive irrigation and excessive use of water has led to the emergence of twin environmental problems of water logging and soil salinity. Introduction of canal irrigation has brought about a perceptible transformation in the agricultural economy of the region.
 - Soil moisture has been a limiting factor in successful growing of crops in this area. Spread of canal irrigation has led to increase in cultivated area and intensity of cropping.
 - The traditional crops sown in the area, gram, bajra and jowar have been replaced by wheat, cotton, groundnut and rice. This is the result of intensive irrigation. This intensive irrigation, no doubt, initially has led to tremendous increase in agricultural and livestock productivity. This has also caused water logging and soil salinity, and thus, in the long run, it hampers the sustainability of agriculture.

Measures for Promotion of Sustainable Development

- The ecological sustainability of Indira Gandhi Canal Project has been questioned by various scholars. Their point of view has also largely been validated by the course of development this region has taken during the last four decades, which has resulted in degradation of physical environment.
- It is a hard fact that attaining sustainable development in the command area requires major thrust upon the measures to achieve ecological sustainability.
- Hence, five of the seven measures proposed to promote sustainable development in the command area are meant to restore ecological balance.
- The first requirement is strict implementation of water management policy. The canal project envisages protective irrigation in Stage-I and extensive irrigation of crops and pasture development in Stage-II.
- In general, the cropping pattern shall not include water intensive crops. It shall be adhered to and people shall be encouraged to grow plantation crops such as citrus fruits.
- The CAD programmes such as lining of water courses, land development and levelling and *warabandi* system (equal distribution of canal water in the command area of outlet) shall be effectively implemented to reduce the conveyance loss of water. The areas affected by water logging and soil salinity shall be reclaimed.
 - The eco-development through afforestation, shelterbelt plantation and pasture development is necessary particularly in the fragile environment of Stage-II.
 - The social sustainability in the region can be achieved only if the land allottees having poor economic background are provided adequate financial and institutional support for cultivation of land.
 - The economic sustainability in the region cannot be attained only through development of agriculture and animal husbandry. The agricultural and allied activities have to develop along with other sectors of economy. This shall lead to diversification of economic base and establishment of functional linkages between basic villages, agro-service centres and market centres.

TRANSPORT AND COMMUNICATION

Land Transport

- The pathways and unmetalled roads have been used for transportation in India since ancient times. With the economic and technological development, metalled roads and railways were developed to move large volume of goods and people from one place to another.

1. Road Transport

- India has one of the largest road networks in the world with a total length of 33.1 lakh km (2005).
- About 85 per cent of passenger and 70 per cent of freight traffic are carried by roads every year.
- Road transport is relatively suitable for shorter distance travel.
- Sher Shah Suri built the Shahi (Royal) road to strengthen and consolidate his empire from the Indus Valley to the Sonar Valley in Bengal. This road was renamed the Grand Trunk (GT) road during the British period, connecting Calcutta and Peshawar. At present, it extends from Amritsar to Kolkata. It is bifurcated into 2 segments :
 - National Highway(NH)-1 from Delhi to Amritsar, and (b) NH- 2 from Delhi to Kolkata
 - 20 year road plan (1961) was introduced to improve the conditions of roads in India.

- For the purpose of construction and maintenance, roads are classified as National Highways (NH), State Highways (SH), Major District Roads and Rural Roads

National Highways

- The main roads which are constructed and maintained by the Central Government are known as the National Highways.
- These roads are meant for inter-state transport and movement of defence men and material in strategic areas.
- These also connect the state capitals, major cities, important ports, railway junctions, etc.
- The length of the National Highways has increased from 19,700 km in 1951 to 65,769 km in 2005. The National Highways constitute only two per cent of the total road length but carry 40 per cent of the road traffic.
- The National Highways Authority of India (NHAI) was operationalised in 1995.

It is an autonomous body under the Ministry of Surface Transport.

- It is entrusted with the responsibility of development, maintenance and operation of National Highways. This is also the apex body to improve the quality of the roads designated as National Highways.

Golden Quadrilateral:

- It comprises construction of 5,846 km long 4/6 lane, high density traffic corridor, to connect India's four big metro cities of Delhi-Mumbai-Chennai- Kolkata.

North-South and East-West Corridors:

- North-South corridor aims at connecting Srinagar in Jammu and Kashmir with Kanyakumari in Tamil Nadu (including Kochchi-Salem Spur) with 4,076 km long road.
- The East-West Corridor has been planned to connect Silchar in Assam with the port town of Porbandar in Gujarat with 3,640 km of road length.

State Highways

- Constructed and maintained by state governments.
- Join the state capitals with district headquarters and other important towns.
- Connected to the National Highways. These constitute 4 per cent of total road length in the country.

District Roads

- Connecting link between District Headquarters and the other important nodes in the district.
- Account for 14 per cent of the total road length of the country

Rural Roads

- These roads are vital for providing links in the rural areas.
- About 80 per cent of the total road length in India are categorised as rural roads.
- There is regional variation in the density of rural road because these are influenced by the nature of the terrain

Other Roads

Border Roads and International Highways.

- The Border Road Organisation (BRO) was established in May 1960 for accelerating economic development and strengthening defence preparedness through rapid and coordinated improvement of strategically important roads along the northern and north-eastern boundary of the country.
- It is a premier multi faceted construction agency. It has constructed roads in high altitude mountainous terrain joining Chandigarh with Manali (Himachal Pradesh) and Leh (Ladakh). This road runs at an average altitude of 4,270 metres above the mean sea level.
- This organisation has completed over 40,450 km of roads by March 2005.
- The BRO also undertakes snow clearance in high altitude areas.
- The international highways are meant to promote the harmonious relationship with the neighbouring countries by providing effective links with India.

2. Rail Transport

- one of the longest in the world.
- Facilitates the movement of both freight and passengers and contributes to the growth of economy.
- Mahatma Gandhi said, the Indian railways “*brought people of diverse cultures together to contribute to India’s freedom struggle.*”
- Indian Railway was introduced in 1853, when a line was constructed from Bombay to Thane covering a distance of 34 km.
- length of Indian Railways network is 63,221 km. Its very large size puts lots of pressure on a centralized railway management system.
- Thus, in India, the railway system has been divided into sixteen zone.

On the basis of width of the track of Indian Railways, three categories have been made:

- **Broad gauge:** The distance between rails in broad gauge is 1.676 metre. The total length of broad gauge lines is 46,807 km which accounts for 74.14 per cent of the total length of rail routes in the country.
- **Metre gauge:** The distance between rails is one metre. It runs over 13,290 km covering 21.02 per cent of the total route length.
- **Narrow gauge:** The distance between the rails in this case is 0.762 metre or 0.610 metre. Nearly 4.94 per cent of the total length of the Indian Railways is narrow gauge, which accounts for 3,124 km of route length. It is generally confined to hilly areas

3. Water Transport

- an important mode of transport for both passenger and cargo traffic in India.
- cheapest means of transport and is most suitable for carrying heavy and bulky material. It is a fuel-efficient and eco-friendly mode of transport.
- The water transport is of two types—(a) inland waterways, and (b) oceanic waterways.

Inland Waterways

- chief mode of transport before the advent of railways.
- faced tough competition from road and railway transport. Moreover, diversion of river water for irrigation purposes made them non navigable in large parts of their courses.
- India has 14,500 km of navigable waterways, contributing about 1% to the country’s transportation.
- It comprises rivers, canals, backwaters, creeks, etc.

- For the development, maintenance and regulation of national waterways in the country, the Inland Waterways Authority was set up in 1986.
- The authority has declared three inland waterways as National Waterways
- The backwaters (Kayal) of Kerala has special significance in Inland Waterway. Apart from providing cheap means of transport, they are also attracting large number of tourists in Kerala. The famous Nehru Trophy Boat Race (VALLAMKALI) is also held in the backwaters.

NW 1	Allahabad-Haldia stretch (1,620 km)	It is one of the most important waterways in India, 17.10.1986 which is navigable by mechanical boats up to Patna and by ordinary boats up to Haridwar. It is divided into three parts for	17.10.1986
NW 2	Sadiya-Dhubri stretch (891 km)	Brahmaputra is navigable by steamers up to Dibrugarh (1,384 km) which is shared by India and Bangladesh	26.10.1988
NW 3	Kottapuram- Kollam stretch (205 km)	It includes 168 km of west coast canal along with Champakara canal (23 km) and Udyogmandal canal (14 km).	01.12.1991

Oceanic Routes

- India has a vast coastline of approximate 7,517 km, including islands.
- Twelve major and 185 minor ports provide infrastructural support to these routes.
- Oceanic routes play an important role in the transport sector of India's economy.
- Approximately 95 per cent of India's foreign trade by volume and 70 per cent by value moves through ocean routes.
- Apart from international trade, these are also used for the purpose of transportation between the islands and the rest of the country.

4. Air Transportation

- Air transport is the fastest means of movement from one place to the other.
- It has reduced distances by minimising the travel time. It is very essential for a vast country like India, where distances are large and the terrain and climatic conditions are diverse.
- Air transport in India made a beginning in 1911 when airmail operation commenced over a little distance of 10 km between Allahabad and Naini.
- **The Airport Authority of India** is responsible for providing safe, efficient air traffic and aeronautical communication services in the Indian Air Space.
- The authority manages 126 airports including 11 international, 86 domestic and 29 civil enclaves at defence air fields.
- The air transport in India is managed by two corporations, Air India and Indian Airlines after nationalisation.

Air India

- Air India provides International Air Services for both passengers and cargo traffic.
- It connects all the continents of the world through its services.
- About 52 per cent of the total air traffic was handled only at Mumbai and Delhi airports.
- Pawan Hans is the helicopter service operating in hilly areas and is widely used by tourists in north-eastern sector.
- Pawan Hans Limited mainly provides helicopter services to petroleum sector and for tourism.

Open Sky Policy

- To help the Indian exporters and make their export more competitive, the government had introduced an Open Sky Policy for cargo in April 1992.
- Under this policy, foreign airlines or association of exporters can bring any freighters to the country.

Oil and Gas Pipelines

- Pipelines are the most convenient and efficient mode of transporting liquids and gases over long distances.
- Even solids can also be transported by pipelines after converting them into slurry.
- Oil India Limited (OIL) under the administrative set up of the Ministry of Petroleum and Natural Gas is engaged in the exploration, production and transportation of crude oil and natural gas. It was incorporated in 1959 as a company.
- Asia's first cross country pipeline covering a distance of 1,157 km was constructed by OIL from Naharkatiya oilfield in Assam to Barauni refinery in Bihar.
- It was further extended up to Kanpur in 1966.
- Another extensive network of pipelines has been constructed in the western region of India of which Ankleshwar -Koyali, Mumbai High- Koyali and Hazira-Vijaipur- Jagdishpur (HVJ) are most important.
- Recently, a 1256 km long pipeline connecting Salaya (Gujarat) with Mathura (U.P.) has been constructed. It supplies crude oil from Gujarat to Punjab (Jalandhar) via Mathura. OIL is in the process of constructing of 660 km long pipeline from Numaligarh to Siliguri.

Communication Networks

- Invention of post- office, telegraph, printing press, telephone, satellite, etc has made the communication much faster and easier. Development in the field of science and technology has significantly contributed in bringing about revolution in the field of communication.
- On the basis of scale and quality, the mode of communication can be divided into following categories :

Personal Communication System

- Among all the personal communication system internet is the most effective and advanced one.
- It is widely used in urban areas. It enables the user to establish direct contact through e-mail to get access to the world of knowledge and information.
- It is increasingly used for e-commerce and carrying out money transactions.
- The internet is like a huge central warehouse of data, with detailed information on various items.
- The network through internet and e-mail provides an efficient access to information at a comparatively low cost. It enables us with the basic facilities of direct communication. You might have noticed the proliferation of cyber cafes in urban areas.

Mass Communication System

1. Radio.

- Radio broadcasting started in India in 1923 by the Radio Club of Bombay.
- Since then, it gained immense popularity and changed the socio- cultural life of people. Within no time, it made a place in every household of the country.
- Government took this opportunity and brought this popular mode of communication under its control in 1930 under the Indian Broadcasting System. It was changed to All India Radio in 1936 and to Akashwani in 1957.
- All India Radio broadcasts a variety of programmes related to information, education and entertainment. Special news bulletins are also broadcast at specific occasions like session of parliament and state legislatures.

2. Television (T.V.)

- Television broadcasting has emerged as the most effective audio-visual medium for disseminating information and educating masses.
- Initially, the T.V. services were limited only to the National Capital where it began in 1959.
- After 1972, several other centres became operational.
- In 1976, TV was delinked from All India Radio (AIR) and got a separate identity as Doordarshan (DD).
- After INSAT-IA (National Television-DD1) became operational, Common National Programmes (CNP) was started for the entire network and its services were extended to the backward and remote rural areas.

3. Satellite Communication

- Satellites are mode of communication in themselves as well as they regulate the use of other means of communication.
- However, use of satellite in getting a continuous and synoptic view of larger area has made satellite communication very vital for the country due to the economic and strategic reasons.
- Satellite images can be used for the weather forecast, monitoring of natural calamities, surveillance of border areas, etc.
- On the basis of configuration and purposes, satellite system in India can be grouped into two:
 - Indian National Satellite System (INSAT) and
 - Indian Remote Sensing Satellite System (IRS).
- The INSAT, which was established in 1983, isa multi- purpose satellite system for telecommunication, meteorological observation and for various other data and programmes.
- The IRS satellite system became operational with the launching of IRS-IA in March 1988 from Vaikanour in Russia.
- These satellites collect data in several spectral bands and transmit them to the ground stations for various uses.
- The National Remote Sensing Agency (NRSA) at Hyderabad provides facilities for acquisition of data and its processing. These are very useful in the management of natural resources.

INTERNATIONAL TRADE

- International Trade is mutually beneficial as no country is self-sufficient. I
- India's International trade has undergone a sea change in recent years in terms of volume, composition as well as direction.

- Although India's contribution in the world trade is as low as one per cent of the total volume, yet it plays a significant role in the world economy
- The value of import continued to be higher than that of exports in India.

Changing Patterns of the Composition of India's Import

- India faced serious food shortage during 1950s and 1960s. The major item of import at that time was food grain, capital goods, machinery and equipments.
- The U.S.A. is India's largest trading partner and the most important destination of India's export.
- Other countries in order of significance include the U.K., Belgium, Germany, Japan, Switzerland, Hong Kong, the U.A.E., China, Singapore and Malaysia

Sea Ports as Gate ways of International Trade

- India is surrounded by sea from three sides and is bestowed with a long coastline. Water provides a smooth surface for very cheap transport provided there is no turbulence.
- India has a long tradition of sea faring and developed many ports with place name suffixed with *pattan* meaning port.
- An interesting fact about ports in India is that its west coast has more seaports than its east coast (y?)
- At present, India has 12 major ports and 185 minor or intermediate ports. In case of the major ports, central government decides the policy and plays regulatory functions. The minor ports are therewhose policy and functions are regulated by state governments.

Kandla Port

- Situated at the head of Gulf of Kuchchh has been developed as a major port to cater to the needs of western and north western parts of the country and also to reduce the pressure at Mumbai port.
- The port is specially designed to receive large quantities of petroleum and petroleum products and fertiliser.
- The offshore terminal at Vadinar has been developed to reduce the pressure at Kandla port.

Mumbai

- is a natural harbour and the biggest port of the country.
- The port is situated closer to the general routes from the countries of Middle East, Mediterranean countries, North Africa, North America and Europe where the major share of country's overseas trade is carried out.
- The port is 20 km long and 6-10km wide with 54 berths and has the country's largest oil terminal.
- M.P., Maharashtra, Gujarat, U.P. and parts of Rajasthan constitute the main hinterlands of Mumbai ports.

Jawaharlal Nehru Port

- At Nhava Sheva was developed as a satellite port to relieve the pressure at the Mumbai port.
- It is the largest container port in India.

Marmagao Port

- situated at the entrance of the Zuari estuary, is a natural harbour in Goa.
- It gained significance after its remodelling in 1961 to handle iron-ore exports to Japan. Construction of Konkan railway has considerably extended the hinterland of this port.

- Karnataka, Goa, Southern Maharashtra constitutes its hinterland.

New Mangalore Port

- is located in the state of Karnataka and caters to the needs of the export of iron- ore and iron-concentrates.
- It also handles fertilisers, petroleum products, edible oils, coffee, tea, wood pulp, yarn, granite stone, molasses, etc. Karnataka is the major hinterland for this port.

Kochchi Port

- Situated at the head of Vembanad Kayal, popularly known as the “*Queen of the Arabian Sea,*” is also a natural harbour.
- This port has an advantageous location being close to the Suez-Colombo route. It caters to the needs of Kerala, southern- Karnataka and south western Tamil Nadu.

Kolkata Port

- Is located on the Hugli river, 128 km inland from the Bay of Bengal.
- Like the Mumbai port, this port was also developed by the British. Kolkata had the initial advantage of being the capital of British India.
- Kolkata port is also confronted with the problem of silt accumulation in the Hugli river which provides a link to the sea.
- Its hinterland covers U.P., Bihar, Jharkhand, West Bengal, Sikkim and the north-eastern states. Apart from this, it also extends ports facilities to our neighbouring land-locked countries such as Nepal and Bhutan.

Haldia Port

- It is located 105 km downstream from Kolkata.
- It has been constructed to reduce the congestion at Kolkata port.
- It handles bulk cargo like iron ore, coal, petroleum, petroleum products and fertilisers, jute, jute products, cotton and cotton yarn, etc.

Paradwip Port

- It is situated in the Mahanadi delta, about 100 km from Cuttack.
- It has the deepest harbour specially suited to handle very large vessels. It has been developed mainly to handle large-scale export of iron-ore.
- Orissa, Chhattisgarh and Jharkhand are the parts of its hinterland.

Visakhapatnam Port

- In Andhra Pradesh is a land-locked harbour, connected to the sea by a channel cut through solid rock and sand.

Chennai Port

- It is one of the oldest ports on the eastern coast.
- It is an artificial harbour built in 1859. It is not much suitable for large ships because of the shallow waters near the coast.
- Tamil Nadu and Pondicherry are its hinterland.

Ennore Port

- A newly developed port in Tamil Nadu, has been constructed 25 km north of Chennai to relieve the pressure at Chennai port.

Tuticorin Port

- It was also developed to relieve the pressure of Chennai port. It deals with a variety of cargo including coal, salt, food grains, edible oils, sugar, chemicals and petroleum products

CHAPTER 10

GEOGRAPHICAL PERSPECTIVE ON SELECTED ISSUES AND PROBLEMS

Environmental Pollution

- Environmental pollution results from, the release of substances and energy from waste products of human activities. There are many types of pollution. They are classified on the basis of medium through which pollutants are transported and diffused. Pollution can be classified into (i) air pollution, (ii) water pollution, (iii) land pollution and (iv) noise pollution

Types and Sources of Pollution

Pollution Type	Pollution Involved	Sources of Pollution
Air Pollution	Oxides of sulphur (SO ₂ , SO ₃), Oxides of nitrogen, carbon monoxide, hydro-carbon, ammonia, lead, aldehydes asbestos and beryllium.	Combustion of coal, petrol and diesel, industrial processes, solid waste disposal, sewage disposal, etc.
Water Pollution	Colour, dissolved and suspended solids, ammonia and urea, nitrate and nitrites, fluoride, carbonates, oil and grease, insecticide and pesticide residue, tannin, coliform MPM (bacterial count) sulphates and sulphides, heavy metals e.g. lead, arsenic, mercury, manganese, etc., radioactive substances.	Sewage disposal, urban run-off, toxic effluents from industries, run-off over cultivated lands and nuclear power plants.

Land Pollution	Human and animal excreta viruses and bacteria, garbage and vectors therein, pesticides and fertiliser-residue alkalinity, fluorides, radio-active substances.	Improper human activities, disposal of untreated industrial waste, use of pesticides and fertilisers.
Noise Pollution	High level of noise above tolerance level	Aircrafts, automobiles, trains, industrial processing and

Sources of Pollution in the Ganga and the Yamuna Rivers

River and	Polluted Stretches	Nature of Pollution	Main Polluters
Ganga (Uttar Pradesh) Bihar and West Bengal	Downstream of Kanpur Downstream of Varanasi Farrakka Barrage	Industrial pollution from Kanpur Domestic wastes from urban centres Dumping of carcasses in the	Cities of Kanpur, Allahabad, Varanasi, Patna and Kolkata Urban domestic waste into the river
Yamuna (Delhi) (Uttar Pradesh)	Delhi to confluence with Chambal Mathura and Agra	Extraction of water by Haryana and Uttar Pradesh for irrigation Agricultural run off resulting in high levels of micro-pollutants in the Yamuna Domestic and industrial waste Delhi	Delhi dumping its domestic waste

Urban Waste Disposal

- Environmental pollution by solid wastes has now got significance because of enormous growth in the quantity of wastes generated from various sources.
- These discarded materials are also termed as refuse, garbage and rubbish, etc. and are disposed of from two sources : (i) household or domestic establishments, and (ii) industrial or commercial establishments.
- The household wastes is disposed off either on public lands or on private contractors sites, whereas the solid wastes of industrial units are collected and disposed off through public (municipal) facilities at low lying public grounds (landfill areas).
- Solid wastes cause health hazard through creation of obnoxious smell, and harbouring of flies and rodents, which act as carriers of diseases like typhoid, diphtheria, diarrhoea, malaria and cholera, etc
- The dumping of industrial waste into rivers leads to water pollution. River pollution from city-based industries and untreated sewage leads to serious health problems downstream.
- Urban waste disposal is a serious problem in India. In metropolitan cities like Mumbai, Kolkata, Chennai, Bangalore, etc.

Problems of Slums

- The concept “Urban or Urban Centre” is defined in settlement geography to differentiate it from the “Rural slums”, jhuggi-jhopari” clusters and colonies of shanty structures.
- These are inhabited by those people who were forced to migrate from the rural areas to these urban centres in search of livelihood but could not afford proper housing due to high rent and high costs of land. They occupy environmentally incompatible and degraded areas.
- Slums are residential areas of the least choice, dilapidated houses, poor hygienic conditions, poor ventilation, lack of basic amenities like drinking water, light and toilet facilities, etc. These areas are overcrowded having narrow street pattern prone to serious hazards from fire. Moreover, most of the slum population works in low paid, high risk-prone, unorganised sectors of the urban economy.
- Consequently, they are the under nourished, prone to different types of diseases and illness and can ill afford to give proper education to their children. The poverty makes them vulnerable to drug abuse, alcoholism, crime, vandalism, escapism, apathy and ultimately social exclusion.

Land Degradation

- The pressure on agricultural land increases not only due to the limited availability but also by deterioration of quality of agricultural land.
- Soil erosion, water-logging, salinisation and alkalinisation of land lead to land degradation.
- Land is degraded and productivity declines. Land degradation is generally understood either as a temporary or a permanent decline in productive capacity of the land.
- Though all degraded land may not be wasteland, but unchecked process of degradation may lead to the conversion to wasteland.
- There are two processes that induce land degradation. These are natural and created by human beings.
- National Remote Sensing Agency(NRSA) has classified wastelands by using remote sensing techniques and it is possible to categorise these wastelands according to the processes that have created them.
- There are a few types of wastelands such as gullied /ravine land, desertic or coastal sands, barren rocky areas, steep sloping land, and glacial areas, which are primarily caused by *natural agents*.
- There are other types of degraded lands such as waterlogged and marshy areas, land affected by salinity and alkalinity and land with or without scrub, which have largely been caused by *natural as well as human factors*

Case Study : (optional to study)

A Role Model to Restore the Ecology and Safeguard Human Health in Daurala

- Based on the universal law “Polluter pays”, effort to restore the ecology and safeguard the human health with people’s participation has taken place in Daurala near Meerut.
- These efforts are now bearing fruits after a span of three years when Meerut based NGO had developed a model for ecological restoration. The meeting of the Daurala Industries officials, NGOs, Government officials and other stakeholders at Meerut has brought out results.
- The powerful logics, authentic studies and the pressure of people have brought a new lease of life to the twelve thousand residents of this village. It was in the year 2003 that the pitiable condition of Dauralaites drew the attention of the civil society.
- The groundwater of this village was contaminated with heavy metals. The reason was that the untreated wastewater of Daurala industries was leaching to the groundwater table. The NGO conducted a door to door survey of the health status of the residents and came out with a report.

- The organisation, the village community and people's representatives sat together to find out sustainable solutions to the health problem.
- The industrialists showed a keen interest towards checking the deteriorating ecology.
- The overhead water tank's capacity in the village was enhanced and a 900m extra pipeline was laid to supply potable water to the community.
- The silted pond of the village was cleaned and recharged by desilting it. Large quantity of silt was removed paving way to large quantity of water so that it recharged the aquifers.
- Rainwater harvesting structures have been constructed at different places which has helped in diluting the contaminants of the groundwater after the monsoons. 1000 trees have also been planted which have improved the environment

2nd case study

- Ramesh has been working in contract as a welder on construction site in Talcher (coal region of Orissa) for the last two years. He moved with the contractor to various places like Surat, Mumbai, Gandhi Nagar, Bharuch, Jamnagar and so on.
- He remits Rs. 20,000 per year to his father in his native village. The remittances have been mainly used for daily consumption, health care, schooling of children, etc.
- Part of the money is also used in agriculture, purchasing of land and building of houses, etc. The standard of living of Ramesh's family improved significantly.
- Fifteen years ago, the situation was not the same. The family was passing through very tough times. Three of his brothers and their families had to survive on three acres of land.
- The family was highly in debt. Ramesh had to discontinue his studies after ninth standard.
- He was further hard pressed when he got married. Simultaneously, he was also impressed by some successful out-migrants of his village who had been working in Ludhiana and supporting their families in village by sending money and some consumer goods.
- Thus, due to abject poverty in the family and perceived job promises at Ludhiana, he made a move to Punjab with his friend. He worked there in a woolen factory for six months at the rate of only Rs. 20 per day in 1988.
- Apart from the crisis of managing his personal expenditure from this meagre income, he was also facing difficulty in assimilation to the new culture and environment. Then he decided to change his place of work from Ludhiana to Surat under the guidance of his friend.
- He learnt the skills of welding in Surat and after that he has been moving to different places with the same contractor.
- Though the economic condition of Ramesh's, family at village improved, he is bearing the pain of separation of his near and dear ones. He cannot shift them with him, as the job is temporary and transferable.

Comments

- In developing countries, poor, semi-illiterate and the unskilled like Ramesh migrating from rural areas frequently end up performing menial jobs at low wages in informal sector in urban areas.
- Since wages are very low to support the family at the place of destination, the spouses are left behind in rural areas to look after children and elderly people. Thus, the rural-urban migration stream is

dominated by the males.