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GEOGRAPHY

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**NCERT CONDENSED / SUMMARISED
CLASS 12 PART 1**

FUNDAMENTALS OF HUMAN GEOGRAPHY

**Chapter 1 - Population: Distribution, Density, Growth
and Composition**

Chapter 2 - Migration: Types, Causes and Consequences

Chapter 3 - Human Development

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Chapter 1 - Population: Distribution, Density, Growth and Composition

Distribution of Population

- Distribution of population means how population is distributed in any given area. In India, spatial pattern of population distribution is very uneven. As some areas are sparsely populated whereas others are dense. These states can be categorised into three categories:
 - **State with High Population** Uttar Pradesh (highest population), Maharashtra, Bihar, West Bengal, Madhya Pradesh, Tamil Nadu, Rajasthan, Karnataka, Gujarat and Andhra Pradesh. These states together account for 76% of population.
 - **States with Moderate Population** Assam, Haryana, Jharkhand, Chhattisgarh, Kerala, Punjab, Goa.
 - **States with Low Population** Hilly and tribal areas like Jammu and Kashmir, Uttarakhand, Himachal Pradesh, all North-Eastern state (except Assam) and Union Territories excluding Delhi.

Density of Population

- Population density means number of person living in per unit area. According to 2011 census, in India 382 person live in per sq km of area. Over the last 50 years the population density has recorded an increase of about 260 persons per sq km, as ranging from 117 persons/sq km in 1951 to 382 persons/sq km in 2011.

Spatial Pattern of Population Density in India

- Spatial pattern of population density is also uneven in India. For example:

States/UTs having High Density of population

- States Bihar (1106 highest), West Bengal (1028), Kerala (860), Uttar Pradesh (829), UTs Delhi (11320 highest), Chandigarh (9258).
- **States/UTs having Moderate Density of Population** Haryana (573), Tamil Nadu (555), Punjab (551), Jharkhand (414), Assam (398), Goa (394), Maharashtra (365) Tripura (350). UTs Dadra and Nagar Haveli (700).
- **States/UTs having Low Density of Population**
- States Arunachal Pradesh (17 Lowest), Mizoram (52), Jammu and Kashmir (56), Sikkim (86), Nagaland (119). UTs Andaman and Nicobar islands (46 lowest).

Growth of Population



- Growth of population refers to the changes occurring in the number of persons living in a particular area between two points of time. Its rate is expressed in percentage. Two components in population growth are as follows:
- **Natural Growth** It means the change occurring by the births and deaths in any area.
- **Induced Growth** It means the changes occurred by the volume of inward and outward movement in an area.

Phases of Population Growth

- There are four different phases of population growth:
 - **Phase-I** (1901-1921) It is stagnant or stationary phase because of very low growth rate.
 - **Phase-II** (1921-1951) It is the period of steady population growth.
 - **Phase-III** (1951-1981) This period is known as the period of population explosion in India. Rapid fall in death rate and high fertility rate were the main causes of this explosion.
 - **Phase-IV** (Post 1981 till present) Growth rate has started down gradually because of downward trend in birth rate. But in developing countries like India, growth rate is still high. According to World Development Report by 2025, Indian population will surpass the figure of 1350 million.

Regional Variation in Population Growth

- Spatial pattern of population growth in India is very uneven. It ranges from -0.58% (Negative) in Nagaland to 55.88% in Dadra and Nagar Haveli.

States/UTs having High Growth Rate of Population

- States Meghalaya (27.95%), Arunachal Pradesh (26.03%), Bihar (25.42%), Manipur (24.50%), Jammu and Kashmir (23.64%).
- UTs Dadra and Nagar Haveli (55.88%), Daman and Diu (53.76%), Puducherry (28.08%).

States/UTs having Moderate Growth Rate of Population

- Chhattisgarh (22.61%), Jharkhand (22.42%), Rajasthan (21.31%), Madhya Pradesh (20.35%), Uttar Pradesh (20.23%).
- States/UTs having Low Growth Rate of Population
- States Nagaland (-0.58% lowest), Kerala (4.91%), Goa (8.23%), Andhra Pradesh (10.98%). UTs Lakshadweep (6.30%), Andaman and Nicobar Islands (6.86%).

Growth of Adolescent Population

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- United Nation considers person aged 10-19 year as adolescents population. Since 1971, the proportion of adolescent population has remained around 21%.
- Decadal growth rate of adolescent population of India is 12.5% as per census 2011. India is on 4th place in adolescent population (10-19 years) after Pakistan, Nigeria and Bangladesh.
- Adolescent population has increased from 85 million in 1961 to 253.2 million in 2011. Sex-ratio of adolescent population of India is 898 females per 1000 males.
- Government of India has taken many steps by some policies like, National Youth Policy 2003, for channelisation and proper utilisation of adolescents by giving them proper education.

Population Composition

- It is a detailed analysis of age and sex, place of residence, ethnic characteristics, tribes, language, religion, marital status, literacy and education, occupational characteristics, etc in population geography.

Rural-Urban Composition

- In India, its 68.84% of total population lives in rural villages by 2011. According to census 2011, India has 6,40,867 villages.
- Percentage of rural population is high in Himachal Pradesh (89.97% highest) and Bihar (88.71%) and low in Goa (37.83%) and Mizoram (47.89%). Delhi has the least rural population (2.50%).

Rural Population in Indian States

- States having High Proportion of Rural Population Himachal Pradesh (89.97%) and Bihar (88.71%), Assam (85.90%), Odisha (83.31%).

States having Moderate Proportion of Rural population

- Meghalaya (79.93%), Uttar Pradesh (77.73%), Arunachal Pradesh (77.06%), Chattisgarh (76.76%), Jharkhand (75.95%).
- States having Low Proportion of Rural Population
- States Goa (37.83%), Mizoram (47.89%), Tamil Nadu (51.60%), Kerala (52.30%). UTs Delhi (2.50%), Chandigarh (2.75%).

Urban Population in Indian States

Regions having High Degree of Urbanisation

- States Goa (62.17%), Mizoram (52.11%), Tamil Nadu (48.40%) Kerala (47.70%). UTs Delhi (97.50%), Chandigarh (97.25%), Lakshadweep (78.07%).

Regions having Low Degree of Urbanisation



- Himachal Pradesh (10.03%), Bihar (11.29%), Assam (14.10%), Odisha (16.69%), Meghalaya (20.07%).

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 India. But now, there are 22 scheduled languages and number of non-scheduled languages.

Linguistic Classification

- The speakers of major Indian languages belong to four language families, which have their sub-families and branches or groups.

Family

- Austric (Nishada-1.38%)
- Dravidian (Dravida-20%)
- Sino-Tibetan (Kirata-0.85%)
- Indo-European (Aryan-73%)

Religious Compositions

All India Religion Census Data 2011

Religion	Percentage	Estimated
All Religion	100.00%	121 Crores
Hindu	79.80%	96.62 Crores
Muslim	14.23%	17.22 Crores
Christian	2.30%	2.78 Crores
Sikh	1.72%	2.08 Crores
Buddhist	0.70%	84.43 Lakhs
Jain	0.37%	44.52 Lakhs
Other Religion	0.66%	79.38 Lakhs
Not stated	0.24%	28.67 Lakhs

Composition of Working Population

- Proportion of working population to total population is called work participation rate.
- Population of India according to their economic status is divided into three groups like:
- **Main workers** A person who works atleast 183 days in a year.
- **Marginal workers** A person who works for less than 183 days in a year.
- **Non-workers** A person who does not work and depends upon working class.



- According to 2011 census, it is observed that the proportion of workers (both main and marginal) is only 39.8% leaving a vast majority of about 60% as non-workers.

Occupational categories

- 2011 census has divided the working population of India into four major categories:
 - Cultivators
 - Agricultural labourers – 54.6%
 - Household labourers – 3.8%
 - Other workers – 41.6% (2011)

Chapter 2 - Migration: Types, Causes and Consequences

Migration

- Census of India records population and migration related data of the country.
- Many modifications in data related to migration has been done from the first census in 1881 to 1981 as:

Census Year	Modification in data collection (Migration)
From 1881 to 1961	Place of birth
1961	Place of birth (village, town) and Duration of residence
1971	Place of last residence and duration of stay at the place of enumeration
1981	Reasons for migration

- A person who moves from one place to another in order to find work or better living conditions is known as '**Migrant**'
- There are two types of migrants on the basis of enumeration of census:
 - **Life-Time Migrant** If a person's place of birth is different from the place of census enumeration, then he is known as lifetime migrants. As per census 2001, this group reported 307 million persons (30%) and as per 2011, this group reported 36.7%.
 - **Migrant by place of last residence** If a person's place of last residence is different from the place of enumeration, then he is known as migrant by place of last residence. As per census 2001, this group reported 315 million migrants (31 percent). According to 2011 census, 5.36 crore



migrants (37%) and settled in a place different from their last residence.

Streams or Types of Migration

- In general, there are two types of migration: Internal Migration It refers to the movement of people within a country or nation. This can be intra-state and inter-state migration. There are four streams of migration identified under the internal migration:
 - Rural to Rural (R-R)
 - Rural to Urban (R-U)
 - Urban to Urban (U-U)
 - Urban to Rural (U-R)
- Women migrants are highest in both intra-state and inter-state migration, short distance rural to rural migration stream because of their marriage. Whereas male migrants are highest in rural to urban streams of inter-state migration due to the economic reasons.

International Migration

- It refers to the movement of people out of the country or out of the geopolitical border. India experiences large number of international migration mostly from neighboring countries.
- As per census 2001, there were more than 5 million persons reported from other countries in India.

Out of these 96% came from the neighbouring countries as:

- Bangladesh – 3.0 million
- Pakistan – 0.9 million
- Nepal – 0.5 million

Immigration The action of coming to live permanently in a foreign country. There were 0.16 million refugees from Tibet, Sri Lanka, Bangladesh, Pakistan, Afghanistan, Iran and Myanmar.

Emigration Apart from this immigration, India also experiences huge emigration. Emigration is the act of leaving one's own country to settle permanently in another country. As per census 2001, around 20 million people of Indian diaspora are spread across 110 countries.

Spatial Variation in Migration

- In India, there is an uneven spatial variation in migration in terms of in-migration and out-migration.

States Receiving High Number of In-Migrants



- Maharashtra is the largest migrants receiving state (2.3 million). Besides this, Delhi, Gujarat, Haryana and other urbanised areas attract high number of migrants.

States with High Out-Migrants

- Uttar Pradesh (-2.6 million), Bihar (-1.7 million) and some other backward states have largest number of net out. Urban agglomerations are largely expanding because of high Intra-state immigration. For e.g.
- Greater Mumbai received the highest number of in-migrants.

Causes of Migration

- The reasons/causes of migration can be put under two categories:

Push Factors These are factors which urges people to leave their place of residence or origin. Some of them are as follows:

- Natural disaster like flood, drought, cyclonic storms, earthquake, tsunami, etc.
- Political/Local conflicts like-war, riots.
- Poverty, lack of employment opportunities.
- High population pressure on land.
- Lack of basic infrastructural facilities like health care, education, etc.

Pull Factors These refers to factors which attract the people from different places. Some of them are as follows:

- Better opportunities for education.
- Better health facilities.
- Source of entertainment.
- According to an estimation, about 38% males migrate for work and employment whereas only 3% female migrate for the same reason. (But according to census 2011 there is a downfall of 4.2% as compared to 2001 census).
- About 65% (69.7% according to 2011 census) of women migrate because of marriage, whereas only 2% males migrate ! for the same reason.

This migration of males (marriage) is higher in Meghalaya.

Consequences of Migration

- Migration is a consequence of the uneven - distribution of opportunities over space. People : tends to move from place of low opportunity and low safety to the place of higher opportunity and ; better safety. Results can be observed in i economic, social, cultural, political and, demographic terms.

Economic Consequences

These consequences are positive as well as negative:



- **Positive** Remittances are important for economy of a country. As migrants sent remittances to their family members for food, repayment of loans/debts, treatment, marriages, children's education, agricultural inputs, construction of houses, etc.
- Green Revolution in the rural areas of Punjab, Haryana, Western Uttar Pradesh was a success because of the migrants from rural areas of ' Eastern Uttar Pradesh, Bihar, Madhya Pradesh and Odisha.
- **Negative** Over crowding due to unregulated migration. Development of unhygienic slums in industrially developed states like Maharashtra, Gujarat, Karnataka, Tamil Nadu and Delhi.

Demographic consequences

These consequences can be both positive or negative:

- **Positive** Redistributing of population within a country. The process of urbanisation is dependent on rural-urban migration.
- **Negative** Imbalance in demographic structure. Age and skill selective out migration created an imbalance in demographic structure of rural areas. Age and sex-composition is seriously affected in states of Uttarakhand, Rajasthan, Madhya Pradesh and Eastern Maharashtra due to migration. The same situation happens in the recipient states.

Social consequences

These consequences are both positive as well as negative:

- **Positive** Migrants work as an agent of social change. They diffuse new ideas of science and technology, family planning, girls education, etc from one place to another place. People also bring different cultures with them which help to break the narrow considerations and broaden up the mental horizon of the people.
- **Negative** Anonymity increases and creates social vacuum and feeling of ejection. This feeling ultimately results in anti-social activities such as crime, drug abuse, theft, etc.

Environmental consequences

- **Negative** Large scale rural-urban migration leads to overcrowding in the cities and puts tremendous pressure on the infrastructure. It also results in unplanned and haphazard growth of cities in which slums and shanty colonies are very common. Overcrowding is also related to over-exploitation of natural resources and cities are facing serious problems of



water shortage, air and water pollution, problem of sewage disposal and management of solid wastes.

Other consequences

- When male migrants leave their wives in rural areas, this puts extra physical and mental pressure on women.
- Migration of women for education and employment gives them more freedom, on the other hand it also adds to their vulnerability

Chapter 3 - Human Development

Development in India

- India has mixed experience of development. The distribution of available opportunities is uneven. A small section of population enjoys all the available modern facilities. On the other hand, the marginalised sections include scheduled castes, scheduled tribes, landless agricultural labourers, poor farmers, slum dwellers and others, which do not have basic amenities even potable water, education, and health facilities.
- Among all sections, women are the most marginalised. With the increasing developmental activities, these marginalised sections are becoming even more marginalised and hence are forced to live under abject poverty and sub-human conditions.
- There is another inter-related aspect of development that has direct role in making human life uncomfortable and cause environmental pollution, e.g. air, water, soil and noise pollutions. These are leading to the tragedy of commons and threatening the existence of human society. Consequently, the poor are being subjected to three inter-related processes of declining capabilities, they are:
 - **Social Capabilities** due to displacement and weakening social ties
 - **Environmental Capabilities** due to increasing in pollution.
 - **Personal Capabilities** due to increasing incidence of diseases and accidents.
- Thus, in turn, this has adverse effects on their quality of life and human development.

Human Development

- After seeing the inability of the western or euro-centric view of development to handle the existing issues, the concept of



human development is brought against this concept. It is considered as a solution to all the existing problems.

- Thus, human development is a process of widening and providing more choices to people, providing them more opportunities for education, health care, empowerment, income and covering all the choices from a healthy physical environment to economic, social and political freedom.
- First systematic effort in enhancing the human development was made by United Nations Development Programme (UNDP) by publishing the first Human Development Report in 1990. Now, it is regularly published. UNDP is responsible for making and amending the indicators to decide the human development of a country. It gives ranks to all member countries, on the basis of calculated scores by using indicators and publish them in the report.

Human Development in India

- According to Human Development Report (HDR) of 2011, India ranks 134th with the composite HDI value of 0.547 (medium human development) among 172 member countries of the world. There are many socio-cultural and historical factors which are responsible for the low score condition of human development in India. These are:
 - **Historical factors** These include colonisation, imperialism and neo-imperialism.
 - **Socio-Cultural factors** These include violation of human rights, social discriminations like race, religion, gender and caste based discriminations, social problems of crimes, terrorism and war.
 - **Political factors** These include political stability and nature of state, forms of government, level of empowerment, etc.
- Planning Commission of India also prepares the Human Development Report (HDR) for India and takes the states and Union Territories as units for analysis. Further, the states take districts as their units of analysis.
- Planning Commission in its Human Development Report takes the given indicators selected by UNDP along with other indicators like economic attainment, social empowerment, social distributive justice, accessibility of opportunities, hygiene and welfare policies made by the states.

Indicators of Economic Attainment



- Economic productivity forms an integral part of human development, thus. Gross National Product (GNP) and per capita availability are taken as measures to assess the resources base/endowment of any country.
- On one side India's GDP at current prices (₹ 3200 thousand crores) and its per capita income (₹ 20813) are showing an impressive development in India in terms of resource base.
- But on the other side, the existence of poverty deprivation, malnutrition, illiteracy and different prejudices like caste, religion and gender discrimination are showing a different face of economic achievements.

Variation in Per Capita Income

The spatial pattern of per capita income is uneven.

- **States having high per capita income** (More than ₹ 4000 per year at 1980-81 prices) Maharashtra, Punjab, Haryana, Gujarat and Delhi.
- **States having low per capita income** (Less than ₹ 2000 per year) Uttar Pradesh, Bihar, Odisha, Madhya Pradesh, Assam, Jammu and Kashmir, etc.

Variation in Per Capita consumption

- There are large regional disparities in terms of per capita consumption.
- Developed states having high per capita consumption (more than ₹ 690 per month) are Kerala, Punjab, Haryana, Maharashtra, Gujarat, etc.
- Poor states having low per capita consumption (less than ₹ 520 per month) are Uttar Pradesh, Bihar, Odisha and Madhya Pradesh, etc.
- These variations in both per capita income and consumption are showing some serious problems like poverty, unemployment and under-employment.

Poverty

- Poverty is a state of deprivation. In absolute terms, it reflects the inability of an individual to satisfy certain basic needs for a sustained healthy and reasonably productive living.
- In India, poverty varies among different states. Bihar and Odisha (population living below poverty line) recorded more than 40% poverty, while Madhya Pradesh, Sikkim, Assam, Tripura, Arunachal Pradesh, Meghalaya and Nagaland recorded more than 30% of poverty. Union Territories record poverty less than 30% are Chandigarh, Daman and Diu and Delhi.



- Employment rate for educated youth is only 25%. Jobless growth and rampant unemployment are some of the major causes responsible for poverty in India.

Indicators of Healthy Life

Healthy and long life is important for everyone and it is measured by availability of adequate health facilities to decrease infant deaths, post delivery deaths of mothers, old age health care, proper nutrition and safety of people. The Health indicators are:

- **Mortality rate** India has been successful in declining mortality rate from 25.1 per thousand in 1951 to 8.1 per thousand in 1999. Infant mortality rate is also declined from 148 per thousand in 1951 to 70 per thousand in 1999.
- **Average life expectancy rate** It is increased from 37.1 years to 62.3 years for males, 36.2 to 65.3 for females during 1951-1999.
- **Birth rate** India has also brought down its birth rate from 40.8 in 1951 to 26.1 in 1999. But it is still higher as compared to developed countries.
- **Sex-ratio** Sex-ratio in India is declining after every decade. According to 2001 census, the findings are very disturbing particularly in case of child sex ratio between 0-6 age group. Except Kerala (highest sex-ratio), all the states have the declining trend in child-sex ratio. For example, Haryana and Punjab have the child sex ratio below 800 female children on per thousand male children (according to 2011 census, child sex ratio decline against 2001 from 927 to 919).

Indicators of social Empowerment

- Freedom from hunger, poverty servitude, bondage, ignorance, illiteracy and other forms of domination is the key to human development.
- Empowerment and participation of the people by using their capabilities and choices in the society, leads to actual freedom.
- People can use their capabilities and choices by understanding the society and environment. This can happen through literacy as it opens the door of a world of knowledge and freedom.

literacy in India

- According to 2001 census, India's literacy is about 65.4%, while its female literacy is 54.16% (according to 2011, 74.04% is total literacy rate, of these 82.14% and 65.46% are males and females respectively).

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- Percentage of total literacy and female literacy are higher than the national average in most of the southern states.
- Literacy rate is low in Bihar (47.53%) and high in Kerala (90.92%). It shows a large regional disparities in context of literacy in India.
- Literacy rate is low in rural areas, in some marginalised sections of our society like females, schedule castes, schedule tribes, agricultural labourers, etc. In spite of having some improved condition in literacy rate in these section, there is still a wide gap between the rich and the marginalised sections.

Human Development Index in India

Human Development Report in India is prepared annually by the Institute of Applied Manpower Research in the supervision of Planning Commission by taking states and Union Territories as the unit of study. States with high HDI value are Kerala (highest HDI among Indian states i.e. 0.92), Delhi, Himachal Pradesh, Goa and Punjab, whereas Chhattisgarh, Odisha and Bihar (Lowest HDI among Indian States with 0.41) recorded as lowest HDI value.

Reasons for High and Low HDI Value

- There are several reasons for having high and low HDI value include socio-political, economic or historical reasons. They are:
- Higher number of literates is the main reason for Kerala having high HDI value. On the other hand, Bihar, Odisha, Madhya Pradesh, Assam and Uttar Pradesh have low composite value of HDI because of their lowest literacy rate.
- Economic development also has very important role in HDI. Economically developed states like Maharashtra, Tamil Nadu, and Punjab have higher value of HDI as compared to states like Chhattisgarh, Bihar, Madhya Pradesh.
- Historical reasons are also responsible for having high or low human development, e.g. regional imbalances and social disparities which emerged under the British period are still crucial in determining the level of development because they are still affecting the political, economical and social system in India. Despite of having planned development by the government, the most important goals are still far away from the ideal level.

Population, Environment and Development

- Development is important because it improves quality of life, but simultaneously brought many problems like regional



disparities, social inequalities, discriminations, deprivations, displacement of people, violation of human rights and declining human values and environmental degradation.

- **UNDP in its Human Development Report** of 1993 tried to amend these issues and found an important role of civil societies in bringing about peace and human development. These civil societies can help by building up opinion for reduction in military expenditure, demobilisation of armed forces, transition from defense to production of basic goods and services and reduction in the nuclear weapons in developed countries.
- View of these approaches are presented by **Neomalthusians**, environmentalists and Radical ecologists. These thinkers argued to maintain a balance between population and resources before starting any developmental activity. Sir Robert Malthus was the first scholar who drew the attention towards the imbalance between population and resources. Along with the problem of the scarcity of resources and growing population, there was another problem of unevenly distributed resources over the space and their accessibility only by few rich countries and people. So there were conflicts between rich and poor countries for these unevenly distributed resources.
- Along with Malthus, Mahatama Gandhi was also a supporter of balance and harmony between population and resources. According to him, industrialisation has institutionalised the loss of morality, spirituality, self-reliance, non-violence and mutual co-operation and environment. Further, Gandhiji says that, higher goals in the life of a person or by a nation can be achieved through the austerity for individual, trusteeship of social wealth and non-violence.

Chapter 4 - Human Settlements

Rural Settlements

- They are mainly smaller in size and poorly spaced. The people of these settlements are mainly engaged in primary activities like, agriculture, fishing, mining, etc, e.g. people surviving in hamlets and villages.

Factors Determining the Rural Settlements

- There are various factors and conditions responsible for having different types of rural settlements in India. These are:



- **Physical Features** These include nature of terrain, altitude, climate and availability of water.
- **Cultural and Ethnic Factors** These include social structure, caste and religion.
- **Security Factors** These include defence against thefts and robberies.

Types of Rural Settlements

- Types of the rural settlements are determined by the above determinants as well as by the extent of the built up area and inter-house distance. In India, Rural settlements can broadly divided into four types:
 - Clustered, agglomerated or nucleated
 - Semi-clustered or fragmented
 - Hamleted, and
 - Dispersed or isolated

Clustered Settlements

- The houses in this settlement are closely spaced or have no space between houses.
- The living place is distinct and separated from the surrounding farms, bams and pastures.
- The settlement sometimes present distinct patterns or geometrical shapes like rectangular, radial, linear, etc which are recognisable in fertile alluvial plains and North-Eastern states.
- This type of settlement is built due to various reasons, e.g. in Bundelkhand and Nagaland, people live in these settlements for defence and security purposes, in Rajasthan these settlements are built around/ near water resources due to water scarcity.

Semi-Clustered Settlements

- This type of settlement develops by the concentration of houses in a restricted area of a dispersed settlement or develop due to segregation or fragmentation of a large compact village.
- Here, a dominant community captures the most important part in main village and force other communities to live away. For e.g. plains of Gujarat and Rajasthan.

Hamleted Settlement

- This type of settlement is formed due to social or ethnic factors and thus known for different identity and name, like, panna, para, nagla, dhani etc.
- Each hamlet is a unit and has a number of houses.



- Several units of hamlets collectively form a village. For e.g. middle and lower Ganga plain, Chhattisgarh and lower valleys of Himalayas.

Dispersed Settlements

- Isolated huts or hamlets of few huts in remote jungles or on small hills with farms or pastures are characteristics of dispersed type of settlement.
- These houses may be of temporary use. It is found in Meghalaya, Uttaranchal, Himachal Pradesh, Kerala, etc.

Urban Settlements

- Unlike rural settlement, urban settlement are usually more dense, compact and larger in size.
- Here, people are mostly engaged in non-agricultural activities i.e. industries, services, administrative functions, etc.
- Cities and towns both are connected directly or indirectly with villages and also with each other and exchange goods, services and also commute.

Evolution of Towns in India

- The evolution of towns started in India from prehistoric times, e.g. Harappa, Mohenjodaro towns, European colonies of modern period, etc.
- Indian towns may be classified into three groups on the basis of their evolution in different periods:

Ancient Towns

- These towns were developed over 2000 years ago by the various kings as religious and cultural centres, e.g. Varanasi, Prayag (Allahabad), Pataliputra (Patna), Madurai, etc.

Medieval Towns

- These towns were developed as headquarters of principalities and kingdoms by medieval kings and Sultans of India.
- These towns are about 100 in numbers and were generally fort towns which came up on the ruins of ancient towns.
- For example, Delhi, Hyderabad, Jaipur, Lucknow, Agra and Nagpur.

Modern Towns

- These towns were developed by the Britishers and other Europeans in India. These are further divided into the following groups:
- Port Towns These are located on the coastal areas of India i.e. Surat, Daman, Goa, Puducherry, etc.



- **Administrative Towns** These were developed for the administrative purposes, e.g. Mumbai (Bombay), Chennai (Madras) and Kolkata (Calcutta).
- **Industrial Towns** After 1850, these towns were developed like Jamshedpur.
- **Some other Towns of European Styles** These towns include hill stations for summer resorts, military towns and small towns for administrative purposes.

Towns after Independence

- After Independence, some towns were also developed like:
- **Administrative Headquarters or Capital of States** These towns include Chandigarh, Bhubaneswar, Gandhinagar and Dispur etc.
- **Industrial Towns/Centres** These towns include Durgapur, Bhilai, Sindri, Barani, etc.
- **Satellite Towns** These were old towns which developed around metropolitan cities such as Ghaziabad, Rohtak, Gurgaon (Gurugram), etc.
- **Medium and Small towns** These are developed due to increasing investment in rural areas.

Urbanisation in India

- Urbanisation is the transition of rural population into urban population.
- It is measured by the percentage of urban population into total population. In India, the level of urbanisation is very low, as it was just 28% in 2001.
- Developed countries have a higher level of urbanisation than India.
- Although, urbanisation in India is increasing with high rate, as it increased 11 times during twentieth century, but this process is comparatively slow during recent two decades.

Classification of Towns on the Basis of Population Size

- Census of India is responsible for defining and classifying urban areas in India. Cities and urban areas are classified into six classes by census of India.
- Urban areas use their population size as base. Thus, an urban Area that have population of more than one lakh is considered as city or class I town.
- **Cities** that have population more than one million but less than 5 million are considered as metropolitan or metro city. Cities that have population more than 5 million are considered as 'megacities' or 'megalopolis'.



The six classes of towns are given below

Class	Population	Number
Class I	100000 and more	423
Class II	50,000-99999	498
Class III	20000 - 49999	1386
Class IV	10000 - 9999	1560
Class V	5000 - 9999	1057
Class VI	Less than 5000	227

(India-Classwise Number of Towns and Cities 2001)

- Apart from these cities, there is also a concept of urban agglomeration in India. According to census of India, an urban agglomeration may have to fulfil anyone of the following conditions:
 - A town and its adjoining urban out growths.
 - Two or more contiguous towns with or without their outgrowths.
 - A city and one or more adjoining towns with their outgrowths together forming a contiguous spread.
- Examples of these outgrowth may be in the form of railway colonies, university campus, part area, military cantonment, etc.
- According to the given table, class IV cities are highest in number but larger proportion of urban population lives in class I cities (61.48%).
- Besides these towns, India has 423 cities. Among them, 35 cities or urban agglomeration are metropolitan cities. Six of them are mega cities with population over 5 million each.
- For e.g.. Greater Mumbai being the largest urban agglomeration with 16.4 million population, followed by Kolkata, Delhi, Chennai, Bengaluru, and Hyderabad.

Functional Classification of Towns

- Apart from population size, Indian towns and cities can be classified into the following heads on the basis of their functions (dominant economic activity):

Administrative towns and cities

- These towns work as headquarter for surrounding region. Government offices and departments, etc are mainly concentrated in these cities. For e.g. Chandigarh, New Delhi, Bhopal, Shilong, Guwahati, Imphal, Srinagar, Gandhinagar, Jaipur and Chennai, etc.



- **Industrial Towns** These towns/ cities mainly dominated by industries. For e.g. Jamshedpur, Bhilai, Durgapur, Madurai, Mumbai, etc.
- **Transport Cities** Transportation is the main function of these cities. Port towns are examples of these towns that are always busy in transporting commodities to other cities. For e.g. Kandla, Kochchi, Kozhikode, Visakhapatnam, etc. There are some cities which are hubs of inland transport such as Agra, Dhulia, Mughal Sarai, Itarsi, Katni, etc.
- **Commercial Towns** The important functions of these towns are trade and commerce. For e.g. Kolkata, Saharanpur, Satna, etc.
- **Mining Towns** These towns have developed in mineral rich areas. For e.g. Raniganj, Jharia, Digboi, Ankaleshwar, Singrauli, etc.
- **Garrison Cantonment Towns** These towns are meant for the army or defence purpose. For e.g. Ambala, Jalandhar, Mhow, Babina, Udhampur, etc.
- **Educational Towns** Initially these towns were important education centres, but later they emerged as major campus towns. For e.g. Roorkee, Varanasi, Aligarh, Pilani, Allahabad, etc.
- **Religious and Cultural Towns** These towns are famous for pilgrimage, religious worship or old cultures. For e.g. Varanasi, Mathura, Amritsar, Madurai, Pune, Ajmer, Tirupati, Kurukshetra, Haridwar, Ujjain, etc.
- **Tourists Towns** These towns are famous for attracting wide range of tourists from India and all over the world. For e.g. Nainital, Mussoorie, Shimla, Pachmarhi, Jodhpur, Jaisalmer, Udagamandalam (Ooty), Mount Abu, etc.
- Functions of these cities are not fix and change with the time as cities are dynamic in nature. With increase in population, cities become metropolis and multi-functional i.e. industry, business, administration, transport, etc. Thus, classification of these cities on the basis of specialised function is impossible as all the functions are interlinked.

Chapter 5 - Land Resources and Agriculture

Land use Categories

- Land revenue department is responsible for categorising land and maintaining its records. These records contains reporting area.



- Under the land revenue records land use categories are as follows:
 1. Forest
 2. Land put to non-agricultural uses.
 3. Barren and Wastelands.
 4. Area under permanent pastures and grazing lands.
 5. Area under miscellaneous tree crops and groves.
 6. Culturable wastelands
 7. Current fallow
 8. Net sown area

Land use Changes in India

- Unlike other natural resources, land is fixed, it does not change by size or area. Economic activities are the major causes that affect land use. The three main economic changes that changes the land use are:
 1. The size of the economy.
 2. The composition of an economy (proportion of different sectors).
 3. Increasing pressure on agricultural lands.
- During the period of 1960-61 to 2008-09 some land use changes are worth mentioning which show an increase and decrease in these categories:
 - **Area Records Increase in Land use**
 - Area under forest.
 - Current fallow lands.
 - Area under non-agricultural use.
 - Net sown area.
 - **Area Records Decrease in Land use**
 - Barren and wasteland.
 - Culturable wasteland
 - Area under permanent pastures and tree crops.
 - Fallow other than current fallow.
- On the basis of ownership land can be classified into two categories:
 - Private land Owned by individual or group of individuals.
 - Common Property Resources (CPRs) Available for all and can be used by any person. It provides fodder for the livestock and fuel for the households. In rural areas, such land is of particular relevance for livelihood of the landless and marginal farmers.

Agricultural Land Use in India



- Most of the Indians are dependent on agriculture, directly or indirectly for their subsistence. Agriculture is mainly Land-based activity unlike secondary and tertiary sectors. The role of quality of land is important in agriculture. The more the land is fertile the more it gives output/production. Ownership of land resource is considered as a social status in rural areas. It is also seen as security for credit, natural hazards or life contingencies. Availability of total resources for agricultural uses is calculated by adding up net sown area, all fallow lands and culturable wastelands.
- Cropping Intensity (CI) is calculated as follows:
- Cropping Intensity in percentage = $\frac{\text{GCA (Gross Cropped Area)}}{\text{NSA (Net Sown Area)}} \times 100$

Cropping seasons in India

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	Rice, maize, ragi, groundnut, jowar
Zaid: April-June	Vegetables, fruits, fodder	Rice, vegetables, fodder

Types of Farming

- In India farming is classified on the basis of moisture available for crops:
 - **Irrigated Farming** The main source of moisture for this farming is irrigation by various methods i.e. wells, tubewells, etc. Two types are protective and productive farming.
 - **Rainfed Farming** (Barani) The main source of moisture for this farming is rainfall. Two types are dryland farming and wetland farming.
- Dryland farming is largely confined to the regions having rainfall less than 75 cm. These regions grows hardy and drought resistant crops such as ragi, bajra, moong, gram and gaur. On the other hand 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 sugercane.

Cropping Pattern

Food grains



- Foodgrains are important for agriculture economy which constitute about two-third of total cropped area in the country. The foodgrains are classified on the basis of structure of grains:

Cereals

- India ranks 3rd in the production of cereals after China and USA. India produces 11% of the world and covers about 54% of the total cropped area in India. These cereals are:
 - **Rice** It is the most important food crop of India which feeds more than half of our population. India ranked second with the production nearly 22% after China in the world. States like West Bengal, Punjab and Uttar Pradesh were major rice producing states in India. In North-Western and in Himalayas regions, it is grown as a Kharif crop, whereas in West Bengal, farmers grow three crops of rice called 'aus', 'aman' and 'boro'.
 - **Wheat** India share 12% of total wheat production of the world. It is cultivated on about 14% of the total cropped area. About 85% of this area comes under the Indo-Gangetic Plain, Malwa Plateau and Himalayas in North and central parts of the country. The major wheat producing states of India are Uttar Pradesh, Punjab, Haryana, Rajasthan, and Madhya Pradesh, Bihar and Jammu and Kashmir.

Coarse Grains

These crops are grown in almost 16.50% of total cropped area in the country. These coarse grains are:

- **Jowar/Sorghum** It is grown in about 5.3% of total cropped area. Maharashtra is the largest producer of Jowar in India. The major producer of Jowar are central and Southern states i.e. Karnataka, Madhya Pradesh and Andhra Pradesh.
- **Bajra** It is grown in about 5.2% of the total cropped area in the country. The major producers of bajra are Maharashtra, Gujarat, Uttar Pradesh, Rajasthan and Haryana.
- **Maize** It is grown in about 3.6% of total cropped area in the country. There is no particular region under maize. It is sown all over India except Eastern and North Eastern regions. The leading producers are Madhya Pradesh, Andhra Pradesh, Telangana, Karnataka, Rajasthan and Uttar Pradesh.
- **Pulses** Pulses are grown in India on about 11% of the total cropped area. India is one of the largest producers of pulses, as it cultivates about 20% pulses of the world. Pulses are



legume crops. These are largely confined to the drylands of Deccan and Central plateaus and NorthWestern parts of the country.

- **Gram** It is grown in 2.8% of the total cropped area. The major producers are Madhya Pradesh, Uttar Pradesh, Maharashtra, Andhra Pradesh and Rajasthan.
- **Tur (Arhar)** This is grown in 2% of the total cropped area of India. It is the second important pulse crop in the country. Maharashtra is the leading producer of tur which produces about 75% of tur in India. It is also called as red gram or pigeon pea.
- **Oil seeds** Oil seeds are produced for extracting edible oils. Oil seeds include groundnut, (3.6%), rapeseed and mustard (2.5%), soybean, sunflower, etc. These different oilseeds are grown in India about 14% of total cropped area in the country.
- Drylands of Malwa Plateau, Maharashtra, Gujarat, Rajasthan, Telangana and Rayalseema of Andhra Pradesh and Karnataka plateau are leading producers of oilseeds. Soybean and sunflower are other important oil seeds grown in India.

Fibre Crops

Fibre crops are one which provides fibre for preparing cloth. These includes:

- **Cotton** India grows both short staple (Indian) cotton as well as long staple (American) cotton. India produces about 8.3% of the world's cotton. This makes India the fourth largest producer of cotton after China, USA and Pakistan. Largest producers of cotton in India are Maharashtra, Gujarat, Andhra Pradesh, Punjab and Haryana.
- **Jute** India accounts for about 60% of the world's jute production. West Bengal (75%) is the largest producer of jute in the country. Other producers are Bihar and Assam.

Other Crops

- **Sugarcane** It is an important cash crop in India. India's sugarcane production is about 23% of the world's total production, which makes India the 2nd largest producer after Brazil. Major producers are Uttar Pradesh, Maharashtra, and Gujarat. Uttar Pradesh accounts 40 percent of sugarcane production and secures a position of the largest producer of India.
- **Tea** Assam (53.2%) is the largest producer of tea in India. Other states are West Bengal and Tamil Nadu.

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- Coffee India is the 7th largest producer of coffee in the world which accounts about 3.2% share. Karnataka is the largest producer of coffee that produces more than 66% of India's total coffee.

Agricultural Development in India

- About 54.6% of population is engaged in agricultural activity. According to census (2011) and about 57% of its land is used for cultivation of various crops in India whereas world average is only about 12%.
- The land-human ratio in India is only 0.31 hectare whereas, the world is almost double of this figure i.e. 0.59 hectare.

Strategy of Development

- Before Independence, Indian agriculture was largely subsistence in nature, this period was frequently witnessed severe droughts, famines and food shortage. About 1/3rd of the irrigated area went to Pakistan. Consequently, Government took several steps to increase the production of food grains. Following three strategies were adopted to achieve this goal:
 - Switching over from cash crops to food crops.
 - Intensification of cropping over already cultivated land.
 - Increasing cultivated area by bringing cultivable and fallow land under plough.
- However, Indian agriculture could not progress much, then Government introduced modern technology into agriculture. These were:
 - High Yielding Variety (HYV) of seeds
 - Fertilisers
 - Mechanisation
 - Improved irrigation and credit marketing facilities.
 - Intensive Area Development Programme
- All the above inputs were the main components of what is known as Green Revolution. This strategy of agricultural development in the country made the country self-reliant in foodgrain production. But, green revolution was initially confined to irrigated areas only. This led to regional disparities in agricultural development in the country till the seventies. Consequently, Planning Commission prepared plans to solve the problems of agriculture in rainfed areas in 1980s. It initiated agroclimate planning in 1988 to induce regional balance.



Growth of Agricultural Output and Technology

- Since independence, there has been improvement in technologies used for agricultural production. As a result, increase in agricultural production has been recorded.
- India is now became 1st largest producer of pulses and jute and 2nd largest in rice, wheat, groundnut, sugarcane and vegetables.
- New technologies also came up to increase the production of food grains, for e.g. HYV seeds, chemical fertilisers raised 15 folds since mid 1960s.

Problems of Indian Agriculture These problems are:

- **Dependence on Erratic Monsoon** There is only 33% cultivated area is under irrigation. The nature of South-West monsoon is very fluctuating which causes flood and drought situation in India.
- **Low Productivity India** also lag behind in terms of per hectare production and per person production and also behind at International level. This low productivity is a result of high population which creates a heavy pressure on available land resources.
- **Constraints of Financial Resources and Indebtedness** Lack of money and financial resources are the major constraints to the development of agriculture in India. As majority of farmers are small, marginal and poor, they cannot afford highly expensive inputs to increase their production.
- **Lack of Land Reforms** Lack of land reforms and unequal distribution of land resources led to the worst condition of poor and marginal farmers and also become constraint in the development of agriculture in India.
- **Small Farm Size and Fragmentation** of Landholdings 'Inheritance law' is mainly responsible for small and fragmented farm size.
- **Lack of Commercialisation** As most of the farmers are poor and marginal, farmers practice subsistence agriculture for their living.
- **Vast Under-employment** There is seasonal unemployment in agricultural sector. There is no income during ploughing field to harvesting crops.
- **Degradation of Cultivable Land** After green revolution degradation has started in India. Excessive use of irrigation, chemical fertilizers, etc created problems of water lodging and solemnization. Fertility of land is also decreasing day by day.



Chapter 6 - Water Resources

Water Resources of India

- India contributes about 2.45% world's geographical area, the 4% of the world's water resources and about 16% of world population.
- India receives water from annual precipitation i.e. 4000 cubic km, and surface and groundwater sources i.e. 1869 cubic km. But only 60% (1122 cubic km) from these two sources of water are beneficial and usable.

Surface Water Resources

- River, lakes, ponds and tanks are four main sources of surface water resources in India.
- About 10,360 number of river and tributaries existed here and each tributary is more than
- 1.6 km long.
- The mean annual flow in all the river basin in India is estimated to be 1,869 cubic km. But only about 690 cubic km or 32% of these water can be utilised due to topographical, hydrological and other constraints.
- Size of catchment area/river basin and rainfall in its catchment area control the flow of water in a river. Water availability in rivers is more during monsoon than other seasons in India.
- In India, Ganga, Brahmaputra and Indus have large catchment area. Catchment areas of
- Ganga and Brahmaputra and Barak rivers fall into the high rainfall receiving area thus, have 60% of total water resources and have only 33% of the surface areas in India, but most of the water is not utilised.
- On the other hand, in the Peninsular rivers like Godavari, Krishna, Kaveri, etc mean annual flow of water is less, but much of their water resources has been utilised.

Groundwater Resources

- There is about 432 cubic km of total replenishable ground water resources available in India. Ganga and Brahmaputra basins have about 46% of the total replenishable groundwater resources.
- The level of groundwater utilisation is relatively high in the river basins of North-Western parts and Southern parts of India.



- States having very high utilisation of groundwater are Punjab, Haryana, Rajasthan and Tamil Nadu.
- States having moderate utilisation ground water are Gujarat, Uttar Pradesh, Bihar, Tripura and Maharashtra.
- States having low Utilisation of groundwater are Chhattisgarh, Odisha, Kerala, etc.
- It is assumed that if the utilisation of water continue with the present rate, there are chances that it will limit the development and create a situation of social upheaval disruptions.

Lagoons and Backwaters

- Some states of India have indented coastline and thus a number of lagoons and lakes have formed. Examples of such states are Kerala, Odisha, and West Bengal.
- Due to brackish water-bodies, these water resources are used for fishing and irrigating certain varieties of paddy crops, coconut, etc.

Water Demand and Utilisation

- Agriculture, being an important part of Indian economy, alone uses about 89% of surface water and 92% of groundwater.
- Most of the developmental projects, river valley projects like the Bhakra-Nangal, Hirakund, Damodar Valley, Nagaijuna Sagar, Indira Gandhi Canal project, etc as well as five year plans were started to provide water to agricultural sector and increase agricultural production.
- Besides this, utilisation of surface and groundwater for domestic purposes are 90% and 3% and for industrial sector are 2% and 5%, respectively.

Demand of Water for Irrigation

- Need for irrigation is very high in India due to the spatial and temporal variation of rainfall.
- As winter and summer season are more or less dry in most parts of India. So, without irrigation agriculture cannot be practised in these parts.
- Some crops like rice, sugarcane, jute and other are water intensive and require more water to grow.
- Irrigation helps to grow multiple crops, gives more agricultural productivity, and along with HYV seeds gives more yield at fast rate. For e.g. Punjab Haryana and Western Uttar Pradesh which have more than 85% of net source area under irrigation.



- Total net irrigated area in Punjab under wells and tube wells is 76.1% whereas it is 51.3% in Haryana. These states utilise a large share of their groundwater resources and thus, it is the major cause behind the depletion of these resources.
- Besides these in Rajasthan and Bihar, the concentration of flouride in groundwater is also increasing due to over withdrawal of this resource. Whereas in West Bengal and Bihar, the concentration of arsenic has been increased because of the same reason.

Emerging Water Problems

- Rapid growth in population and pollution from various sources like industries, agriculture, and domestic sources are the major problems which are responsible for declining the availability of potable water.
- The per capita availability of water in India is also decreasing day by day.

Deterioration of Water Quality

- Water quality means water free from unwanted foreign substances that make water polluted i.e. micro-organisms, chemicals, industrial and other wastes.
- These toxic substances are responsible for water pollution by dissolving or suspended in lakes, streams, rivers and oceans.
- Sometimes, such pollutants seep down and pollute groundwater. The most polluted rivers in India are Ganga and Yamuna.

Water Conservation and Management

- The conservation and management of water become necessary after decreasing the availability of fresh water and increasing its demand by increasing population.
- For Sustainable development and maintaining the quality of life the government should encourage people to adopt watershed development, rainwater harvesting, recycling and reuse of water, conjunctive use of water for availability of quality water for long time.

Prevention of Water Pollution

- Availability of water resources are shrinking with a faster rate. It is seen that hilly areas have less dense population and thus, have high quality of water in their rivers. Whereas plains have dense population and thus have low quality of water in their rivers, and here water is widely used for irrigation, domestic works and industrial works.



- Plains also contribute more in polluting water sources by draining agricultural wastes (chemical fertilisers and insecticides) solid and domestic wastes and industrial wastes.
- During summer, concentration of pollutants in rivers remains high because of low amount of water which unable to flow these pollutants.
- Water quality of national aquatic resources at 507 stations have been monitored by the Central Pollution Control Board (CPCB), with the collaboration of State Pollution Control Boards.
- The analysis of data recorded from these stations shows that the major rivers of India are most polluted by the organic and bacterial pollution.
- Yamuna river is most polluted river in the country between Delhi and Etawah. Other severely polluted rivers are the Sabarmati at Allahabad, the Gomti at Lucknow, the Kali, the Adyar, the Cooum (at entire stretches), the Vaigai at Madurai, Musi at Hyderabad and the Ganga at Kanpur and Varanasi.
- Ground water is also polluted because of high concentration of heavy toxic metals, flouride nitrates at different parts of the country.

Legislative Provisions and Laws to Prevent River Pollution

- Government has taken various steps to minimise river and water pollution but due to some obstacles, these were proved to be less effective, for e.g. Water (Prevention and Control of Pollution) Act of 1974, and Environment Protection Act of 1986 were unsuccessful as in 1997, 251 polluting factories were established along the rivers and lakes.
- The Water Cess Act of 1977 which was made to prevent pollution, was also less effective. So there is an urgent need to create awareness in public about the importance of water in life. It will result in reducing the pollutants from agricultural activities and industrial discharge.

Recycle and Reuse of Water

- Recycle and reuse is a simple and best way to conserve fresh water and make it available for all.
- Industries can use water of low quality and their waste water for cooling and fire fighting, which can decrease the cost of water for them and conserve fresh water.
- Water could be collected after bathing and washing utensils, washing clothes and cars can be a better option for gardening.



- Today, reusing and recycling of water is limited to few people but there is enormous scope for replenishing water through recycling.

Watershed Management

1. Watershed management basically refers to efficient management and conservation of surface water.
 2. Watershed management includes:
 3. ground water resources.
 4. prevention of surface runoff.
 5. storage and recharge of ground-water by different methods such as percolation tanks, recharge wells, etc.
 6. the conservation, regeneration and judicious use of all natural resources (land, water, plants and animals) and human resources.
 7. create a balance among natural elements as well as in society.
 8. community participation is a key to success of a Watershed Development programme.
- There are various Watershed Development and management programmes started by both Central and State Government at national and state level in India like:
 - **Haryali** It is sponsored by the central government while gram panchayats of different villages execute it with the public participation. This programme enabled people to conserve water for various uses such as drinking,, irrigation, fisheries and afforestation.
 - **Neeru-Meeru (Water and You)** Programme in Andhra Pradesh and Arvary Pani Sansad (in Alwar, Rajasthan) are examples of state initiated watershed development programmes.
 - Under these two programmes numerous percolation tanks, dug out ponds (johad), check dams, etc were constructed for harvesting water with the help of public participation. Tamil Nadu is only state which has made the construction of water harvesting structures compulsory in the houses.
 - The construction of a building without the structure of water harvesting is not allowed. Despite having such programmes, still most of the people in India are not aware with the benefits of watershed development and management of water. Thus, there is a need to encourage more people to participate in this programme.
 - **Rain Water Harvesting**



- Rain water harvesting is a cheap and environmental friendly technique that guides us to store rainwater into bore wells, pits and also recharge groundwater aquifers for different uses. There are various benefits of rainwater harvesting which are as follows:
 - It increases water availability.
 - Checks the declining groundwater level.
 - It improves the quality of groundwater by dilution of pollutions like fluoride and nitrates.
 - It prevents soil erosion and flooding.
 - It can be used to arrest salt water intrusion in coastal areas, if used to recharge aquifers.
- There are numerous methods to harvest rain water in India. In traditional rain water harvesting techniques, water is usually collected in any surface water body i.e. lakes, ponds, irrigation tanks, etc of rural areas. Another technique is kund or tanka which is a covered storage under ground tank. This technique is widely used in Rajasthan. Rain water harvesting structure can be made on the open spaces and even on the roof tops of the houses and the collected water can be used for domestic use by large number of people and reduce their dependence on ground water.

Other Methods

- To solve the problem of water scarcity, we can use brackish water of arid, semi-arid and coastal areas after the desalinated processes.
- By interlinking of rivers, water can be transferred from the water surplus areas to water deficit areas.

Highlights of India's National Water Policy, 2002

- The National water Policy, 2002 stipulates water allocations priorities broadly in the following order i.e. drinking water, irrigation, hydro-power, navigation, industrial and other uses.
- The main objectives of this policy are to provide water to all human beings and animals, regular monitoring of surface and ground water quality, create awareness of water as a scarce resource, create conservation consciousness among people through education, regulation, incentives and disincentives, etc.

Chapter 7 - Mineral and Energy Resources

Types of Mineral Resources



- Mineral are classified on the basis of their physical and chemical properties which are as follows:

Metallic Minerals

These minerals are rich in metals e.g. copper, bauxite, iron, manganese, etc. These are of two types:

- **Ferrous Minerals** These are rich in iron contents and an important source of iron.
- **Non-Ferrous Minerals** These do not have iron content and have highest proportion of other metals. For e.g. copper, bauxite, etc.

Non-Metallic Minerals

- These minerals do not have contents of metals. They are classified into two groups:
 - **Organic Minerals** These are made up of organic matter of buried animal and plants. For e.g, coal, petroleum.
 - **Inorganic Minerals** These are inorganic in nature of origin. For e.g. Mica, limestone, graphite, etc.

Characteristics of Minerals Resources

The main characteristics of minerals are as follows:

- Their distribution over the earth surface are uneven.
- There is inverse relationship in quantity and quality of minerals i.e. good quality minerals are less in quantity as compared to low quality minerals.
- Minerals are exhaustible. Once they used can not replenished immediately at the time of need. So, minerals have to be conserved and used judiciously.

Distribution of Minerals in India

- Most of metallic minerals in India occur in the Peninsular Plateau region in the old crystalline rocks.
- River valleys of Damodar, Sone, Mahanadi and Godavari have over 97% of coal reserves in India.
- Sedimentary basins of Assam and offshore region in the Arabian Sea (Gujarat and Mumbai High) are famous for their crude petroleum reserves.
- New reserves of petroleum also have been found in the basins of Krishna-Godavari and Kaveri.
- 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.
- There may be some sporadic occurrences here and there in isolated pockets. These belts are:



The North-Eastern Plateau Region

- This belt includes the regions of Chotanagpur (Jharkhand), Odisha Plateau, West Bengal and parts of Chhattisgarh.
- Important minerals are iron ore, coal, manganese, bauxite and mica.
- Due to availability of these minerals, most of the iron and steel industries are located here.

The South-Western Plateau Region

- This belt extends to lower Karnataka, Goa and contiguous uplands of Tamil Nadu and Kerala.
- Ferrous metals and bauxite are concentrated here along with high grade iron ore, manganese and limestone. This belt is rich in coal packs except Neyveli lignite.
- Neyveli has lignite coal deposit. Deposits of monazite sand and thorium are found in Kerala.
- Mines of iron-ore are located in Goa.

The North-Western Regions

- Minerals of this belt are associated with Dharwar system of rocks which are found in the Rajasthan and parts of Gujarat.
- Major minerals are copper and zinc. Rajasthan is rich in building stones i.e. sandstone, granite, marble, fuller's earth and gypsum.
- Some cement industries are also concentrated here due to availability of dolomite and limestone which are the raw materials of these industries.
- Gujarat is rich in petroleum deposits. Salt is also produced in Gujarat and Rajasthan.

Other Areas/Regions

- Both Eastern and Western parts of the Himalayan belt have minerals like copper, lead, zinc, cobalt and tungsten.
- Assam Valley has mineral oil deposits. Besides, oil resources are also found in off-shore areas near Mumbai Coast (Mumbai High).

Spatial Pattern of Metallic Minerals

Spatial pattern of some of the important minerals are as follow:

Ferrous Minerals

- India is well placed in respect of ferrous minerals like iron-ore, manganese, chromite, etc.
- These minerals provide a strong base for the development of metallurgical industries.

Iron ore

India has largest iron ore reserves in Asia. Its superior quality of hematite and magnetic iron-ore have a great demand in International market. Iron ore mines of India are found near the coal fields of North-Eastern Plateau region which is an advantage for iron-ore industries of India. During 2004/05, India has about 20 billion tonnes of iron-ore reserves. Few Indian states have about 95% of total iron-ore reserves in India. These states are:

- **Odisha** The important mines are located at Sundergarh, Mayurbhanj and Jhar. Gurumahisani, Sulaipet, Badampahar in Mayurbhanj and Kiruburce and Bonai (Sundergarh) have important mines. Jharkhand It has oldest mines in India. Important mines are Noamundi and Gua in Poorbi and Paschimi Singhbhum districts.
- **Chhattisgarh** The mine belt further extended to Durg, Dantewada, Bailadiala, Dalli and Rajhara.
- **Karnataka** Important mines are Sundar-Hospet area of Bellary distict, Baba Budan hills and Kundremukh in Chikmogalur Tumkur districts,
- **Maharashtra** Important iron-ore deposits are located in Chandrapur, Bhandara and Ratnagiri districts.
- **Andhra Pradesh** Important areas of iron ore are Karimnagar Warangal, Kumool, Cuddapah and Anantpur districts.
- **Others** These include Salem and Nilgiris Districts of Tamil Nadu state and Goa state.

Manganese

It is an important raw material which is used in iron and steel industry for smelting of iron-ore and in the manufacturing of ferro alloys.

It is mainly associated with Dharwar system but found almost in all geological formations. Important states are:

- **Odisha** It is the largest manganese producer of India. The central part of the iron-ore belt of India has most of the manganese mines of Odisha. Important mines are located in the districts of Bonai, Kendujhar, Sundargarh, Gangpur, Koraput, Kalahandi and Bolangir.
- **Karnataka** Dharwar, Bellary, Belgaum, North Canara, Chikmagalur, Shimoga, Chiradurg and Tumkur.
- **Maharashtra** The main disadvantage of its mines are that these are located away from iron and steel plants. Nagpur, Bhandara and Ratnagiri have manganese mines.
- **Madhya Pradesh** Balaghat, Chhindwara, Nimar, Mandla and Jhabua districts have manganese mines.

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- **Others** Other producer states of manganese are Andhra Pradesh, Goa and Jharkhand.

Non-Ferrous Minerals

India has large deposits of bauxite but is lacking behind in other non-ferrous minerals.

Bauxite

It is the ore that used to manufacture aluminum and aluminium products.

It is found in laterite rocks mostly in the plateau or hilly regions of peninsular India and also in the coastal areas. Important states are:

- **Odisha** It is the largest producer of bauxite and important producing areas are Kalahandi, Sambalpur, Bolangir and Koraput.
- **Jharkhand** Peldands of Jharhand in Lohardage home rich deposits.
- **Gujarat Bhavanagar** and Jamnagar are important sites of bauxite.
- **Chattisgarh** Amarkanatak plateau region has large deposits of bauxite.
- **Madhya Pradesh** Katni-Jabalpur and Balaghat have important deposits of bauxite.
- **Others** Tamil Nadu, Karnataka and Goa are other producers of bauxite.

Copper

It is alloyable, malleable and ductile and an indispensable metal in electrical industry used for making wires, electric motors, transformers and generators.

It is also used to give strength in gold jewelleryes. Important copper producing states are:

- Jharkhand Singbhum district
- Madhya Pradesh Balaghat
- Rajasthan Jhunjhunu and Alwar
- Andhra Pradesh Agnigundala in Guntur district
- Karnataka Chitradurg and Hasan
- Tamil Nadu South Arcot district

Non-Metallic Minerals

Limestone, dolomite, phosphate and mica are some non-metallic minerals produced in India. Mica is the important among them while others are produced for domestic consumption.

Mica

Mica is mainly used in the electrical/electronic industries which can be split into very thin, strong and flexible sheets.



Due to its resistance quality it is used in electricals and electronic industry. Important producer states are:

- **Jharkhand** Hazaribagh plateau produces a high quality of mica.'
- **Andhra Pradesh** Nellore district is important producer of mica, it produces best quality mica.
- **Rajasthan** A 320 km long belt from Jaipur to Bhilwara near Udaipur produces mica.
- **Karnataka** Mysore and Hasan are important producers of mica.
- **Others** Coimbatore, Tiruchirapalli, Madurai and KanyaKumari (Tamil Nadu),

Ratnagiri(Maharashtra), Alleppey, (Kerala), Purulia and Bankura (West Bengal) are also known for mica deposits.

Energy Resources

All sectors of economy i.e. agriculture, industry, transport are run by power which comes from mineral fuels whether conventional or non-conventional energy resources.

Conventional Sources of Energy

These are exhaustible in nature e.g. fossil fuels like coal, petroleum and natural gas.

Coal

- It is required in the generation of thermal power and smelting of iron-ore.
- India has about 80% of bituminous coal which is of non-cooking grade.
- It is found in two rock sequences i.e. Gondwana coal fields and tertiary coal fields.
- **Gondwana Coal Fields**
 - Damodar Valley is the important coal field of India. Jharkhand and West Bengal coal have the entire area of this coal field. Jharia (largest coal field), Raniganj (second fields largest), Bokaro, Giridih, Karanpura are important coal fields of this valley. Other river valleys are Godavari, Mahanadi and Sone.
- **Tertiary Coal Fields**
 - Important states are:
 - **Meghalaya** Darangiri, Cherrapunji, Mewlong and Langrin (Meghalaya).
 - **Assam** Makum, Jaipur and Nazira in Upper Assam.
 - **Arunachal Pradesh** Namchik-Namphurk Jammu and Kashmir Kalakot Others Nagaland state



- **Other Coal Fields**

- Besides, the brown coal or lignite coal occurs in the coastal areas of Tamil Nadu, Puducherry, Gujarat and Jammu and Kashmir.

Petroleum

- Crude petroleum consists of hydrocarbons of liquid and gaseous states varying in chemical composition, colour and specific gravity. It is used as a source of energy in all internal combustion engines of automobiles, railways and aircrafts. It is also used as a raw material in petrochemical industries to produce fertilizer, synthetic rubber, synthetic fibre, medicines, vaseline, lubricants, wax soap and cosmetics, etc.
- It is also called liquid gold due to the scarcity and different uses. Crude oil is found in sedimentary rocks of tertiary age. Before independence, Digboi was the only crude oil producing region in India but after independence in 1956, Oil and Natural Gas Commission was set up. Important oil producing regions are:
 - **Assam** Digboi, Naharkatiya and Moran.
 - **Gujarat and Mumbai High** Ankaleshwar, Kalol, Mehasana, Nawagam, Kosamba and Lunej. Krishna, Godavari and Kaveri basin also have Oil and Natural Gas reserves on the East coast of India.

There are two types of oil refineries in India:

- **Field Based Refineries** Digboi is an example of field based refinery.
- **Market Based Refineries** Barauni is an example of market based refinery. There are total 21 refineries as on June 2011.

Natural Gas

- It occurs alongwith oil as well as separately in gas reserves in India.
- These gas reserves are located alongwith Eastern cost of Tamil Nadu, Odisha, Andhra Pradesh, Tripura, Rajasthan, Gujarat and Maharashtra.
- Gujarat and Maharashtra have off-shore wells of natural gas.
- According to a survey report, there are indications of huge gas reserves in Ramathanpuram in Tamil/Nadu state.

Non-Conventional Energy Sources

- Unlike conventional sources of energy, non-conventional energy sources are renewable i.e. solar, wind, hydro-geothermal and biomass and are not threat to natural system.



- Their use ensure sustainable development as these are environment friendly and cheaper energy sources.

Nuclear Energy Sources

Nuclear energy has emerged as a feasible source in recent times.

- Uranium and thorium are main minerals that are used to generate nuclear energy.

Uranium Deposits in India

- It is found in Dharwar rock system. Important regions are: • Jharkhand Singhbhum (alongwith the copper belt)
- Rajasthan Udaipur, Alwar, Jhunjhunu districts.
- Chhattisgarh Durg district Maharashtra Bhandara district.
- Himachal Pradesh Kullu district.

Thorium Deposits in India

It is found in very few places in India:

- Kerala (in monazite and ilmenite beach sands) Plakkad and Kollam districts.
- Andhra Pradesh Vishakhapatnam.
- Odisha Mahanadi river delta
- These three states have world's richest monazite deposits. The development of nuclear energy was started after establishment of Atomic Energy Institute at Trombay in 1954 which was renamed as the Bhabha Atomic Research Centre in 1967. Tarapur (Maharashtra), Rawatbhata near Kota (Rajasthan), Kalapakkam (Tamil Nadu), Narora (Uttar Pradesh), Kaiga (Karnataka) and Kakrapar (Gujarat) are other nuclear power sites in India.

Solar Energy

- Sun's energy trapped by two methods i.e. photovoltaic cells and solar thermal technology and convert into electricity is called solar energy.
- Its construction is easy, eco-friendly and cost competitive.
- It is 7% and 10% more effective than coal and oil based plants and nuclear energy, respectively.
- Heaters, dryers, cookers and other heating appliances use solar energy more than others.
- Gujarat, Rajasthan and the Western part of India have higher potential for the development of solar energy.

Wind Energy

- Wind energy is non-polluting and renewable source. Through turbine mechanism, kinetic energy of wind can be directly converted into electrical energy.



- Electricity can be produced by permanent wind systems like trade wind, westerlies or seasonal winds like monsoon winds. Besides, production of electricity can also be done by local winds, land and sea breezes.
- India already has started generating wind energy to lessen the burden of oil import bill. It is estimated that India has 50000 megawatts potential of wind generation, of which one-fourth may be easily employed.
- Rajasthan, Gujarat, Maharashtra and Karnataka have higher potential for the development of wind energy.

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.
- Many efforts for the efficient use of oceanic tides and waves were made since 17th and 18th century.
- But these waves have not yet been utilised properly because of lack of technology'. Geothermal Energy
- Magma that comes over the earth's surface releases vast amount of heat. This heat energy can be converted into electrical energy by tapping it. It is called geothermal energy
- Main sources of this energy are magma, hot spring (hot water), hot geysers, etc.
- Geothermal energy is gaining importance and can be used as an alternative to conventional energy sources.
- In India at Manikaran in Himachal Pradesh, a geothermal energy plant has been commissioned.

Bio-Energy

- **Bio-energy** refers to energy derived from biological products which includes agricultural residues, municipal, industrial and other wastes.
- It can be converted into electricity or electrical energy, heat energy or gas for cooking food.
- This can also solve the problem of garbage and waste in urban areas because energy can also be derived from these.
- It can contribute in improving economic life of rural peoples in developing countries, increasing environmental problems like pollution, solid waste management, enhancing self-reliance and reducing pressure on fuel wood.
- A project in OKHLA (Delhi) is an example that generates energy from municipal waste.

Conservation of Mineral Resources



- There are some methods through which we can conserve mineral resources:
- Adoption of renewable resources in place of exhaustible resources like solar power, wind, geothermal energy can save our non-renewable resources.
- Use of recycle scrap metals should be encouraged.
- 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

There are various ways to classify industries:

Based on size capital investment and labour force employed:

- Large scale industries
- Medium scale industries
- small scale and cottage industries

Based on ownership:

- Public sector industries
- Private sector industries
- Joint and cooperative sector

Based on use of finished goods:

- Basic goods industries
- Capital goods industries
- Intermediate goods industries
- Consumers goods industries

Based on raw materials used by them:

- Agriculture based industries
- Forest based industries
- Mineral based industries
- Industrially processed raw material based industries

Based on nature of the manufactured products:

- Metallurgical industries
- Mechanical engineering industries
- Chemical and allied industries
- Textiles industries
- Food processing industries
- Electricity generation
- Electronics
- Communication industries



Location of Industries

- Location of industries is determined by important factors i.e. raw materials, power resources, water, labour, markets and the transport facilities.
- Raw materials and industries are inter-related to each other. Most of the manufacturing industries are located at a place where cost of production and cost of delivery of finished goods are least.
- Nature of raw materials and finished goods decide the cost of transportation.

Factors of Industrial Location

The following factors influence the location of industries:

Raw materials

- Industries using raw materials which are perishable or lose weight in the process of manufacture are usually located near the source of the raw materials.
- For example, sugar mills, pulp industries, copper smelting, pig iron industries, etc.
- Iron and steel industries are mostly located near coalfields (e.g. Bokaro, Durgapur) or near source of iron-ore (Bhadravati, Bhilai, Rourkela) as both iron-ore and coal lose their weight during the process of manufacturing of steel.
- Power is must for every industry so supply of power should be ensured before locating any industry. For e.g. aluminum and synthetic nitrogen manufacturing industries.

Market

- Market is an important factor for market oriented industries as market provide outlets for manufactured products like heavy machines, machine tools, heavy chemicals, to sell finished goods.
- For example, Petroleum refineries like Koyali, Mathura and Barauni are located near markets so that the products derived from them can be used as raw material in other industries.

Transport

- It is important for the location of industries to move goods and labour from industrial area to markets and others.
- For example, around Delhi, Mumbai, Chennai and Kolkata, the concentration of industries is maximum.

Labour

- It is another important factor of the location of industries.



- Due to our large population, labour is quite mobile and is available in large numbers.

Historical Factors

- Colonial influence like competition from the British goods and the British discriminatory policies, are also important reasons for the emergence of some of our industrial nodes (like, Mumbai, Kolkata and Chennai) and manufacture centres (like Murshidabad, Dhaka, Bhadohi, Surat, Vadodara, Kozhikode, Coimbatore, Mysore, etc).

Industrial Policy

- To bring balanced regional development and to eradicate regional disparities in the economy, are the main objectives of our democratic country.
- India attempts to promote backward areas like tribal areas into economic development process by providing lots of incentives. For example, establishment of iron and steel industry in Bhilai and Rourkela were based on decision to develop backward tribal areas of the country.

Major Industries

Some of the major industries of our country are discussed below:

Iron and Steel Industry

Iron and steel industry provides basic infrastructure to almost all sectors of the Indian industry. The raw materials used in this industry, iron-ore, cooking coal, limestone, dolomite, manganese and fire clay are found in parts of Chhattisgarh, Northern Odisha, Jharkhand and Western West Bengal. This industry comprises of large integrated steel plants as well as mini steel mills and also includes secondary producers, rolling mills and ancillary industries.

Some integrated steel plants are:

TISCO

The Tata Iron and Steel Plant lies near to Mumbai-Kolkata railway line and about 240 km away from Kolkata which is nearest port for the export of steel. This industry gets its raw materials from different source regions like:

- Water supply from Subamarekha and Kharkai rivers.
- Iron-ore from Noamundi and Badam Pahar.
- Coal from Joda mines in Odisha.
- Coking coal from coal fields of Jharia and West Bokaro.

IISCO

The first factory of the Indian Iron and Steel Company (IISCO) was set-up at Hirapur and another at Kulti. In 1937, the steel corporation



of Bengal was established in association with IISCO by setting up another unit at Bumpur (West Bengal).

IISCO gets its raw materials from different source regions like:

- Coal from Damodar valley coal fields (Raniganj, Jharia and Ramgarh).
- Iron-ore from Singhbhum in Jharkhand.
- Water supply from river Barakar (a tributary of Damodar river).

The Kolkata- Asansol railway line runs along the plants. Later in 1972-73, the government took over the IISCO plant because of the fall of steel production.

Visvesvaraiya Iron and Steel Works Ltd. (VISL)

Initially named Mysore Iron and Steel Works, the VISL is located at the banks of Badravati in Shimoga district of Karnataka. This plant produces specialised steels and alloys. VISL gets raw materials from:

- It gets iron ore from Kemangundi in the Bababudan hills, limestone and manganese from the local area.
- water supply from the Bhadravati river.
- Due to unavailability of coal in this region, at the beginning charcoal was used as fuel by burning wood till 1951. Later, electric furnaces were installed which use hydroelectricity from the Jog falls hydel power project.

During the second five years plan (1956-61), three new public sector integrated steel plants were set up with foreign collaboration i.e. Rourkela in Odisha, Bhilai in Chhattisgarh and Durgapur in West Bengal.

These were under Hindustan steel Limited (HSL). In 1973, the Steel Authority of India Limited (SAIL) was created to manage these plants.

Rourkela Steel Plant

This plant was established in 1959 in the Sundargarh district of Odisha in collaboration with Germany.

This plant gets its raw materials from different sources region like:

- Coal from Jharia.
- Iron-ore from Sundargarh and Kendujhar districts.
- Hydro-electric power from Hirakud Power Project.
- Water from Koel and Sankh rivers.

Bhilai Steel Plant

It was set up with Russian collaboration in Durg district of Chhattisgarh and started production in 1959.

It gets its raw material from different places like:

- Coal from Korba and Kargali.

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- Water from Tanduladam.
- Power from Korba thermal power station.

This plant is connected with Kolkata-Mumbai railway line. This plant supplies the bulk of steel to the Hindustan Shipyard at Vishakhapatnam.

Durgapur Steel Plant

It was set up in collaboration with the Government of United Kingdom in West Bengal and started production in 1962.

It gets its raw material from the following places:

- Coal from Jharia and Raniganj.
- Iron-ore from Noamundi.
- Water and hydel power from Damodar Valley Corporation (DVC).
- It lies on the main Kolkata-Delhi railway route.

Bokaro Steel Plant

Bokaro steel plant was set up in 1964 with Russian collaboration at Bokaro. It aims at transport cost minimisation by creating Bokaro-Rourkela combine. The raw materials and their source regions are:

- Iron-ore from Rourkela.
- Water and Hydel power from Damodar Valley Corporation (DVC).
- Other raw materials come from within a radius of about 350 km.

Other Steel Plants

In the Fourth Five Year Plan, three new steel plants were set up away from the main raw materials sources, namely:

- The Vizag Steel Plant in Vishakhapatnam in Andhra Pradesh is the first port based plant which started operating in 1992.
- The Vijayanagar Steel Plant at Hospet in Karnataka.
- The Salem Steel Plant in Tamil Nadu was commissioned in 1982.

There are also more than 206 units in India which use scrap iron as main raw material and process it in electric furnaces.

The Cotton Textile Industry

- This industry is one of the traditional industries of India. The first successful modern cotton textile mill was established in Mumbai in 1854. Because, it is very close to the cotton producing areas of Gujarat and Maharashtra and being a large town, provide employment opportunities to many people. After the first mill, two more mills, the Shahpur mill and the Calico mill were established in Ahmedabad (Gujarat). But,



after partition, India was left with 409 mills out of 423 mills and only 29% of the cotton progrowing area.

- The cotton textile industry can be classified as organised and decentralised sectors. The decentralised sector includes cloth produced in handlooms (including khadi) and powerlooms. On the other hand, production of the organised sector has drastically fallen from 81% in the mid twentieth century to only about 6% in 2000. Now powerlooms on the decentralised sector produce more than the handloom sector. As cotton does not lose weight in the manufacturing process, hence the location of cotton textile industry is determined by other factors like power supply, labour, capital or market.
- At present, market is the most preferred factor to locate industry as market decides what is the current trend of clothes. After first cotton textile mills were set up in Mumbai and Ahmedabad, the cotton textile industry expanded very rapidly. Development of the railway network also contributed to the expansion of mills. In southern India, mills were set up at Coimbatore, Madurai and Bangaluru.
- In central India, mills were set up at Nagpur, Indore, Solapur and Vadodra. Mills were also set up at
- Kanpur and Kolkata. Availability of hydel power favoured the setting up of cotton mills in Tamil Nadu. Availability of cheap labour favoured the setting up of cotton mills at Ujjain, Bharuch, Agra, Hathras, Coimbatore and Tirunelveli.

Distribution of Cotton Textile Industries

- In present time, important centres of cotton textile industries are Ahmedabad, Bhiwandi, Solapur, Kolhapur, Nagpur, Indore and Ujjain. Maharashtra, Gujarat and Tamil Nadu are the leading cotton producing states. West Bengal, Uttar Pradesh, Karnataka, and Punjab are the other important cotton textile producers.
- Tamil Nadu has largest number of mills and most of them produce yam rather than cloth. Coimbatore accounts for 50% of total mills. Other important centres are Chennai, Madura, Tirunelveli, Tuticorin, Thanjavur, Ramanathapuram and Salem.
- In Karnataka, Bengaluru, Hubli Devangera, Bellary, Mysore are some important centres.
- The cotton textile industry has developed in cotton producing Telangana region. The important centres are Hyderabad,



Secunderabad and Warangal in Telangana and Guntur in Andhra Pradesh.

- Most of the cotton textile industry has developed in the Western part of Uttar Pradesh. Kanpur is the largest centre and known as Manchester of Uttar Pradesh. Other important centres are Agra, Modinagar, Sahranpur, Lucknow and Hathras.
- In West Bengal, important centres are Kolkata, Serampur, Howrah and Shyamnagar.
- Cotton textile industry has been facing tough competition from synthetic cloth.

Sugar Industry

- The sugar industry being the second largest agro-based industry in India, is the largest producer of both sugar and sugarcane. It contributes about 8% of the total sugar production in the world. The first sugar mill was established in 1903 in Bihar and then many mills were established in many parts of Bihar and Uttar Pradesh.
- This industry provides employment to more than 4 lakh persons and large number of farmers. It is a seasonal Industry.

Location of the Sugar Industry

- As sugarcane is a heavy, low value, weight losing and perishable raw material, thus sugar factories are located mostly in sugarcane growing regions.
- Maharashtra has emerged as a leading sugar producer in the country and produces more than onethird of the total production of the sugar in the country. Uttar Pradesh is now the second largest producer of sugar.

There are two belts where sugar factories are located:

- **The Ganga-Yamuna Doab** Saharanpur, Muzaffamagar, Meerut, Ghaziabad, Baghpat and Bulandshar districts.
- **Tarai region Lakhimpur** Kheri, Basti, Gonda, Gorakhpur, Bahraich distiricts.

Sugar producing States

- Tamil Nadu has sugar factories in Coimbatore, Vellore, Tiruvanamalai, Villupuram and Tiruchchirappalli districts.
- In Karnataka, the important sugar producers are Belgaum, Bellary, Mandya, Shimoga, Bijapur, and Chitradurg.
- The industry is distributed in the coastal regions i.e. East Godavari, West Godavari, Vishakhapatnam districts and Nizamabad, and Medak districts of Telangana alongwith Chittoor district or Rayalseema.



Other sugar producing states are:

- **Bihar** Saran, Champaran, Muzaffarpur, Siwan, Dharbanga, Gaya.
- **Punjab** Gurdaspur, Jalandhar, Sangarur, Patiala, Amritsar.
- **Haryana** Yamuna Nagar, Rohtak, Hissar, Faridabad.
- **Gujarat** Sugar industry is comparatively new here. Important sugar producing mills are located in Surat, Junagarh, Rajkot, Amreli, Valsad and Bhavnagar districts.

Petrochemical Industries

- This group of industries has been growing very fast in India. The demand of its products is very high since 1960s. Many items are derived from crude petroleum, which provide raw materials for many new industries, these are collectively known as petrochemical industries. Petrochemical industries are divided into four sub-groups:
 - **Polymers**
 - **Synthetic fibres**
 - **Elastomers**
 - **Surfactant intermediate**

Distribution of Petrochemical Industries

Mumbai is the hub of the petrochemical industries. Other cracker units are at Auraiya (Uttar Pradesh), Jamnagar, Gandhinagar and Hajira (Gujarat), Nagothane, Ratnagiri (Maharashtra), Haldia (West Bengal) and Vishakhapatnam (Andhra Pradesh). There are three organisations which are working in the petrochemical sector under the administrative control of the department of chemicals and petrochemicals:

- **Indian Petrochemical Corporation Limited** It is a public sector undertaking and responsible for the manufacturing and distribution of the polymers, chemicals, fibres and fibre intermediates.
- **Petrofies Cooperative Limited (PCL)** It is a joint venture of the government of India and weaver's cooperative societies. It has two plants at Vadodara and Maldhari where polyester filament yarn and nylon chips are produced.
- **Central Institutes of Plastic Engineering and Technology (CIPET)** It is involved in imparting training in petrochemical industry.

Sub-Groups of Petrochemical Industries

- Polymers are made from ethylene and propylene which are obtained after refining crude oil. It provides the basic raw



material for plastic industry which are preferred because of their strength, flexibility, water and chemical resistance and low prices.

- The National Organic Chemical Industries Limited (NOCIL) established in 1961 and started first naphtha based chemical industry in Mumbai. The major producers of plastic materials are Mumbai, Barauni, Mettur, Pimpri and Rishra.
- About 75% of these units are in small scale sector. The industry also uses recycled plastics which constitutes about 30% of the total production. Synthetic fibres are widely used in the manufacturing of fabrics because of their durability, washability and resistance to shrinkage.
- The important fibres and their producing centres are Nylon and Polyester industries at Kota, Pimpri, Mimbai, Modinagar, Pune, Ujjain, Nagpur and Udhna and Acrylic Staple Fibre Industries at Kota and Vadodara.
- Now, plastic has emerged as greatest threat to our environment because of its non-biodegradable quality.

Knowledge Based Industries

- The IT and IT enabled business process outsourcing (ITES-BPO) services continue to grow with an outstanding rate.
- A number of software park have been created by the government and the production of the software industries has surpassed electronic hardware production.
- The contribution of the IT software and services industry in India's GDP is about 2%.
- Most of the multinational companies in IT field has re-established software or research development centres in India.
- In hardware development sector, India has yet not achieved so much but in IT sector, it creates double employment rate every year.

Liberalisation, Privatisation, Globalisation (LPG) and Industrial Development in India The new industrial policy was announced in 1991 with the following objectives:

- 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.
- Attain international competitiveness.

Following were the policy measures taken under LPG:

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.
7. Liberalised industrial location programme.

The policy has three main dimensions Liberalisation, Privatisation, and globalisation. Except six industries based on security, strategic or environmental concerns, for all industries the licensing system has been abolished. The number of industries reserved for public sector since 1956 have been reduced from 17 to 4. Department of atomic energy as well as railways have remained under the public sector. For investment in delicensed sector no prior approval is required. Foreign Direct Investment (FDI) became supplement to domestic investment in achieving a higher level of economic development in this policy. The industrial policy has been liberalised to attract private investor both domestic and multi-nationals.

Globalisation refers to the integration of the country's economy with the world economy. There is free flow of goods and services, labours, capitals from one nation to another. Globalisation aimed at increasing domestic and external competition through market mechanism and facilitating dynamic relationship with the foreign investors and suppliers of technology. In Indian context, globalisation has following objectives:

- Opening of the economy to foreign direct investment by providing facilities to foreign companies to invest in different fields of economic activities 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.
- Instead of a set of export incentives, opting for exchange rate adjustments for promoting export.

Adverse Effect of LPG

- Infra structural sector was remained untouched while major share went to core sectors.



- The gap between developed and developing states has become wider and inter-regional disparity has been increased, e.g. out of total investment from 1991-2000, one fourth (23%) was for Maharashtra, 17% for Gujarat, 7% for Andhra Pradesh about 6% for Tamil Nadu, and only 8 % for Uttar Pradesh. Thus, the share of both domestic and foreign investment went to already developed states. Share of both domestic and foreign investment went to already developed states.
- Economically weaker states could not compete with developed states in open market in attracting industrial investment.

Industrial Regions In India

Due to favourable factors, most of the industries are located in a few pockets. The pockets having high concentration of industries are known as industrial clusters.

Several indices are used to identify the clustering of industries, important among them are:

- the number of industrial units
- number of industrial workers
- quantum of power used for industrial purposes
- total industrial output
- value added by manufacturing

Industrial Regions and Districts

Major industrial Regions

- Mumbai-Puna region
- Hugli region
- Bengaluru, Tamil Nadu region
- Gujarat region
- Chotanagpur region
- Vishakhapatnam-Guntur region
- Gurugram-Delhi-Meerut region
- Kollam-Thiruvananthapuram region

Minor Industrial Regions

- Ambala-Amritsar
- Saharanpur-Muzaffarnagar-Bijnor
- Indore-Dewas Ujjain
- Jaipur-Ajmer
- Kolhapur-South Kannada
- Northern Malabar
- Middle Malabar
- Adilabad-Nizamabad



- Allahabad-Varanasi-Mirzapur
- Bhojpur-Munger
- Durg-Raipur
- Bilaspur-Korba
- Brahmaputra valley

Industrial Districts

- Kanpur
- Hyderabad
- Agra
- Nagpur
- Gwalior
- Bhopal
- Lucknow
- Jalpaiguri
- Cuttack
- Gorakhpur
- Aligarh
- Kota
- Purnia
- Jabalpur
- Bareilly

Major industrial regions of India are as follows:

Mumbai-Pune Industrial Region

It extends from Mumbai-Thane to Pune and in adjoining districts of Nashik and Solapur. Besides, Kolaba, Ahmednagar, Satara, Sangli and Jalagaon districts also have industries. Factors which favoured the location of this region are:

- Development of cotton textile industry in Mumbai.
- Opening of the Suez Canal in 1869 gave impetus to Mumbai port.
- Machineries were possible to import through this port.
- Development of hydro-electricity in Western Ghat region.

Later, a number of industries were developed like chemical industry, Mumbai High petroleum field, nuclear energy plants, engineering goods, petrochemicals, leather, drugs, fertilizers, shipbuilding software, transport equipments and food industries, etc. Important industrial centres are Mumbai, Kolaba, Kalyan, Thane, Trombay, Pune, Pimpri, Nashik, Manmad, Solapur, Kolhapur, Ahmednagar, Satara and Sangli.

Hugli Industrial Region



Located along the Hugli river, this region extends from Bansberia in the north to Birlanagar in the south and in Mednipur in the west.

Factors which are responsible for the location of industries here are:

- Opening of river port on Hugli river.
- Kolkata emerged as a leading centre and connected with interior parts by railway lines and road routes.
- Development of tea plantations in Assam and northern hills of West Bengal.
- Opening of coalfields of the Damodar valley and iron-ore deposits of the Chotanagpur plateau.
- The processing of indigo earlier and jute later.
- Availability of labour from Bihar, eastern Uttar Pradesh and Odisha.
- Kolkata attracted British capital as it was the capital city of the Britishers.
- 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 here.

The major concentration of jute industry is at Haora and Bhatapara. Important industries are cotton textile, jute, paper, engineering, textile machinery, electrical, chemical, pharmaceuticals, fertiliser and petrochemical industries.

Factory of the Hindustan motors limited at Konnagar and diesel engine factory at Chittaranjan are landmarks of this region. The major industrial centres are Kolkata, Haora, Haldia, Serampur, Rishra, Shippur, Naihati, Kakinara, Shamnagar, Titagarh, Sodepur, Budge Budge, Birlanagar, Bansberia, Belgurriah, Triveni, Hugli, Belur, etc.

Bengaluru (Bangalore) Chennai Industrial Region

- It is spread over all the districts of Tamil Nadu except Viluppuram.
- Its development is dependent on the Pykara hydro-electric plant, which was built in 1932.
- Cotton textile industry was the first to take roots due to the presence of cotton growing areas.
- Heavy engineering industries are located at Bengaluru.
- 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, matchbox, leather goods, etc.

- Petroleum refinery at Chennai, iron and steel plant at Salem and fertilizer plants are recent developments.

Gujarat Industrial Region

The place for the basis for its activity growth lies between Ahmedabad & Vadodara but this region Extends up to valsad & Surat in the South & to Jamnagar in the west. Location factors of industries in this region are:

- Decline of the cotton textile industry at Mumbai.
- This region is located in cotton growing area, hence raw material and market are easily available.
- The discovery of oil fields led to the establishment of petrochemical industries around Ankushwar, Vadodara, Jamnagar .
- Development of Kandla port.
- Petroleum refinery at Koyali.

Important industries are textiles (cotton, silk, synthetic, fabrics), petrochemical industries, heavy and basic chemicals, motor, tractor, diesel engines, textile, machinery, engineering, pharmaceuticals, dyes, pesticides, sugar, dairy products and food processing. Recently, largest petroleum refinery has been set up at Jamnagar. Important industrial centres are Ahmedabad, Vadodara, Bharuch, Koyali, Anand, Khera, Surendranagar, Rajkot, Surat, Valsed, Jamnagar.

Chotanagpur Region

This extends over Jharkhand, Northern Odisha and West Bengal. The region is well known for its heavy metallurgical industries.

Factors which are favourable for the location of industries here are:

- Discovery of coal in the Damodar valley.
- Metallic and non-metallic minerals in Jharkhand and northern Odisha.
- Thermal and hydro-electric plants in the Damodar valley.
- Cheap labour from surrounding regions,
- Hugli provides vast market for its industries.

Important industries are heavy engineering, machine tools, fertilizers, cement, paper, locomotives, and heavy electricals. Important centres are Ranchi, Dhanbad, Chaibasa, Sindri, Hazaribag, Jamshedpur, Bokaro, Rourkela, Durgapur, Asansol and Dalmianagar.

Vishakhapatnam-Guritur Region



This region extends from Vishakhapatnam to Kumool and Prakasam districts in the South. Important locational factors are:

- Presently Vishakhapatnam and Machilipatnam ports, developed agriculture and rich reserves of minerals in their hinterlands.
- Coal fields of Godavari basin.
- Presence of petroleum refineries.

Guntur district has one lead-zinc smelter. Important industries are sugar, textile, jute, paper, fertiliser, cement, aluminium and light engineering. Important centres are

Vishakhapatnam, Vijayawada, Vijayanagar, Rajahmundry, Guntur, Eluru and Kumool.

Gurugram-Delhi-Meerut Region

- The industries of this region are light and market oriented as this region is far located from mineral and power resources.
- Important industries are electronics, light engineering, electrical goods, cotton, woollen and synthetic fabrics, hosiery sugar, cement, machine tools, tractor, cycle, vanaspati, etc.
- Software industry is recently developed.
- Important industrial centres are Guru gram (Gurgaon), Delhi, Shahdara, Faridabad, Meerut, Modinagar, Ghaziabad, Ambala, Agra and Mathura.

Kollam-Thiruvananthapuram Region

- Important industrial centres are Thiruvananthapuram, Kollam, Alwaye, Emakulam, Punalur, and Alappuzha districts.
- It is away from mineral belt of India, so agricultural products processing and market oriented light industries predominate the region.
- Important industries are cotton textile, sugar, rubber, matchbox, glass, chemical fertilizers, fish-based industries, food processing, paper, coconut coir products, aluminium and cement.

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