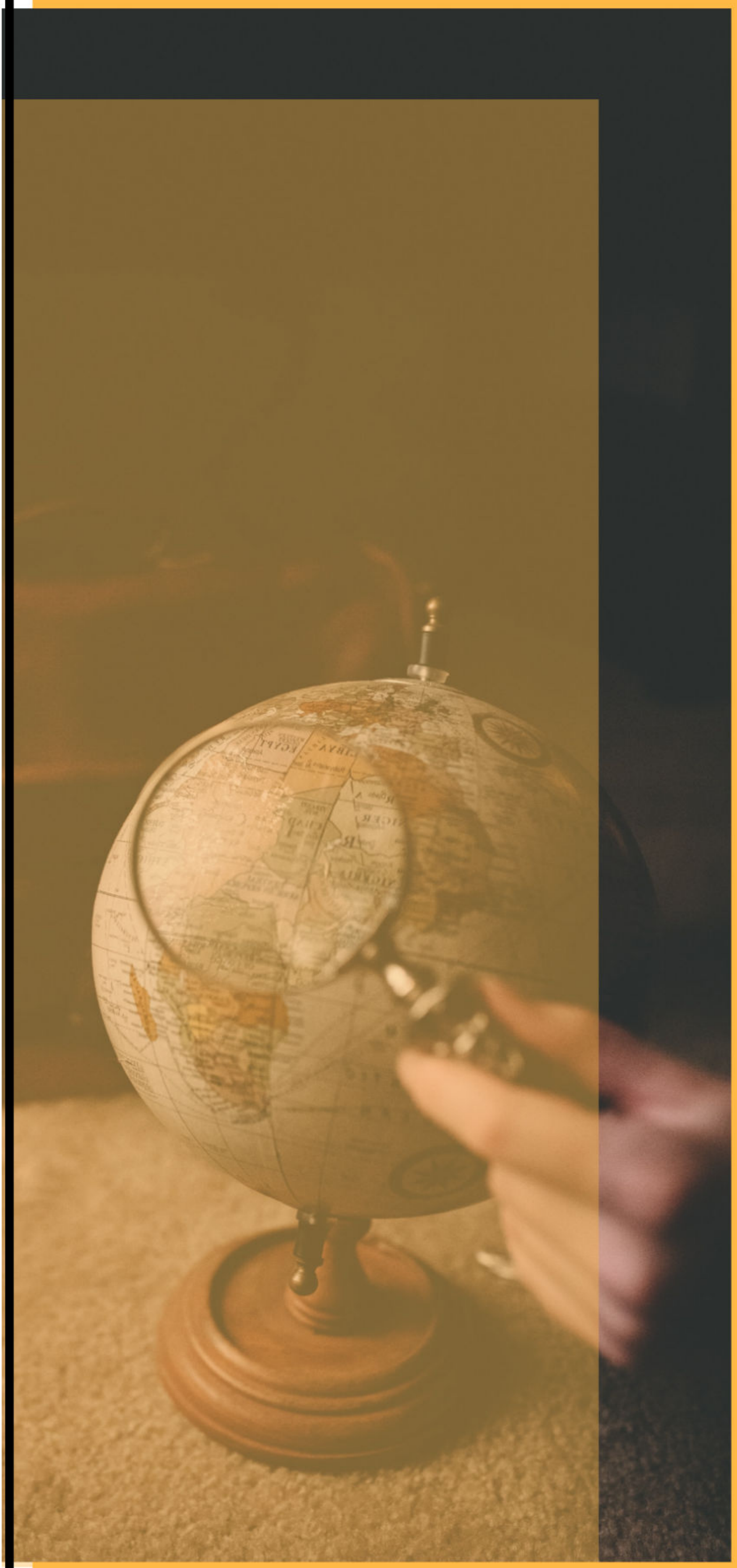

EDEN IAS

GEOGRAPHY

UPSC PREP

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[POPULATION GEOGRAPHY]

WORLD POPULATION DISTRIBUTION, DENSITY AND GROWTH

In demographics, the world population is the total number of humans currently living, and was estimated to have reached 7.7 billion people as of April 2019. It took over 200,000 years of human history for the world's population to reach 1 billion and only 200 years more to reach 7 billion. World population has experienced continuous growth since the end of the Great Famine of 1315–1317 and the Black Death in 1350, when it was near 370 million. The highest population growth occurred between 1955 and 1975, peaking to 2.06% between 1965 and 1970. The growth rate has declined to 1.18% between 2010 and 2015 and is projected to decline further in the course of the 21st century. However, the global population is still growing and is projected to reach about 10 billion in 2050 and more than 11 billion in 2100. Total annual births were highest in the late 1980s at about 139 million. and as of 2011 were expected to remain essentially constant at a level of 135 million, while deaths numbered 56 million per year and were expected to increase to 80 million per year by 2040. The median age of the world's population was estimated to be 30.4 years in 2019.

Six of the Earth's seven continents are permanently inhabited on a large scale. Asia is the most populous continent, with its 4.54 billion inhabitants accounting for 60% of the world population. The world's two most populated countries, China and India, together constitute about 36% of the world's population. Africa is the second most populated continent, with around 1.28 billion people, or 16% of the world's population. Europe's 742 million people make up 10% of the world's population as of 2018, while the Latin American and Caribbean regions are home to around 651 million (9%). Northern America, primarily consisting of the United States and Canada, has a population of around 363 million (5%), and Oceania, the least populated region, has about 41 million inhabitants (0.5%). Though it is not permanently inhabited by any fixed population, Antarctica has a small, fluctuating international population based mainly in polar science stations. This population tends to rise in the summer months and decrease significantly in winter, as visiting researchers return to their home countries.

World Population is not uniformly distributed. There are four areas in world where average density of population is more than 100 people per sq. km.

1. East Asia (China, Japan, South Korea, Taiwan).
2. South Asia (India, Pakistan, Bangladesh, Sri Lanka, Nepal).
3. North West Europe (U.K., France, Germany, Netherlands, Poland, Belgium, Denmark, Spain, Portugal, Italy).
4. Eastern North America (North East United States and South East Canada).

Over 70 percent of land surface is sparsely populated. In general hot, cold, arid and mountainous areas are sparsely populated which are classified under following categories.

1. Deserts, arid and semi arid areas.
2. The polar caps (Tundra and Antarctica).
3. The lofty and rugged mountains.
4. The Equatorial rain forests.

The unevenness in the distribution of population is equally prominent within continents and countries. The southern and southeastern parts in Asia are more populous than its counterparts in north and west. Similarly, the northwestern parts of Europe exhibit a greater concentration of population than the rest of the continent, and a majority of people in North America live along the Atlantic coast in the east. Another striking feature of the world distribution of population is the disparity between the more developed and less developed countries of the world. Nearly 81 per cent of the mankind resides in the less developed countries.

Ecumene and nonecumene or anacumene are the terms used by geographers to differentiate between the permanently inhabited parts and the uninhabited or very sparsely populated parts of the world. Ecumene was the term used by the ancient Greeks to signify the inhabited parts of the earth, thus distinguishing it from what they believed to be uninhabited in the equatorial regions and permanently frozen polar reaches of the earth.

World population (in millions, UN estimates)				
	Top ten most populous countries	**2000**	**2015**	**2030***
1	China*	1,270	1,376	1,416
2	India	1,053	1,311	1,528
3	United States	283	322	356
4	Indonesia	212	258	295
5	Pakistan	136	208	245
6	Brazil	176	206	228
7	Nigeria	123	182	263
8	Bangladesh	131	161	186
9	Russia	146	146	149
10	Mexico	103	127	148
	World total	6,127	7,349	8,501

Notes:

- China = excludes Hong Kong and Macau
- 2030 = Medium variant

The term was revived by the German geographers in the early nineteenth century, and has been subject to slightly differing interpretations. It has been estimated that approximately 60 per cent of the earth's land may be called ecumene, while the rest constitutes nonecumene. The distinction between ecumene and nonecumene is, however, not that sharp. Areas of high concentration of population gradually merge into sparsely populated areas. Even within the ecumene one may come across areas of very sparse population. Similarly, the non-ecumene does contain dense settlement nodes in the form of oases, mining camps and other small communities.

World Population by Region in 1950

#	Region	Population (1950)	World Share
1	Asia	1,404,061,590	55.4 %
2	Europe	549,375,019	21.7 %
3	Africa	228,670,019	9 %
4	Northern America	172,602,624	6.8 %
5	Latin America and the Caribbean	168,917,693	6.7 %
6	Oceania	12,647,776	0.5 %

World Population by Region in 2050

#	Region	Population (2050)	World Share
1	Asia	5,256,927,499	53.8 %
2	Africa	2,527,556,761	25.9 %
3	Latin America and the Caribbean	779,841,201	8 %
4	Europe	715,721,014	7.3 %
5	Northern America	434,654,823	4.4 %
6	Oceania	57,121,455	0.6 %

To conclude, the magnitude of unevenness in the distribution of world population can be outlined in the form of following points:

- Almost 90 per cent of the world's population is found in the northern hemisphere, and two-thirds in the mid-latitudes between 20° and 60° N.
- A large majority of world's people occupy only a small portion of the land surface. More than 50 per cent of the population lives on merely 5 per cent of the land surface, two-thirds on 10 per cent and almost nine-tenths on less than 20 per cent.
- People tend to congregate in areas of low elevations. More than half of the world's population occupies areas below 200 metres above sea level zone containing less than 30 per cent of the land surface areas. Nearly 80 per cent reside below 500 metres.
- The margins of continents are more densely populated than interiors. Nearly two-thirds of the world's population is concentrated within 500 kms of the coast, much of it on the alluvial low lands and river valleys.

The growth of population in a region depends upon fertility, mortality and migration. Fertility or the birth rate is measured in terms of total number of live births per thousand population per year. Generally, the fertility rate is affected by various social, economic and demographic factors. Mortality or the death rate is measured in terms of total number of deaths per thousand population per year. The difference between these two rates (i.e. fertility and mortality) is called the natural growth rate. The term migration refers to the movement of people from one area to the other or from one country to another. The rate of migration affects the growth of population of a region by increasing or decreasing the number of people living there.

The growth rate of population may be positive or negative. A positive growth rate of population mean an increase in the number of people living in a region, whereas negative growth rate means declining population. A positive growth rate occurs when the number of births and in migration exceeds the number of deaths and out migration; the negative growth rate means just opposite to positive growth rate.

POPULATION COMPOSITION

The term "**Population Composition**" actually refers to the characteristics of the particular group of people. The composition or characteristics of the population can be represented in many different ways. These characteristics include the distribution of the population across the number of men relative to the number of women and also across age structure of society. Indeed, Age and Sex composition of population are considered as most important aspects of the population composition. The data on the population by Age and Sex is of great importance for the health administrators and demographers for planning of various developmental projects and initiating health programs. Basically, the classification of Urban/Rural, sex and marital status with respect to age expose the basic characteristics of any population and also provides us with the disaggregated data needed for creation of target groups under different welfare programs. Actually, these characteristics create a profile of the population and also the very attributes that in real sense give population its particular character.

There are many types of population composition and it is broadly divided into three major types

- Biological Composition
- Cultural Composition
- Economic Composition

Biological Composition:

The biological characteristics of the population include the Racial and ethnic composition of population, age composition of population and sex composition of population. Race and ethnicity are considered as related concepts. Ethnicity is used as a matter of cultural identity of a group, often based on shared ancestry, language and cultural traditions, while race refers to a group which has physical similarities. Race is a more controversial subject than ethnicity, due to common political use of the term. It is assumed that, based on power relations, there exist "racialized ethnicities" and "ethnicized races". The term race or racial group refers to dividing the human species according to physical characteristics that are inherited. The most widely used human racial types are those based on visual traits (such as skin color, cranial, facial features, or type of hair).

Social Darwinism refers to various ideologies based on a concept that competition is active among all individuals or even whole nations as social evolution in human societies. It is a social adaptation of the theory of natural selection as proposed by Charles Darwin. Natural selection explains success in various animal populations as the outcome of competition between individual organisms for limited resources. This idea is popularly known as "survival of the fittest", a term first used by Herbert Spencer, not Darwin.

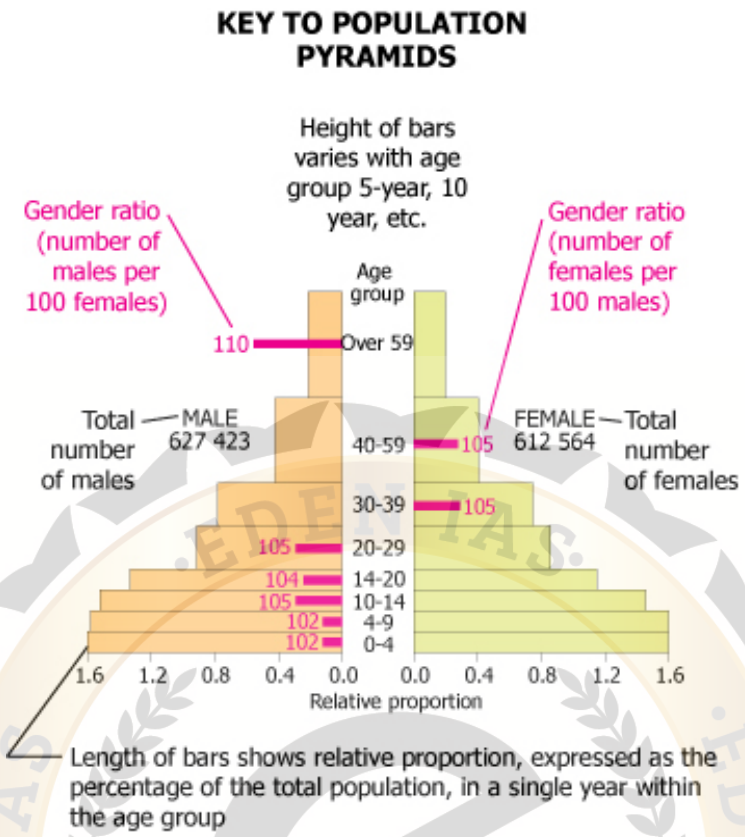
Fascist movements have commonly held social Darwinist views of nations, races, and societies. In Nazi Germany, the Nazis used social Darwinism to promote their racialist idea of the German nation was part of the Aryan race and believed in the competition of races. The Nazis tried to strengthen the 'Aryan race' in Germany by murdering those they regarded as inferior. By this they meant Jews, Slavs, Romanis and disabled people.

Most anthropologists recognize three or four basic races of man in existence today. These races can be further subdivided into as many as 30 subgroups. They are

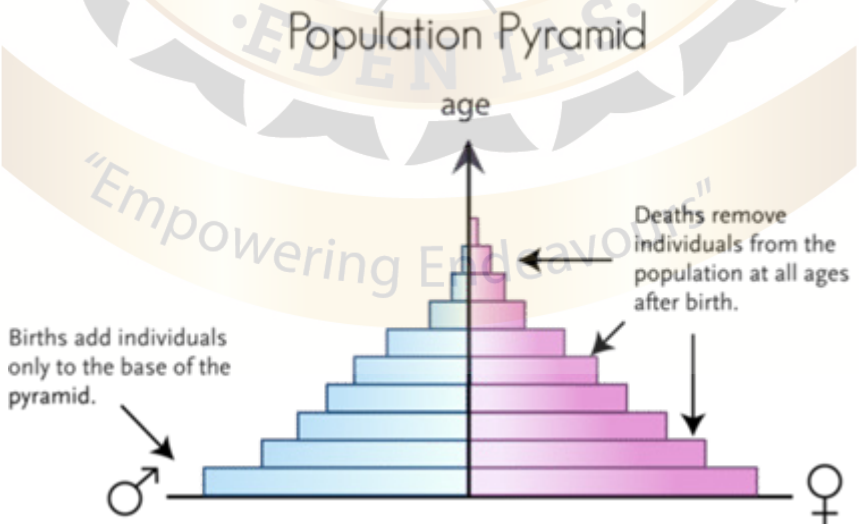
- **Caucasian races** (Aryans, Hamites, Semites)
- **Mongolian races** (northern Mongolian, Chinese and Indo-Chinese, Japanese and Korean, Tibetan, Malayan, Polynesian, Maori, Micronesian, Eskimo, American Indian),
- **Negroid races** (African, Hottentots, Melanesians/Papua, "Negrito", Australian Aborigine, Dravidians, Sinhalese)

POPULATION -PYRAMID

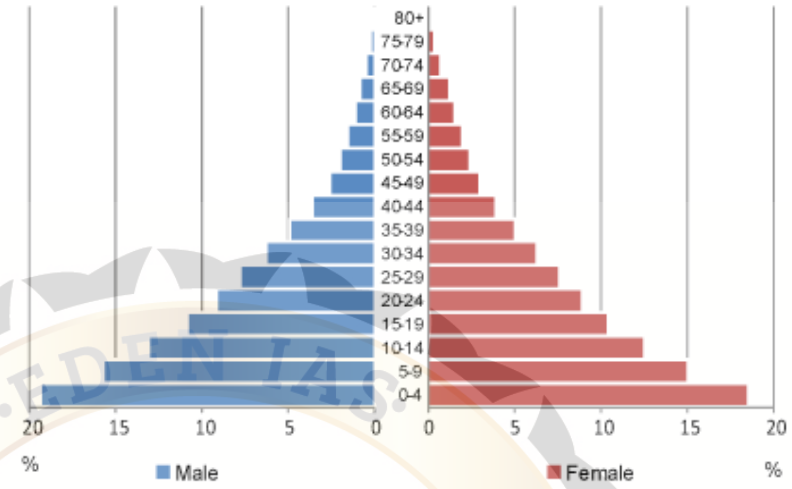
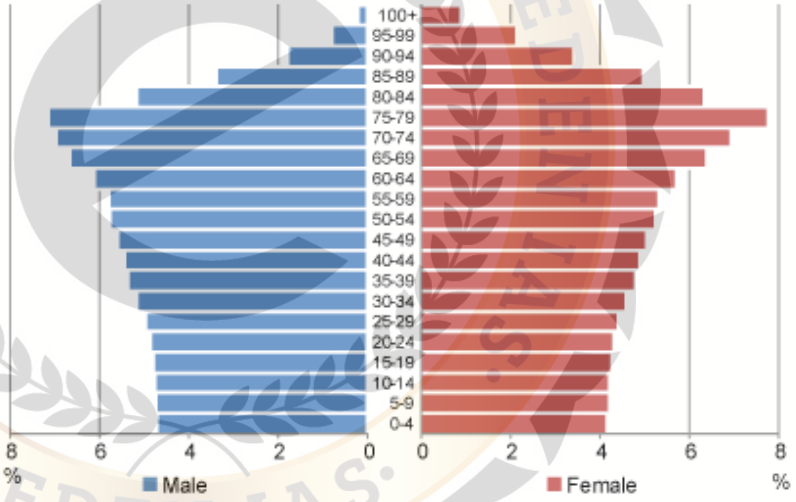
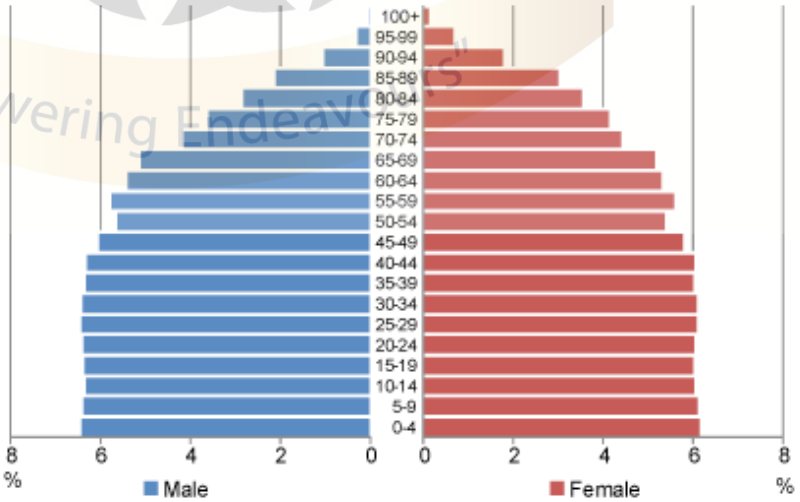
A **population pyramid**, also called an "**age-sex-pyramid**", is a graphical illustration that shows the distribution of various **age** groups in a **population** (typically that of a country or region of the world), which forms the shape of a **pyramid** when the **population** is growing. Population pyramids often contain continuous stacked-histogram bars, making it a horizontal bar diagram. The population size is depicted on the x-axis (horizontal) while the age-groups are represented on the y-axis (vertical). The size of the population can either be measured as a percentage of the total population or by raw number. Males are conventionally shown on the left and females on the right.



Population pyramids are often viewed as the most effective way to graphically depict the age and distribution of a population, partly because of the very clear image these pyramids represent. A great deal of information about the population broken down by age and sex can be read from a population pyramid, and this can shed light on the extent of development and other aspects of the population. Working population – It is the number of people between the age group of 15- 59. Dependent population – People below 14 years and 60 and above are included in this classification. Shape of pyramid shows the characteristics of the population



There are certain terms which are commonly used to describe age structures of populations, such as 'young', 'old', 'declining' etc. Below are shown the three most common types of population pyramid, with descriptions of the features of each.

Description	Example
Young and growing Young populations have a typical 'pyramid' shape, with a broad base indicating high proportions of children. Indicates a population undergoing rapid growth.	 *Population pyramid for Mali, 2010.*
Old and declining A top-heavy population pyramid with higher proportions in older age groups indicates a declining population. This may result from a long period of below replacement fertility, alongside low death rates.	 *Population pyramid for Japan, 2050 (medium-variant projection).*
Stationary A more rectangular population pyramid indicates a population which is neither growing nor declining. There are similar proportions in each age group, apart from at the oldest ages (due to mortality). The population pyramid to the right is just an approximation of what a stationary population would look like. The small fluctuations at age groups 40-59 show that this is not truly a stationary population.	 *Population pyramid for the United States, 2050 (medium-variant projection).*

These three population pyramids just show a few examples of shapes that age-sex structures can take, and the terms demographers use to describe them. However, there are many more forms which age-sex structures can take.

Cultural Composition:

Cultural composition primarily refers to composition on the basis of culture. In anthropology and geography, a cultural region, cultural sphere, cultural area or culture area refers to a geography with one relatively homogeneous human activity or complex of activities (culture). These are often associated with an ethnolinguistic group and the territory it inhabits. Specific cultures often do not limit their geographic coverage to the borders of a nation state, or to smaller subdivisions of a state. Cultural "spheres of influence" may also overlap or form concentric structures of macro cultures encompassing smaller local cultures. Different boundaries may also be drawn depending on the particular aspect of interest, such as religion and folklore vs. dress and architecture vs. language.

Economic Composition:

Economic composition refers to the composition of the population in terms of economic variables. These variables can be occupation, per capita income, per capita expenditure, per capita savings-investment with respect to age or sex etc. Generally the economic composition is made with respect to the dependency ratio. It refers to the number of dependent people with respect to the working population. A country with larger dependency ratio generally faces scarcity of investment capital as most of the income is spent on expenditure viz. pensions, health and education. Populations are also studied with respect to the occupational structure. This refers to the number of people engaged in different sectors of the economy.

CONCEPTS OF OVER, UNDER AND OPTIMUM POPULATION

Concept of over population:

The term 'overpopulation' means too great a population for a given region to support. There may be two causes: (i) population growth exceeds the existing resource base; (ii) existing resources have been depleted.

Some authors distinguish absolute overpopulation (where the absolute limit of production has been attained but standards of living remain low) from relative overpopulation (where present production does not support the population but the production can be augmented). The situation of overpopulation displays the following socio-economic characteristics: high unemployment, low incomes, low standards of living, high population density, malnutrition and famine.

Malthus, for the first time, identified the problems related to overpopulation. Later on, the Neo-Malthusians also viewed overpopulation as a major problem. Marxists argue that overpopulation is the result of the mal-distribution of resources.

Nowadays, some western geographers view overpopulation as the cause of pollution and the increasing migration from the countryside in the western countries of Europe and North America. Overpopulation strikes the lowest strata of the society the hardest particularly in developing countries such as India, Nepal, Myanmar etc. Overpopulation may occur either at national level or at regional level. Regional overpopulation when found in rural areas is attributed to

- Rapid increase of rural population,
- Skewed distribution of agricultural land,
- Lack of agricultural mechanisation,

- Lack of development of non- agricultural sector,
- Low agricultural yield,
- Lack of social development
- Non-resilience of the agricultural sector

Concept of under population:

Under population exists when a population is too small, therefore unable to fully utilise the available resource endowments. Under population is also characterised by a situation where the available resources are capable of supporting a much larger population with no reduction in living standards. The situation is found in regions of low technical development such as equatorial Congo, Amazon River basin or the rich Prairie region of North America.

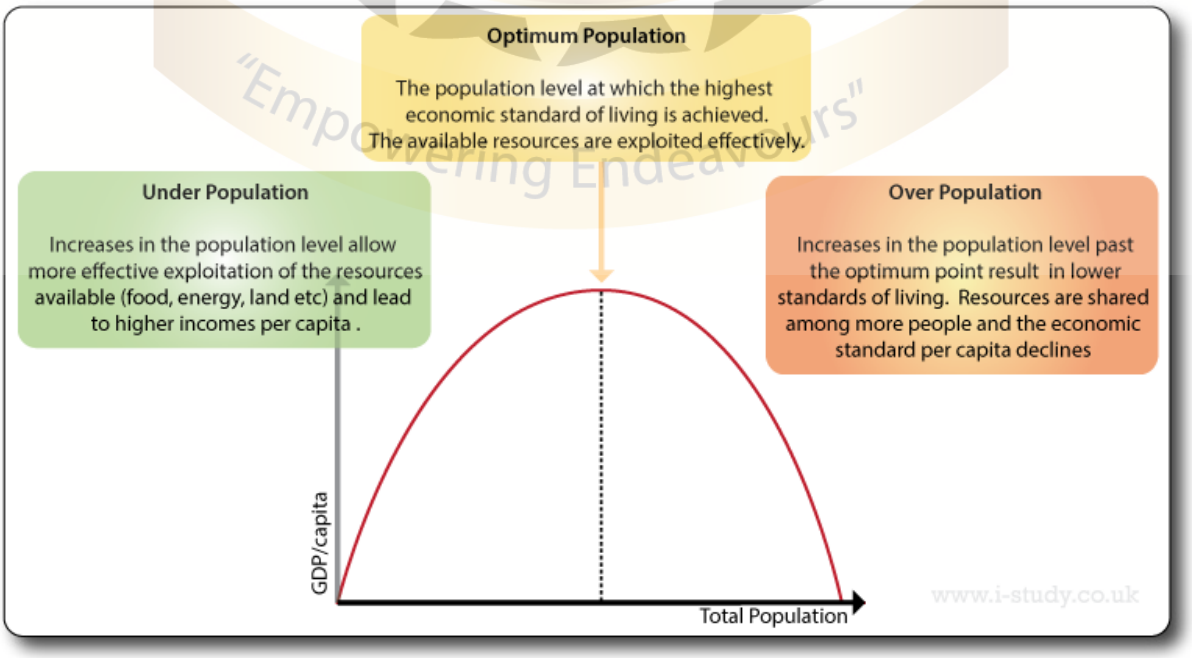
Relative under population is more common than absolute under population. Indeed, absolute under population is rarely seen and may be found in completely secluded societies where, the degree of replacement of population is less than unity. Relative under population occurs due to insufficient resource development. In developed economies, rural under population is more visible, whereas in backward countries, under population is linked to high mortality rate.

Concept of Optimum Population:

Optimum population has been defined as that size of population enabling per capita output of the maximum orders accompanied by the highest possible standards of living under a given set of economic and technological conditions. Therefore, optimum population lies between two extremes, i.e., overpopulation and under-population, although the size of optimum population is not sacrosanct.

It is a theoretically perfect situation difficult to estimate or define. Optimum population can be seen as a situation when the number of individuals can be accommodated in an area to the maximum advantage of each individual.

Thus optimum population yields highest quality of life, which means each person has access to adequate food, water, energy and air of highest quality, adequate medical care, recreational facilities and cultural outlets. In other words, optimum population permits the highest per capita output; therefore the marginal productivity exceeds the average productivity whereby the rates of growth of total production are the highest.



MIGRATION: TYPES, CAUSES AND CONSEQUENCES

Migration is the third factor for changes in the population, the other being birth rate and death rate. As compared to birth rate and death rate, migration affects the size of population differently. Migration is not a biological event like birth rate and death rate, but is influenced by the social, cultural, economic and political factors.

Migration is carried by the decision of a person or group of persons. The changes occurring in the birth rate and death rate do not affect the size and structure of the population on a large scale, while migration, at any time, may cause large scale changes in the size and structure of the population.

The study of migration is of vital importance because the birth rate, death rate and migration determine the size of population, the population growth rate and thus the structure of population. In addition, migration plays an important role in determining the distribution of population and supply of labour in the country.

Thus, the study of migration is also useful for formulating economic and other policies by the government, economists, sociologists, politicians, and planners along with demographers. Migration shows the trends of social changes.

From the historical viewpoint during the process of industrialisation and economic development, people migrated from farms to industries, from villages to cities, from one city to another and from one country to another. In modern times, technological changes are taking place in Asia, Africa and Latin America due to which these regions are witnessing large-scale migration from rural to urban areas.

Economists are interested in the study of migration because migration affects the supply of skilled and semi-skilled labourers, development of industries and commerce causing changes in the employment structure of the migrated people. Formulation of economic policies has a close relation with the process of migration because migration affects the economic and social development of a country.

People migrate for a number of reasons. These reasons may fall under these four areas: Environmental, Economic, Cultural and Socio-political. Within that, the reasons may also be 'push' or 'pull' factors.

Push Factors

Push factors are those that force the individual to move voluntarily, and in many cases, they are forced because the individual risk something if they stay. Push factors may include conflict, drought, famine, or extreme religious activity.

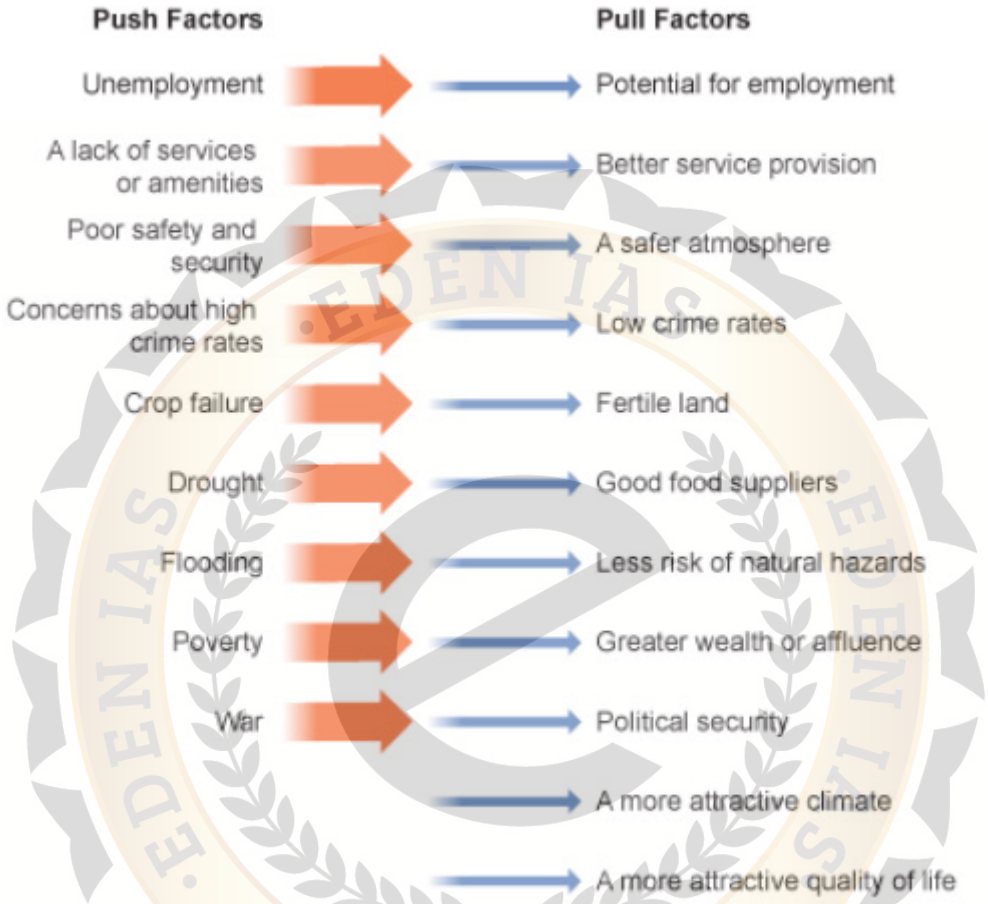
Poor economic activity and lack of job opportunities are also strong push factors for migration. Other strong push factors include race and discriminating cultures, political intolerance and persecution of people who question the status quo.

Pull Factors

Pull factors are those factors in the destination country that attract the individual or group to leave their home. Those factors are known as place utility, which is the desirability of a place that attracts people. Better economic opportunities, more jobs, and the promise of a better life often pull people into new locations.

Sometimes individuals have ideas and perceptions about places that are not necessarily correct, but are strong pull factors for that individual. As people grow older and retire, many look for places with warm weather, peaceful and comfortable locations to spend their retirement after a lifetime of hard work and savings. Such ideal places are pull factors too.

Very often, people consider and prefer opportunities closer to their location than similar opportunities farther away. In the same vein, people often like to move to places with better cultural, political, climatic and general terrain in closer locations than locations farther away. It is rare to find people move over very long distances to settle in places that they have little knowledge of. However many times both push and pull factors are more imagined than real.



There are two basic types of migration studied by demographers:

Internal migration- This refers to a change of residence within national boundaries, such as between states, provinces, cities, or municipalities. An internal migrant is someone who moves to a different administrative territory. Internal migrations can be rural-to-rural, rural-to-urban, urban-to-rural or urban-to-urban.

International migration- This refers to change of residence over national boundaries. An international migrant is someone who moves to a different country. International migrants are further classified as legal immigrants, illegal immigrants, and refugees. Legal immigrants are those who moved with the legal permission of the receiver nation, illegal immigrants are those who moved without legal permission, and refugees are those crossed an international boundary to escape persecution.

Why Do People Migrate?

- For economical, environmental, socio-cultural or political reasons.
- Migration can be voluntary or forced, temporary or permanent, national or international.
- Population movements are driven and sustained by potential push and pull forces due to an imbalance in economic activities and opportunities.

- Push factors are features of the home area which creates pressure and so causes people to move away. e.g. persecution, unemployment & poverty.
- Pull factors operate at places outside of the migrant's home area to attract individuals to a new location. e.g. political asylum, a promotion, high living standards in another area.

Consequences of Migration on the Country of Origin

Economic Impacts

Positive

- The area benefits from remittances sent home.
- Upon return, migrants bring new skills to the country such as the ability to speak foreign languages. These new skills can help to improve the economy in the country of origin.
- There is less pressure on resources such as food and social services such as health care.

Negative

- Loss of young workforce; those with skills and those with entrepreneurial talents move, slowing economic development.
- Loss of labour may reduce inward investment by private companies, increasing dependencies on government initiatives.

Social Impacts

Positives

- Population density is reduced and birth rate falls as it's the younger population who migrates. This can help ease overpopulation.
- Remittances sent home by economic migrants can be used to finance improved education & health service.
- Returning migrants increase social expectations for communities, for example, increasing demand for better leisure facilities.

Negatives

- Marriage rates fall and family structures break down as men migrate producing a generation of single mums.
- Lots of young people migrating out of the country can increase the dependency ratio.
- Returning retired migrants may increase social costs on the community as support mechanisms aren't in place for them.
- Migration of men and young families can cause a loss of cultural leadership and traditions.

Political Impacts

- Policies to encourage natural increase can be developed.
- Policies to encourage immigration to counteract outflow.
- Requests for international aid.

Consequences of Migration on the Host Country

Economic Impacts

Positive

- Migrants take up less desirable, menial jobs which natives would not take but need filling.
- The host country can gain skilled labour for cheap.
- There is a labour surplus; those with skills and education fuel the economy.
- The "skill gap" in many host countries can be filled by migrants.
- Costs of retirement can be transferred to the country of origin.

Negatives

- Migrant children must be educated; they won't necessarily speak the native language of the host country.
- There is an over dependency in some industries on migrant labour, leading to a lack of jobs for people native to the host country.
- Much of the money earned by the migrants isn't spent in the host country and is instead sent back to the country of origin.
- More people increase the pressure on resources and services such as health care systems.

Social Impacts

Positive

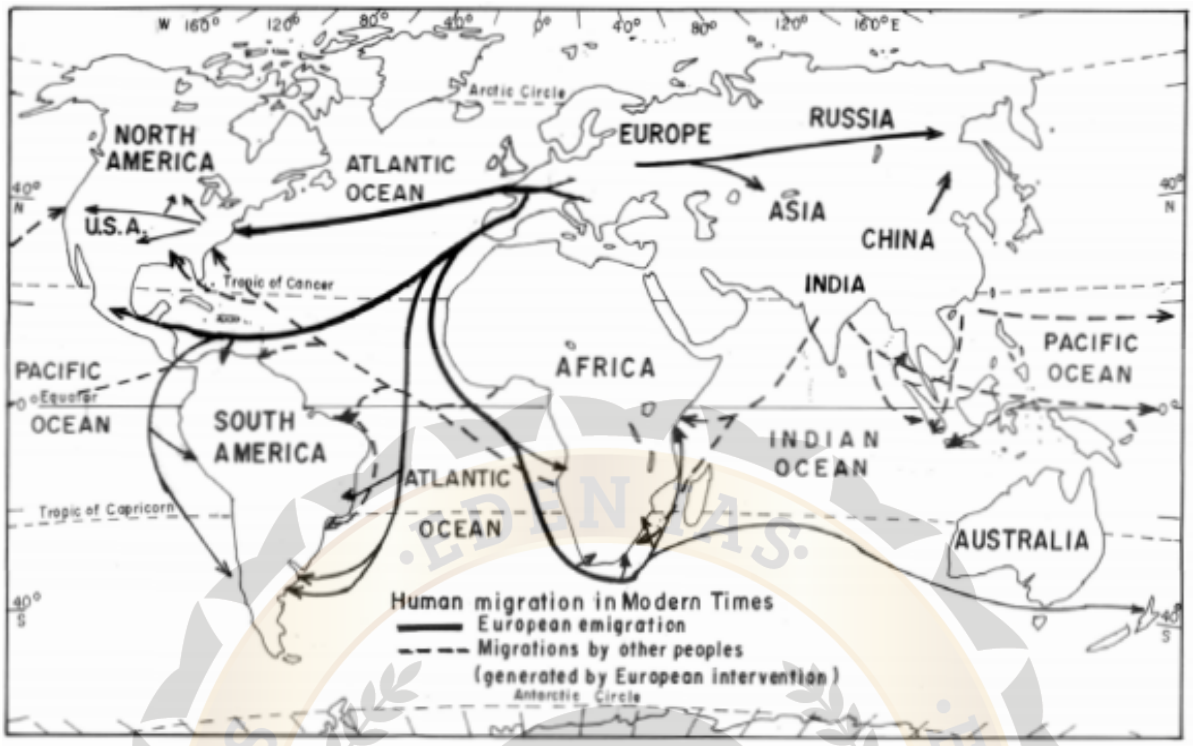
- The creation of a multiethnic society increases understanding and tolerance of other cultures.
- There is an influx of new or revitalised services e.g. South Indian Shops or Punjabi Dhabas
- People from other countries can encourage the learning of new languages, helping people develop skills for working internationally.

Negatives

- The dominance of males is reinforced (due to the large number of male migrants), especially in cultures where women already have a low status.
- Aspects of cultural identity are lost, especially in second generation children.
- Segregated ethnic areas are created e.g. China Town. Schools become dominated by migrant children.

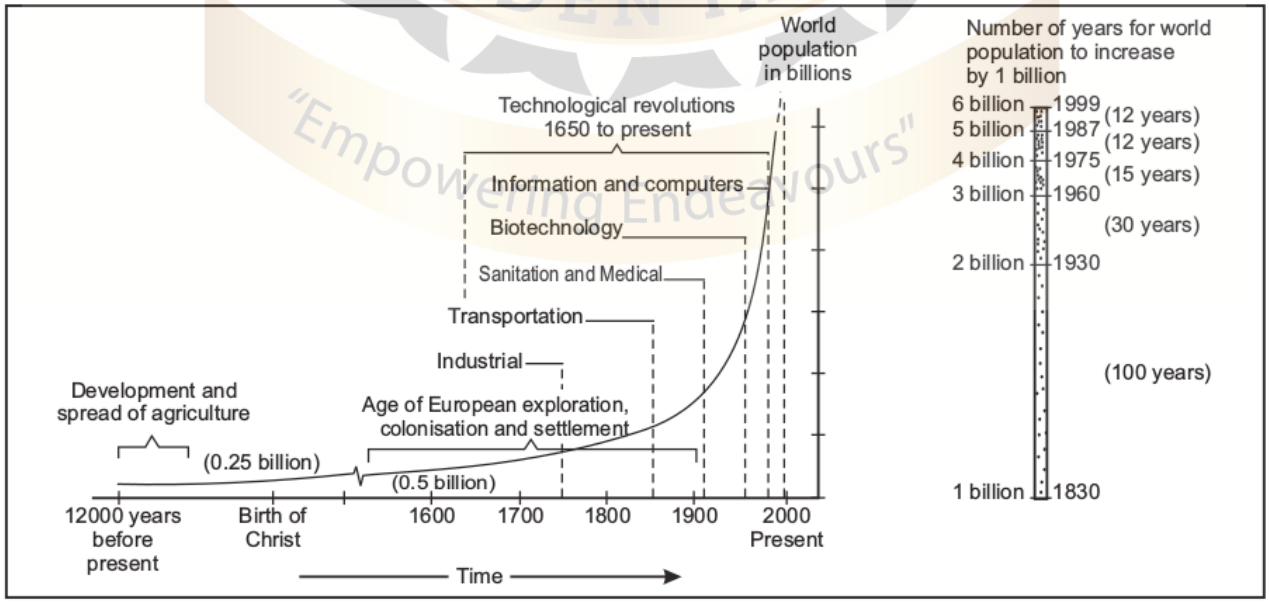
Political Impacts

- Discrimination against ethnic groups & minorities which can lead to civil unrest and extremism.
- Calls for control on immigration.
- Entrenchment of attitudes which may encourage fundamentalism.



TRENDS IN POPULATION GROWTH

In the early stages of development, the hunters, gatherers and farmers, used only simple tools and moved from place to place. Even after the agricultural revolution about 12,000 to 8,000 years ago, the size of human population was small and human activities were simple in nature. As such, human impact on environment was insignificant. The population growth was slow which may be ascertained from the fact that the world population in the first century AD was only 250 millions. The stage for rapid population growth was set by the expanding trade in the sixteenth and the seventeenth centuries. The world population at the dawn of Industrial Revolution i.e. around 1750 was about 0.5 billion. It, however, exploded in the eighteenth century after the Industrial Revolution. A series of dramatic technological changes rapidly expanded the resource base and provided a foundation for accelerated population growth that continued for more than two centuries.

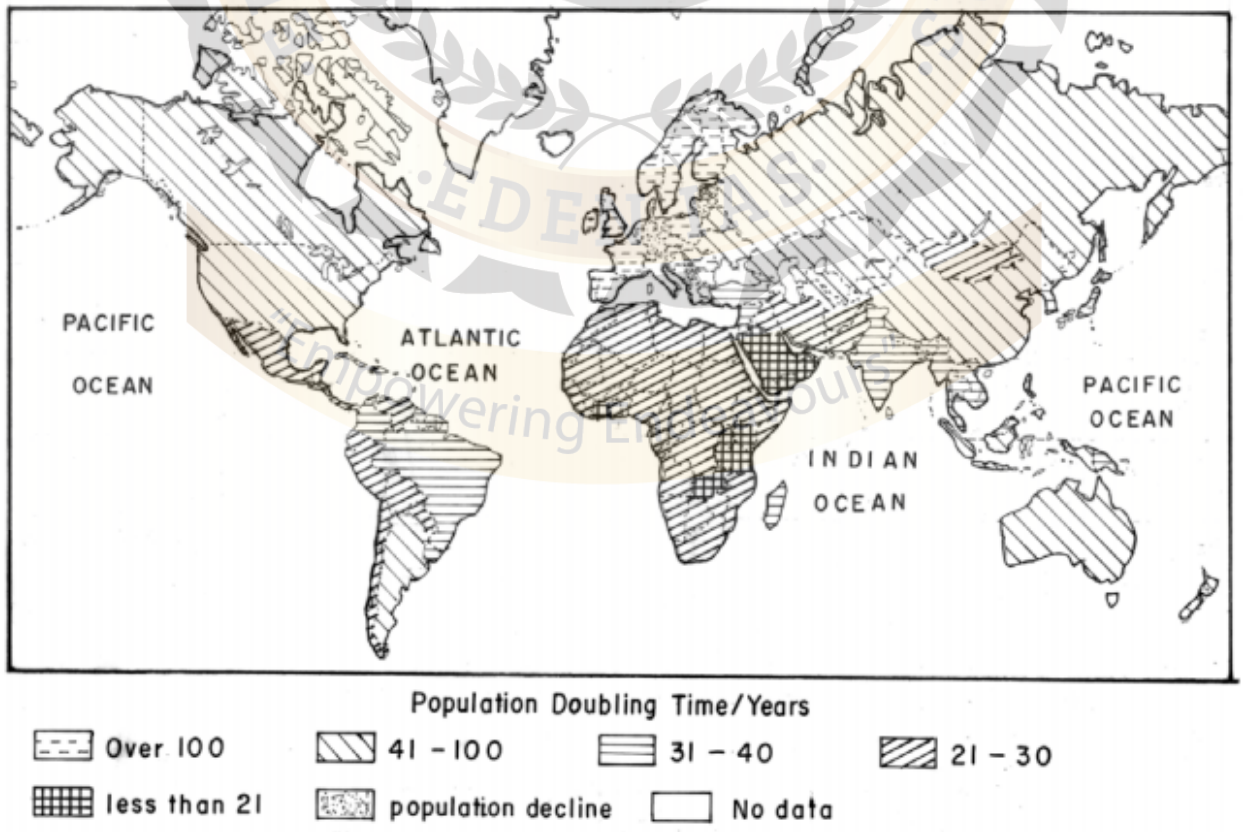


Resource, Technology and Population Growth

The development of steam engine supplemented and then replaced human and animal energy. It provided the mechanised energy of water and wind. Mechanisation improved agricultural and industrial production. Scientific and technological advancements enhanced quality of life in economically developed countries. Improvement in medical facilities and sanitation changed global population dynamics quickly and dramatically. Inoculation against epidemics and other communicable diseases, suppression or elimination of many disease vectors and improvement in sanitation contributed to the rapid decline in the death rates, in virtually all parts of the world. There has been no looking back since then. When the Industrial Revolution began, the world population was growing at about 0.12 per cent a year, but the rate accelerated dramatically to 1.0 per cent by 1930 and to 2.1 per cent by early 1960s. The fast growth rate of population was a cause of concern for the world. Many developed countries were quick to respond. The developing countries are gradually trying to check this rapid growth. During past four decades, the growth rate has slowly declined and the current growth rate is 1.4 per cent. The trend of declining growth rates is likely to continue, though it varies significantly between developed and developing countries. In developed countries, population growth has slowed down to 0.1 per cent a year. In many developing countries also the rate of growth is declining but it is over 1 per cent. It is estimated that the world population will reach 6.8 billion by 2010 and 8 billion by 2025. It is assumed that over 98 per cent of the total population increase (about 2 billion) will take place in the developing countries during the next 25 years. Accordingly, the developed countries which currently have 20 per cent of world population will have only 15 per cent by 2025.

DOUBLING TIME OF WORLD POPULATION

Seventy one countries with current growth rates between 2 and 2.9 percent will double their population in 24-35 years, and 14 countries with growth rates between 3 to 4.4 per cent will double in 16 to 23 years. About one-fourth of the world's population lives in 90 countries, whose population may double in one or two generations. India provides a sobering example, for if it's current 1.9 per cent natural increase continues, its population of over 1 billion would double in approx 36-38 years. The deadly HIV/AIDS epidemics in Africa and some parts of Asia are measurably slowing population growth



Annual Population Growth (Percentage)	*Country/Region*	*Population Doubling Time (in Years)*
3.3	Chad	21
2.8	Iraq, Pakistan	25
2.6	Sub-Sahara Africa	27
2.5	**Africa**	28
2.0	Egypt	35
1.9	India	36
1.8	**Latin America,** Bangladesh	38
1.5	**Asia,** Brazil	46
1.2	**World,** Sri Lanka	58
1.1	**Oceania,** Thailand	63
1.0	China, Singapore	70
0.7	**Australia**	104
0.6	**North America,** USA	116
0.2	Japan, UK, Finland	318
0.0	Spain, Austria	–
-0.1	**Europe,** Germany	–
-0.5	Russia	–
-0.6	Ukraine	–

DEMOGRAPHIC TRANSITION MODEL

Demographic transition is a term, first used by Warren S. Thompson (1929), and later on by Frank W. Notestein (1945), referring to a historical process of change which accounts the trends in births, deaths and population growth that occurred in today's industrialized societies, especially European societies. This process of demographic change began for the most part in the later 18th century.

Demographic transition should not be regarded as a 'law of population growth', but as a generalized description of the evolutionary process. In simple terms, it is a theory which attempts to specify general laws by which human populations change in size and structure during industrialization. It is frequently accepted as a useful tool in describing the demographic history of a country.

The theory postulates a particular pattern of demographic change from a high fertility and high mortality to a low fertility and low mortality when a society progresses from a largely rural agrarian and illiterate society to a dominant urban, industrial, literate and modern society.

It is typically viewed as a three-step process:

(i) That the decline in immortality comes before the decline in fertility,

(ii) That the fertility eventually declines to match mortality, and

(iii) That socio-economic transformation of a society takes place simultaneously with its demographic transformation.

The demographic transition theory is characterized by conspicuous transition stages. The transition from high birth and death rates to low rates can be divided into three stages (some scholars like Haggett, 1975 have divided into four or five stages):

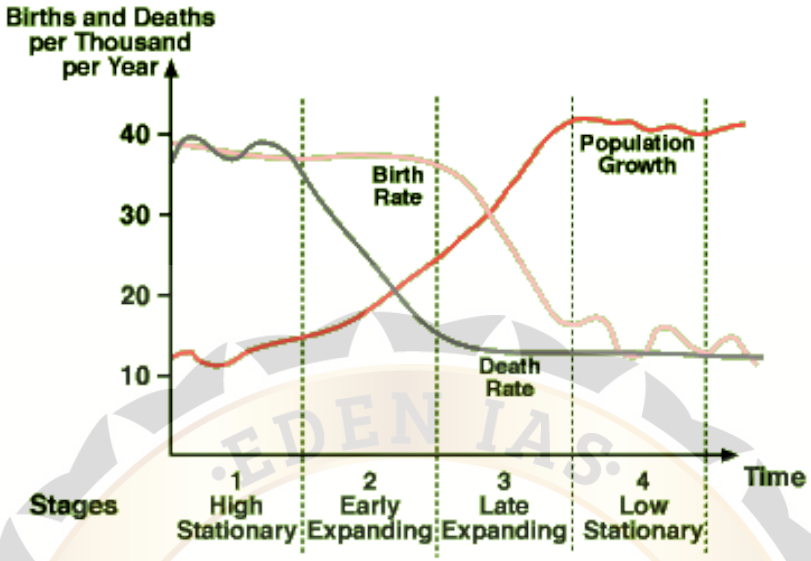
i. High Stationary: - High and fluctuating birth and death rates with little population growth. Generally in this stage the death rates are more volatile than birth rates.

ii. Early Expanding: - High birth rates and declining death rates with rapid population growth.

iii. Late Expanding: - Low birth and death rates with slow population growth.

iv. Low Stationary: - Birth and death rates both decline appreciably leading to zero population growth. In this stage the Birth rates are more volatile than death rates.

Demographic Transition Model



The theory holds that pre-industrial societies were characterized by stable populations which had both a high death rate and birth rate. It postulates a little and slows population growth. The theory states that the high mortality rates characteristic of undeveloped areas will decline before fertility rates which are also high.

- In the second stage of transition, death rates (especially the infant deaths) begin to fall as a result of advances in public health and sanitation as well as improvements in nutrition and food supply. Since the birth rate continues to remain high relative to the declining death rate, there is a rapid 'transitional' growth as we find in India today.

- In the third stage, changes in social attitudes, the introduction of cheap forms of contraception and increases in life expectancy create social pressures for smaller families and for a reduction of fertility.

- The diffusion of knowledge and cheap medical technology has brought many non-industrial societies into this stage of the demographic transition however; these societies have been unable to enter the fourth stage. The result has been very high rates of population growth in countries that are not experiencing corresponding economic growth.

- In the last stage of demographic transition birth and death rates decline appreciably which eventually becomes approximately equal, and in time it will result in zero population growth. Before this stage begins, there can be one more stage in which low birth and death rates lead to slow population growth.

The populations of advanced, urban industrial societies, which have entered the last stage, are now stable with low birth and death rates. In some cases (e.g., Eastern and Central Europe) birth rates have fallen so slow that the rate of natural increase was actually zero or negative. In this stage, the technical know-how is abundant, the deliberate controls on family planning are common and the literacy and education levels are also very high.

Death rates are high because of lack of adequate nutritive food, primitive sanitary conditions and absence of any preventive and curative measures of control over diseases. A high birth rate, on the other hand, is a functional response to high death rates, particularly among infants and children. In the present-day world, as would be true of any point in time, different countries of the world are at different stages of the demographic transition. In the opinion of Glenn Trewartha (1969), this is largely due to the dual nature of man.

According to him, biologically, man is same everywhere and is engaged in the process of reproduction but culturally man differs from one part of the world to another. It is the cultural diversity of man that gives

rise to varying fertility patterns in different areas resulting in different stages of demographic transition discussed above.

Criticisms:

Although the theory of demographic transition has been appreciated widely by the demographers, it has been criticized on many grounds also. There are even critics who have gone to the extent of saying that it cannot be called a theory. The main points of criticism are:

- Firstly, this theory is merely based upon the empirical observations or the experiences of Europe, America and Australia.
- Secondly, it is neither predictive nor its stages are segmental and inevitable.
- Thirdly, the role of man's technical innovations cannot be underrated, particularly in the field of medicine, which can arrest the rate of mortality.
- Fourthly, neither does it provide a fundamental explanation of the process of fertility decline, nor does it identify the crucial variables involved in it.
- Fifthly, it does not provide a time frame for a country to move from one stage to another.
- Finally, it does not hold good for the developing countries of the world, which have recently experienced unprecedented growth in population due to drastic decline in death rates.

In spite of these criticisms and shortcomings, the demographic transition theory does provide an effective portrayal of the world's demographic history at macro level of generalizations. As an empirical generalization developed on the basis of observing the demographic trend in the West, the transition process for any country can easily be understood.

RURAL-URBAN COMPOSITION

The division of population into rural and urban is based on the residence and is made at a different size-point in most of the countries. This division is necessary because both of them differ from each other in terms of their livelihood and social environment. The occupational structure, density of population, and level of social and economic growth, vary between the two groups. People living in the villages and engaged in agriculture or primary activities are categorised as 'rural'. The urban population, on the other hand are engaged in nonagricultural activities. People are attracted to urban areas in search of employment opportunities, better social facilities and higher standard of living.

The urban population increases due to natural growth and migration of people from rural areas. Criteria of labelling a settlement urban vary from one country to another. In USA, an area with a population of less than 2,500 is considered rural, while an area of more than 2,500 inhabitants is called urban. In India, all areas which are not urban are, by definition, rural. Percentage of rural population is higher in farm-based agricultural countries, while industrially developed regions have higher share of urban population. The urban population of the world has been growing more rapidly than the rural population since the emergence of first urban settlement.

A prominent feature of population redistribution, particularly in developing countries, is the growth of major cities. Almost half the world's population lives in cities. Between 1960 and 2000, the urban population increased more than three times i.e. from 800 million to 2.8 billion. During the same period, the world's total population doubled from 3 billion to 6 billion. It is projected that there will be about 8 billion city dwellers by 2030, and 80 per cent of them will live in developing countries. The rate of urbanisation of the world's population is accelerating significantly as a result of the global shift to technological, industrial and service-based economies. As a result, few countries would be able to handle the consequent urban population increase which is causing problems on an unprecedented scale. Ten million people die annually in densely populated urban areas from conditions produced by substandard housing and poor sanitation. About 500 million people, worldwide are either homeless or living in housing that is life threatening.

OCCUPATIONAL STRUCTURE

The economically active section of any population is generally, defined as 'those who are engaged in remunerative occupation and who seek a livelihood in such occupations'. Children below working age, old people, retired persons, housewives and students, who are not engaged in economic pursuits for their livelihood are excluded from the 'active' population. The proportional distribution of this active population under specific economic activities is known as occupational structure.

The United Nations has identified the following categories of occupations: agriculture, forestry, hunting and fishing; mining and quarrying; manufacturing industry; construction; electricity, gas, water and health services; commerce; transport, storage and communication services; unclassified occupations. This classification is essential for international comparisons but each country classifies its population in different occupational categories according to its own needs.

An alternative form of classification reduces the above categories to four major groups : primary activities, including hunting, agriculture, forestry and fishing; secondary activities including manufacturing, power; and tertiary activities, including transport, communication and other services; and quaternary activities including more intellectual occupations, whose task is to think, research and develop ideas.

The proportion of working population engaged in these activities vary significantly among different countries depending upon their levels of economic development. The proportion of working population is very high in primary activities, if the economy is less developed. As it moves forward, the proportion in secondary and then in tertiary increase gradually.

In highly industrialised countries, the proportion of people employed in tertiary sector is more than 40-45 per cent. In the USA, it is more than 70 per cent. Statistics are not available for quaternary sector, but it is suggested that though it employs a small percentage at the moment, it is characterised by the highest income and a high degree of mobility.

POPULATION AND DEVELOPMENT

People are central to the development process and an integral element in all development strategies. There are many different and often conflicting views on the meaning of development. The most appropriate strategies need to be followed at different points of time and in space. Large size population has been

viewed by many as a negative factor in the development. However, much depends on its quality.

Relationship between population and food supply has been a subject of study ever since Malthus projected a grim future for humanity, if population continued to rise faster than food production. Given the uneven rate of population growth and technological breakthroughs in food production, there are difficulties in forecasting rates of increase in food supply or how consumption will vary.

The fact, however, remains that over use or misuse of the land with a view to increase food production has its serious implications for environment and thus indirectly for food security. The vital questions to explore are: Are these regional differences in the rate of population growth in consonance with the regional disparities in the supporting capacity of the areas? If not, how far are these differences in growth rate responsible for creating imbalance between the population and the resources? Growth of population thus becomes a vital element in any assessment of population resource balance. But we cannot ignore the fact that high growth of population or the deficiency of the resources alone are not responsible for the imbalance.

The nature of social structure, the stage of technological advancement, the characteristics of distribution system and the public policies are the elements that influence the balance between the people and the resources. Thus, the number that a given piece of land can support does not merely depend upon its physical resources, but also upon a set of social, economic, technological and political conditions. Therefore, in any assessment of balance between the population and means of subsistence all these constitute important elements of the system. This complex relationship has been presented by different scholars/thinkers as models and theories. Presently, we will get introduced to the concept of Human Development which provides an alternative to the view of development equated exclusively with economic development.

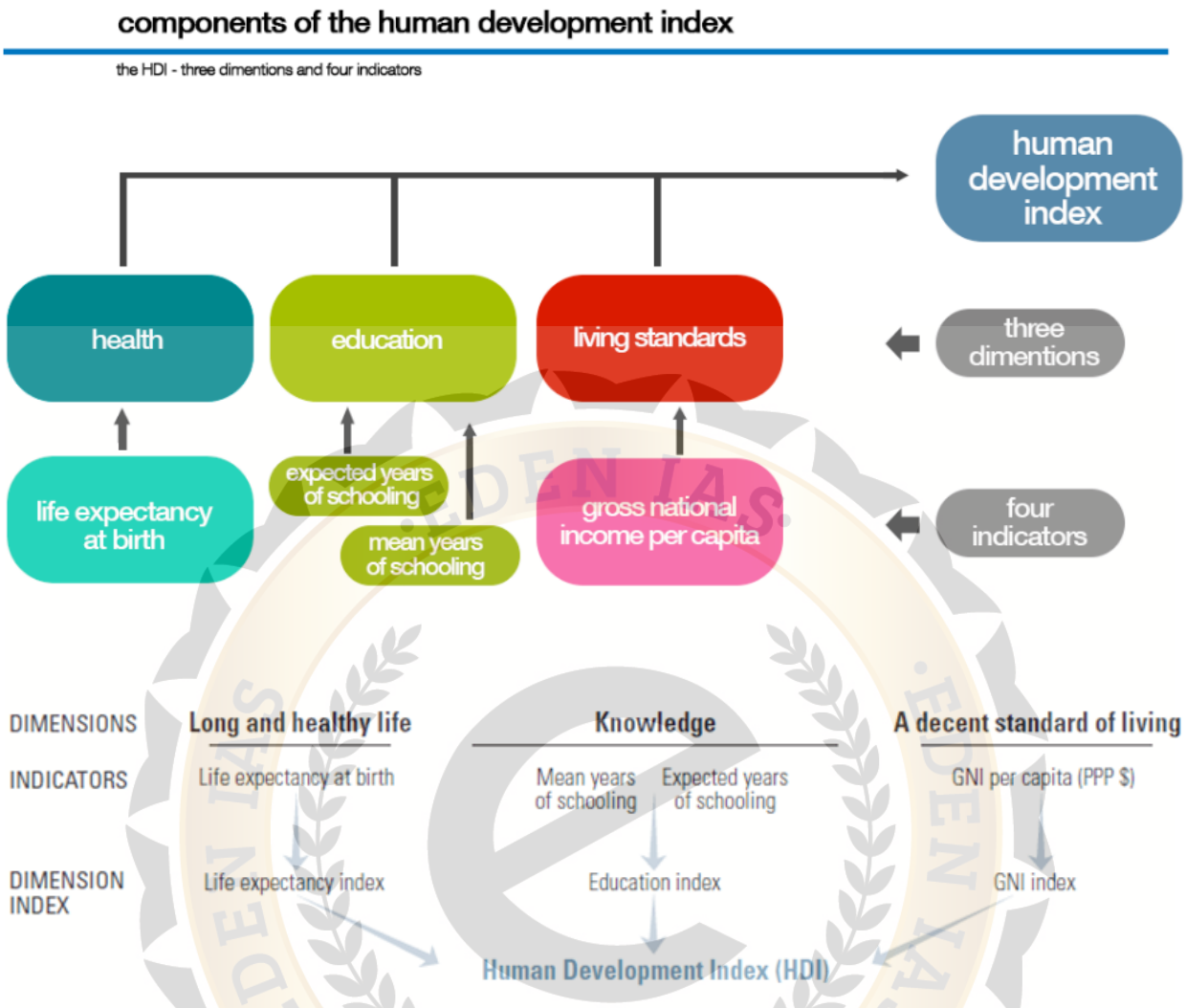
HUMAN DEVELOPMENT INDEX (HDI)

The origins of the HDI are found in the annual Human Development Reports produced by the Human Development Report Office of the United Nations Development Programme (UNDP). These were devised and launched by Pakistani economist Mahbub ul Haq in 1990, and had the explicit purpose "to shift the focus of development economics from national income accounting to people-centered policies". To produce the Human Development Reports, Mahbub ul Haq formed a group of development economists including Paul Streeten, Frances Stewart, Gustav Ranis, Keith Griffin, Sudhir Anand, and Meghnad Desai. Nobel laureate Amartya Sen utilized Haq's work in his own work on human capabilities.

The Human Development Index (HDI) is a statistic composite index of life expectancy, education, and per capita income indicators, which are used to rank countries into four tiers of human development. A country scores a higher HDI when the lifespan is higher, the education level is higher, and the gross national income GNI (PPP) per capita is higher.

The 2010 Human Development Report introduced an Inequality-adjusted Human Development Index (IHDI). While the simple HDI remains useful, it stated that "the IHDI is the actual level of human development (accounting for inequality)", and "the HDI can be viewed as an index of 'potential' human development (or the maximum IHDI that could be achieved if there were no inequality)". The index does not take into account several factors, such as the net wealth per capita or the relative quality of goods in a country. This situation tends to lower the ranking for some of the most advanced countries, such as the G7 members and others.

The index is based on the human development approach, developed by Amartya Sen, often framed in terms of whether people are able **to "be" and "do"** desirable things in life. Examples include—Being: well fed, sheltered, healthy; Doings: work, education, voting, participating in community life. The freedom of choice is central—someone choosing to be hungry (as during a religious fast) is quite different from someone who is hungry because they cannot afford to buy food, or because the country is in a famine



In 2010 three indices were launched to monitor poverty, inequality and gender empowerment across multiple human development dimensions

- The Multidimensional Poverty Index (MPI),
- The Inequality-adjusted Human Development Index (IHDI)
- The Gender Inequality Index (GII).

In 2014 the Gender Development Index (GDI) was introduced.

UNIT-II

[SETTLEMENT GEOGRAPHY]

HUMAN SETTLEMENTS

One of the basic human needs is shelter. It may be in the form of a hut, a house, an apartment or a big mansion. Settlement refers to an organised colony of human beings together with the buildings in which they live or use and the paths and streets over which they travel. It includes the temporary camp of the hunters and herders; the permanent settlements called villages; and large urban agglomerations. Human settlements may consist of only a few dwelling units (hamlets), or they may be as large as megalopolis with a big cluster of buildings accommodating millions of people. Settlements can be studied in terms of their site, situation, size buildings, form, function, internal structure, external linkage, and roles in the national and global economy. Site refers to the actual piece of ground on which the settlement is built. Situation or Position refers to the location of the village or town in relation to surrounding areas.

The site and situation of the settlements and the type of building may be studied in relation to the physical environment and cultural heritage. For example, a village may be sited on a hill or a river bank. Such a site will determine its access to water and the likely inundation in rainy season. The form of settlement in any particular region also reflects human perception of the natural environment. The functions, linkages and roles reveal the nature of hinterland from which the settlement gets sustenance and the level of overall development. Settlements have evolved to the present form over a long period of time. Throughout history, each new innovation in agricultural and industrial techniques has had its effect on settlement structure and patterns in all parts of the world: developed or developing. In the agricultural era, rural settlements predominated. The Industrial Revolution gave rise to urban settlements both small and big. Changing cultural and social nodes are clearly reflected in the structure and functions of settlements.

Settlements vary in size and type. They range from a hamlet to metropolitan cities. With size, the economic character and social structure of settlements changes and so do its ecology and technology. Settlements could be small and sparsely spaced; they may also be large and closely spaced. The sparsely located small settlements are called villages, specialising in agriculture or other primary activities. On the other hand, there are fewer but larger settlements which are termed as urban settlements specialising in secondary and tertiary activities. The basic differences between rural and urban settlements are as follows:

- The rural settlements derive their life support or basic economic needs from land based primary economic activities, whereas, urban settlements, depend on processing of raw materials and manufacturing of finished goods on the one hand and a variety of services on the other.

- Cities act as nodes of economic growth; provide goods and services not only to urban dwellers but also to the people of the rural settlements in their hinterlands in return for food and raw materials. This functional relationship between the urban and rural settlements takes place through transport and communication network.

- Rural and urban settlements differ in terms of social relationship, attitude and outlook. Rural people are less mobile and therefore, social relations among them are intimate. In urban areas, on the other hand, way of life is complex and fast, and social relations are formal.

There are four basic principles relating to settlement formation.

- Maximization of potential contacts
- Minimum effort in terms of energy, time and cost
- Optimization of man's protective space if he is alone or with others
- Optimization of the quality of man's relationship with his environment

TYPES AND PATTERNS OF RURAL SETTLEMENTS

Before discussing types and patterns of rural settlements, let us have some idea about the words: – type and pattern. Type refers to a category of things having some common features whereas pattern refers to a regular form or order in which a series of things occur. When we say settlement pattern, the term is strictly applied to the spatial arrangement or distribution of settlements within a given area. It differs from settlement form. Settlement form relates more to the spatial characteristics of individual settlement. However, sometimes forms and patterns are used interchangeably. But here we will discuss about the patterns only. As far as type of rural settlements is concerned, it implies the degree of dispersion of the dwellings.

Types of Rural Settlements

Geographers have suggested various schemes of classification. If we group settlements found all over the country, these can broadly be grouped under four categories:

1. Compact/clustered/nucleated settlement
2. Semi-compact/Semi-clustered/fragmented settlement
3. Hamleted settlement
4. Dispersed settlement.

Let us discuss these types one by one along with some of the major patterns associated with each type.

Compact Settlements: As the name suggests, these settlements have closely built up area. Therefore in such settlements all the dwellings are concentrated in one central sites and these inhabited area is distinct and separated from the farms and pastures. Maximum settlements of our country come under this category. They are spread over almost every part of the country. These settlements are distributed over the entire northern Indo-Ganga plain (from Punjab in the north-west to West Bengal in the east), Orissa coast, basins of Mahanadi in Chhattisgarh, coastal areas of Andhra Pradesh, Cauvery delta of Tamil Nadu, Maidans of Karnataka, lower Assam and Tripura, in the valleys of Shiwaliks etc. Sometimes people live in compact settlement for security or defence purpose. The greatest example of this type is in Bundelkhand region of Madhya Pradesh and Uttar Pradesh. In Rajasthan also people live in compact settlement because of the scarce availability of cultivable land and water body. Therefore, they want to make maximum use of available natural resources. Such settlements generally range from a cluster of about thirty to hundreds of dwelling of different forms, size and functions. On an average their size various from 500 to 2,500 persons

in sparsely populated parts of Rajasthan to more than 10,000 persons in Ganga plain. Very often these settlements have a definite pattern due to closely built area and intervening street patterns. The major patterns are: (i) Linear pattern (ii) Rectangular pattern (iii) Circular pattern (iv) Square pattern (v) Radial pattern. Though there are many minor patterns

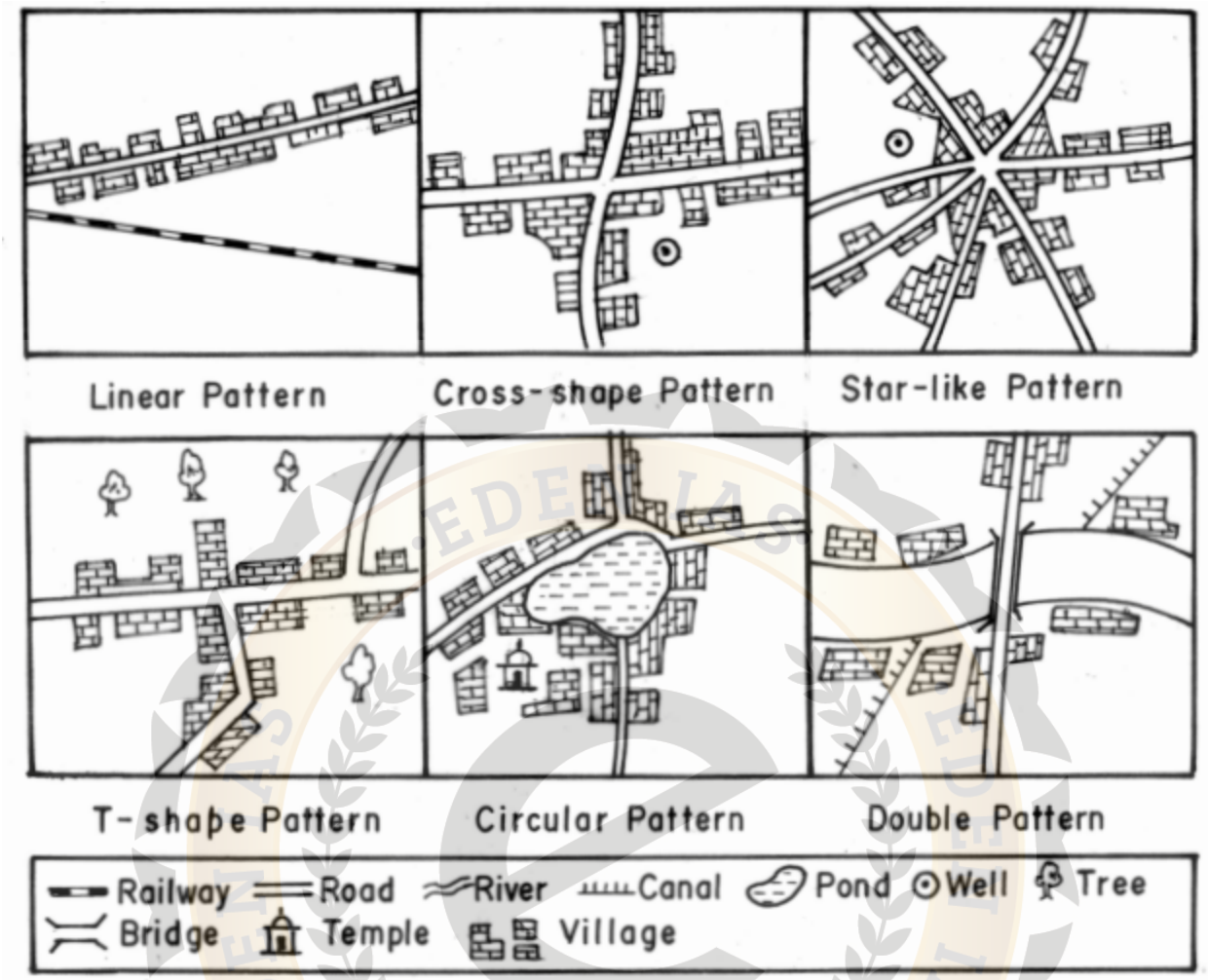
(i) Linear Pattern: It is commonly found along main roads, railways, streams, etc. It may have a single row of houses arranged along the main artery. For example rural settlements found along the sea coast, river valley, mountain ranges etc.

(ii) Rectangular Pattern: This is a very common type which develops around the rectangular shape of agricultural fields as it is common to find a system of land measurement based on square units. Village paths and cart tracks also confirm to the rectangular field patterns and run through the village in north-south and east-west directions. Accessibility to farms and fields and connectivity to other settlements lead to rectangular shape of settlements. The settlements of coastal Maharashtra and Andhra Pradesh and either side of Aravali hills, etc. may be cited for examples.

(iii) Square Pattern: This is basically a variant of rectangular type. Such a pattern is associated with villages lying at the crossing of cart tracks or roads and also related to features restricting the extension of the village outside a square space. These features may include an old boundary wall, thick orchards, a road or a pond.

(iv) Circular Pattern: In the upper Doab and Trans – Yamuna districts, Malwa region, Punjab and Gujarat, large villages are characterized by a very high degree of compactness. The outer walls of dwellings adjoin each other and present a continuous front so that when viewed from outside, the villages look like a walled and fortified enclosure pierced by a few openings. The round form was a natural outcome of maximum aggregation for the purpose of defence during the past. Sometimes circular villages develop around lakes, tanks or simply an open space which is often used for keeping the livestock to protect them from wild animals.

(v) Radial Pattern: In this type, a number of streets converge on one centre which may be a source of water (pond, well), a temple or mosque, a centre of commercial activity or simply an open space. Thus, the streets seem to be radiating from a common centre. Examples are settlements near Gurushikar, Mount Abu in Rajasthan, Vindhyachal etc.



Semi- Compact Settlement: As the name suggests, the dwellings or houses are not well-knitted. Such settlements are characterized by a small but compact nucleus around which hamlets are dispersed. It covers more area than the compact settlements. These settlements are found both in plains and plateaus depending upon the environmental conditions prevailing in that area. Such settlements are situated along streams in Manipur Mandla and Balaghat districts of Madhya Pradesh, and in Chhattisgarh. Different tribal groups inhabit such settlements in the Chotanagpur region. In Nagaland, such settlements may be in the form of blushing villages. Like, compact settlements, semi-compact settlements may also have different patterns. Some of the patterns are (i) checker board pattern (ii) Elongated pattern (iii) Fan shaped pattern.

(i) Checker Board Pattern: This is a type of settlement found generally at the junction of two roads. The village streets meet each other at an angle or are parallel to each other. This is because of the tendency to align the dwellings along cardinal axes. This pattern is common in the northern plains.

(ii) Elongated Pattern: Such settlement occurs as a result of elongation of the rectangular pattern due to influence of site features. For instance, in the Ganga plains, in areas liable to inundation, the rectangular pattern becomes unusually elongated along the high ground. Even otherwise the advantage offered by riverside location forces such a pattern.

(iii) Fan Shaped Pattern: This is seen where some focal points or line is situated at one end of the village. A focal object may be a tank a riverside, a road, an orchard, a well or even a place of worship. Such patterns are common in the delta region where the dwellings simply follow the fan shaped profile of the delta as in the case of Mahanadi, Godavari, Krishna, Cauvery, etc. Such patterns are also common in the Himalayan foothills.

Hamleted Settlements: These type of settlements, are fragmented into several small units. The main settlement does not have much influence on the other units. Very often the original site is not easily distinguishable and these hamlets are often spread over the area with intervening fields. This segregation is often influenced by social and ethnic factors. The hamlets are locally named as faliya, para, dhana, dhani, nanglay etc. These settlements are generally found in West Bengal, eastern Uttar Pradesh, Madhya Pradesh and coastal plains. Geographically it covers lower Ganga plain, lower valleys of the Himalayas and central plateau or upland region of the country.

Dispersed Settlements: This is also known as isolated settlements. Here the settlement is characterized by units of small size which may consist of a single house to a small group of houses. It varies from two to seven huts. Therefore, in this type, hamlets are scattered over a vast area and does not have any specific pattern. Such type of settlements are found in tribal areas of central part of India covering Chotanagpur plateau, Madhya Pradesh, Rajasthan, etc. Such patterns are also common in the hills of north Bengal, Jammu & Kashmir, Tamil Nadu and Kerala.

If the number of villages is less than half the number of hamlets, the settlement is regarded as dispersed. The inhabitants of dispersed settlements live in isolated dwellings scattered in the cultivated fields. Individualism, sentiments of living freely, custom of .marriage relations are conducive to such settlements. However, these dwellings are deprived of neighbourhood, communal interdependence and social interaction.

FACTORS INFLUENCING THE TYPE OF RURAL SETTLEMENTS

There are three factors that influence the type of settlements in India. These factors are (i) Physical (ii) Ethnic or cultural and (iii) Historical or defence. Let us discuss these factors one by one.

(i) Physical Factors: These include relief, altitude, soil capability, climate, drainage, ground water level, etc. These factors influence the type and spacing of dwelling or instance, in dry regions of Rajasthan, water is a crucial factor and, therefore, houses are situated along a pond or well which guides the compactness of the settlement.

(ii) Ethnic and Cultural Factors: These include aspects like caste, community, ethnicity and religion. In India it is commonly found that the main land owning caste resides at the centre of the village and the other service providing castes on the periphery. This leads to social segregation and fragmentation of a settlement into several units

(iii) Historical or Defence Factors: In the past, mostly border areas of northwestern plains were conquered or attacked frequently by outsiders. For a long time, apart from attack from outsiders, there had been continuous fight between princely states and kingdom within the country therefore, security concerns favoured the evolution of nucleated settlements.

URBAN SETTLEMENTS

There are different bases of classifying settlements among rural and urban. Some of the common bases of classification are size of the population, occupational structure, and administration.

Population Size

It is the most important criteria used by almost all countries of the world to designate a settlement as urban. There are, however, wide differences in the exact number that differentiates urban from rural. Coun-

tries with low density of population may chose a lower number as the cut off figure compared to a densely populated country. For example, in Denmark, Sweden and Finland, all places having more than 250 persons are called urban. In Iceland, the minimum size of population for a city is 300, whereas in Canada and Venezuela, it is 1,000. In Colombia the lower limit is 1,500, in Argentina and Portugal 2,000 persons, in USA and Thailand 2,500 persons, in India 5,000 persons and in Japan 30,000 persons. In India, besides the size of population, its density is also an additional condition, which is about 400 persons per sq. km.

Occupational Structure

In addition to the size of population, some countries such as India take into account the major economic activities as a criterion for designating a settlement as urban. In Italy, a settlement is called an urban, if more than 50 per cent of the economically productive population are engaged in non-agricultural pursuits. In India, more than 75 per cent of the work force of the settlement should be engaged in non-agricultural activities, to be called urban.

Administrative Decision

In some countries, the administrative set-up is a criterion for classifying a settlement as urban. For example, in India even a settlement with less than 5,000 population can become urban if it has a municipality, cantonment board or a notified area. In many Latin American countries, such as Brazil and Bolivia, any administrative centre is called an urban irrespective of its size. Location and Form Criteria Depending upon its location, an urban settlement may be linear, square, star or crescent shaped. The architecture and style of buildings depict historical and cultural influences. By and large, the shape of a town is dependent on the site and situation. The towns and cities of developed and developing countries reflect marked difference in planning and development. While most of the towns and cities in developed countries are well-planned and have regular shapes, the urban settlements of developing countries, except for a few, have grown haphazardly giving them irregular shapes. For example, Chandigarh is a well–planned city, while Patna has grown haphazardly.

Function

Towns perform a number of functions. In some towns, one particular activity is predominant and the town is known for that function. For example, Oxford is known as an educational town, Varanasi as a religious centre, and Washington D.C. as an administrative town. Thus on the basis of functions, towns and cities are classified into the following groups:

Administrative Towns: Headquarters of the administrative departments of Central Governments, such as New Delhi, Canberra, Moscow, Beijing; Addis Ababa, Washington, D.C., Paris and London are National Capitals. Jaipur, Bhopal, Patna and Bangalore in India are examples of administrative headquarters of states.

Defence Towns: Centres of military activities are known as defence towns. They are of three types: Fort towns, Garrison towns (bases of army contingents) and naval bases. Jodhpur is a fort town; Mhow is a garrison town; and Kochi is a naval base.

Cultural Towns: Cultural towns are religious, educational or recreational towns. Jerusalem, Mecca, Ayodhya, Hardwar, Madurai and Varanasi have religious importance; hence, they are called religious towns. Some places are known for educational institutions e.g. Varanasi, besides being religious centre, has also been an important seat of learning. Cambridge and Allahabad (Prayagraj) are famous for their educational institutions. There are also recreational towns such as Las Vegas in the USA, Pattaya in Thailand and Darjeeling in India.

Industrial Towns: Mining and manufacturing towns have developed in mining and manufacturing regions. Kalgoorlie, Coolgardie, Dhanbad and Khetri are examples of mining towns. Towns which have developed due to setting up of industries such as Jamshedpur, Kanpur, Durgapur, Birmingham, Pittsburgh and Youngstown etc. are called industrial towns.

Trade and Transport Towns: Many old towns were famous as trade centres. Dusseldorf in Germany, Winnipeg in Canada, Lahore in Pakistan, Baghdad in Iraq and Agra in India have been important trade centres. Some towns have developed as transport towns. Two modes of transport have been responsible for the development of such towns. Port Towns are the centres of imports and exports and are located on the sea coasts e.g. Rotterdam in the Netherlands, Aden in Yemen and Mumbai in India. The junctions of rail routes often develop into urban centres. Mughalsarai and Itarsi are examples of such towns in India.

Class	Population Size	Number	Population (Million)	% of total Urban Population	% Growth 1991-2001
All classes					
Total		5161	285.35	100	31.13
I	**1,00,000 and more**	423	172.04	61.48	23.12
II	**50,000 – 99,999**	498	34.43	12.3	43.45
III	**20,000 – 49,999**	1386	41.97	15.0	46.19
IV	**10,000 – 9,999**	1560	22.6	8.08	32.94
V	**5,000 – 9,999**	1057	7.98	2.85	41.49
VI	**Less than 5,000**	227	0.8	0.29	21.21

According to the census of India urban areas are those which satisfy the conditions given below.

(a) All places with a municipality corporation, cantonment board or notified town area committee etc.

(b) All other places which satisfy the following criteria:

- A minimum population of 5000;
- At least 75 percent of male working population engaged in nonagricultural sector;
- Density of population of at least 4,000 persons per square kilometer.

Besides, the direction of census operation in states and Union Territories were allowed to include in consultation with the state governments and Union Territory administration and the census commissioner of India, some places having distinct urban characteristics as urban even if such places did not strictly satisfy all the criteria mentioned under category (b). Such cases include major project colonies, railway colonies, areas of intensive industrial development, important tourist centres, etc. Therefore, there are two broad groups of town or urban settlement. The places which satisfy the conditions mentioned in category (a) are known as statutory town and the conditions mentioned in category (b) are known as census towns.

Urban agglomeration may consist of any one of the three combinations given below:

(i) a town and its adjoining urban outgrowth;

(ii) two or more contiguous towns with or without their outgrowths; and

(iii) a city and one or more adjoining towns with their outgrowths together forming contiguous stretch.

But, one should remember that these towns are not always permanent. In each census, towns are subjected to de-classification and re-classification based on the prevailing condition at that particular time.

TYPES OF URBAN SETTLEMENTS

Depending on the size and the services available and functions rendered, urban centres are designated as town, city, million city, conurbation, megalopolis.

Town

The concept of 'town' can best be understood with reference to 'village'. Population size is not the only criterion. Functional contrasts between towns and villages may not always be clear-cut, but specific functions such as, manufacturing, retail and wholesale trade, and professional services exist in towns.

City

A city may be regarded as a leading town, which has outstripped its local or regional rivals. In the words of Lewis Mumford, "the city is in fact the physical form of the highest and most complex type of associative life". Cities are much larger than towns and have a greater number of economic functions. They tend to have transport terminals, major financial institutions and regional administrative offices. When the population crosses the one million mark it is designated as a million city.

Conurbation

The term conurbation was coined by Patrick Geddes in 1915 and applied to a large area of urban development that resulted from the merging of originally separate towns or cities. Greater London, Manchester, Chicago and Tokyo are examples.

Million City

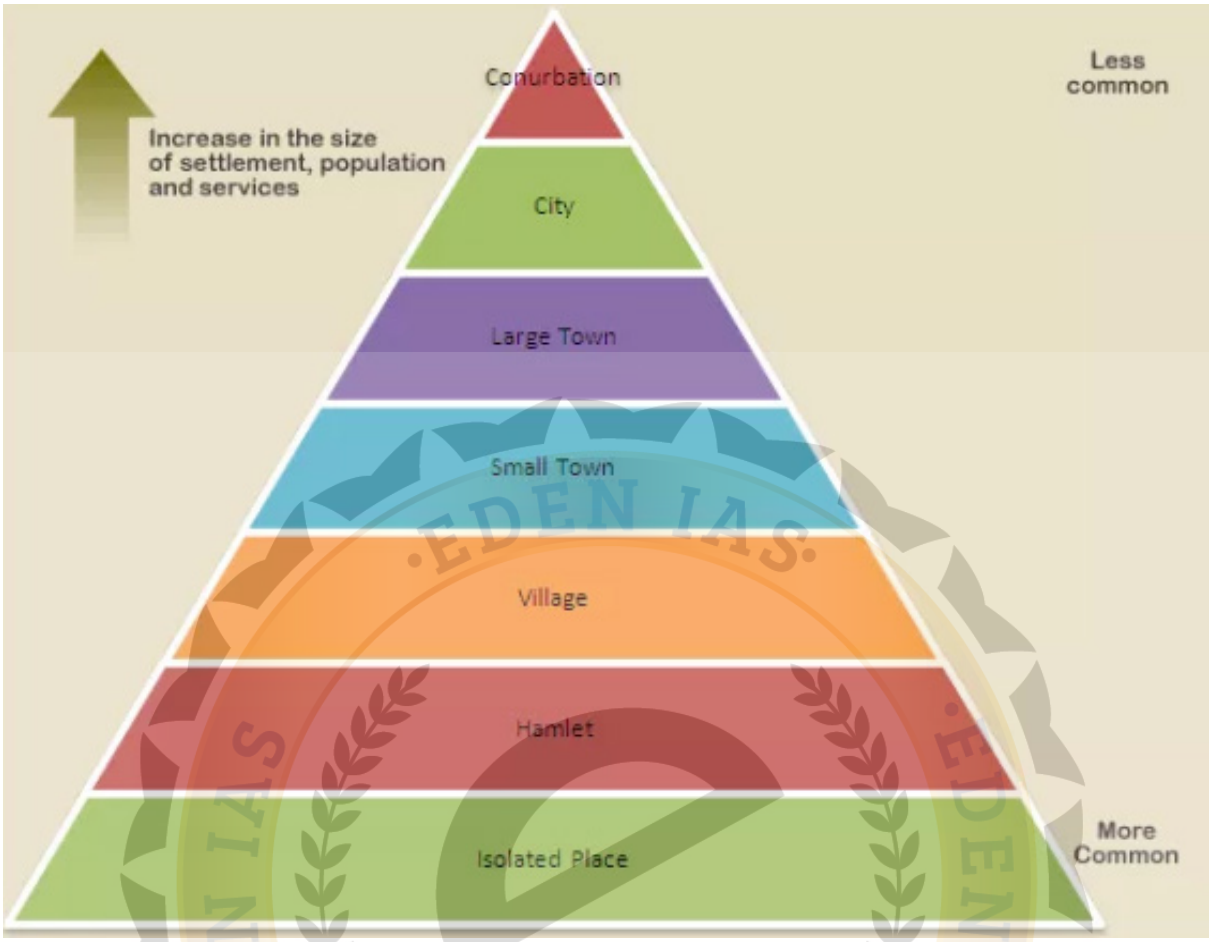
The number of million cities in the world has been increasing as never before. London reached the million mark in 1800, followed by Paris in 1850, New York in 1860, and by 1950 there were around 80 such cities. There were 162 million cities in mid 70's and there was threefold increase in 2005 and the number reached to 438. In 2016, there were 512 cities with at least 1 million inhabitants globally. By 2030, a projected 662 cities will have at least 1 million residents.

Megalopolis

This Greek word meaning "great city", was popularised by Jean Gottman (1957) and signifies 'super- metropolitan' region extending, as union of conurbations. The urban landscape stretching from Boston in the north to south of Washington in U.S.A. is the best known example of a megalopolis.

Distribution of Mega Cities

A mega city or megalopolis is a general term for cities together with their suburbs with a population of more than 10 million people. New York was the first to attain the status of a mega city by 1950 with a total population of about 12.5 million. The number of mega cities is now 31. The number of mega cities has increased in the developing countries during the last 50 years vis-à-vis the developed countries.



SPHERE OF URBAN INFLUENCE

The urban sphere of influence can be defined as the geographical region which surrounds a city and maintains inflow-outflow relationship with the city. Every urban centre, irrespective of the size of population and the nature of function, has a region of influence. Generally speaking, as the size of the population increases, the multiplicity of functions increases. As a result, the influence zone is larger and vice versa.

The term sphere of influence area was first used by Northam and supported by Canter. Other terms to express a similar entity, which have got recognised, include umland and city region. Umland is a German word which means the area around. The term was first used by the Allies in the Second World War. The term city-region was first used by Dickinson. It is used to describe a similar situation on a much larger scale. Some other terms which have become popular include urban field, tributary area and catchment area. The term sphere of influence is preferred by political geographers.

RURAL-URBAN FRINGE

The rural–urban fringe, also known as the outskirts, rurban, peri-urban or the urban hinterland, can be described as the "landscape interface between town and country", or also as the transition zone where urban and rural uses mix and often clash. Rural-Urban fringe is an important concept in settlement geography. The rural-urban fringe is the boundary zone outside the urban area proper where rural and urban land uses intermix. It is the area where the city meets the countryside. It is an area of transition from agricultural and other rural land uses to urban use. Located well within the urban sphere of influence the fringe is characterized by a wide variety of land use including dormitory settlements housing middle-income commuters who work in the central urban area. Over time the characteristics of the fringe change from largely rural to largely urban. Suburbanization takes place at the municipal boundary of rural-urban fringe.

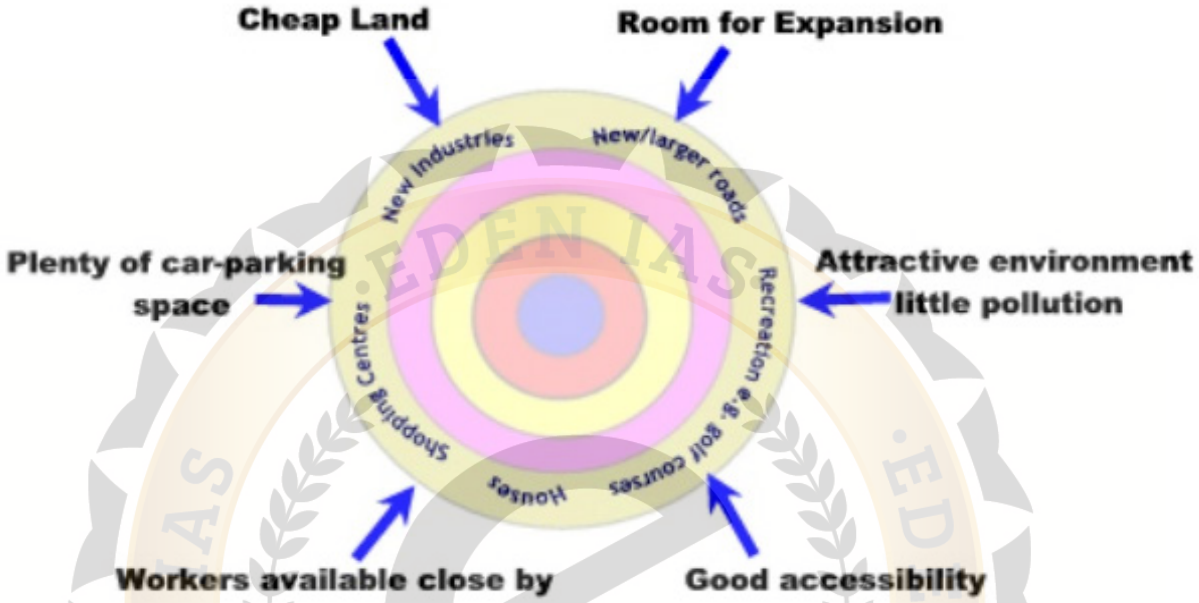
History of rural-urban fringe development:

- There was widespread inner city development immediately post WW2. But this did not create enough housing units for all those who needed them.
- Others were built on the edge of towns and cities.
- Most of the residential growth is outwards into the suburbs. Population density is lower than that in the inner city, and the houses are usually larger as the land is cheaper.
- As residential use started spreading to the suburbs, transportation network developed, increasing the connectivity of the suburbs to the inner city.
- From the 1970s, out-of-town shopping centers took advantage of lower land prices and more space.
- After that many companies moved their offices and factories to the edge of the urban area for similar reasons, where they could take advantage of better transport links as well.
- From the late 1970s, many cities have lost population to counter-urbanization – people leaving the cities for a variety of reasons.
    - People want a better quality of life in quieter, cleaner rural surrounding
    - More people are willing and able to travel further to work
    - Relocation of businesses to places with better transport links and cheaper building costs
    - Flexible working and new technology have increased part-time home working.
    - Retired people leave the city where they once worked.
- This has led to the smaller towns and villages in areas with excellent communication links to expand – a lot of 'in-filling' has taken place. In-filling is building in gaps within the village or town boundary (known as the village/town envelope).

Recently there has been an increasing demand for land in the rural-urban fringe area because:

- **Land is cheaper** – as the accessibility of the RUF is lower than that of the inner city areas and most of the people have to travel to the inner city for work, fewer people are willing to live in the RUF. Thus the land prices are lower.
- **There is less traffic congestion and pollution** – as the area is a new development in the outskirts, and the population living in the area is lesser than the inner city, the traffic congestion and pollution levels are lesser.
- **There is easier access and a better road infrastructure** – as it is a newer development with a lot of space available.
- **There is a more pleasant environment with more open space** – the amount of open space decreases with time as the extent of development increases, and so does the friendly environment.

RURAL-URBAN FRINGE



Issues in Urban-rural fringe

Uses	Positive Aspects	Negative Aspects
Agriculture	Many well-managed farms and small holdings	Farms often suffer litter, trespass, and vandalism; some land is derelict in the hope of planning permission
Development	Some well-cited, carefully landscaped developments such as business and science parks	Some developments, such as out of town shopping areas cause heavy traffic flow and pollution. Unregulated businesses such as scrap metal and caravan storage. Airport expansion
Urban Services	Some, such as reservoirs or cemeteries, may be attractive.	Mineral workings, sewage works, landfill sites, etc. can be unattractive and polluting

Transport	New cycle ways and foot-paths can improve assess to countryside	Motorways destroy countryside and promote new development, particularly near junctions.
Recreation and sport	Country parks, sports fields and golf courses can lead to conservation.	Some activities such as stock car racing and scrambling to erode ecosystems and create localized litter and pollution
Landscape and nature conservation	Many SSSI (sites of special scientific interest) and AONB (Areas of natural beauty)	Much degraded land, eg. land ruined by fly-tipping; many SSSIs under threat

The rural-urban fringe is characterized by a mixture of land uses, most of which require large areas of land.

- Housing developments as urban sprawl continue
- Science and business parks
- Hypermarkets and superstores
- Retail parks and out of town shopping centers
- Office developments
- Hotels and conference centers
- Airport expansion

SATELLITE TOWNS

What is a Satellite Town?

A satellite town can be understood by thinking of the concept of a satellite itself. A man-made satellite is launched into orbit. This object is within Earth's orbit. A satellite orbits the earth. However, it is not part of Earth itself. This is exactly how a satellite town comes to be, as it is a smaller city that is near a large(r) metropolis. It might even have small degree of influence from the nearby metropolis. However, it may not be part of that metropolis. Or, if it is part of that metropolitan area, it exists in such a way that it is unique from the rest of the metropolitan area.

What Makes a Town a Satellite Town?

Satellite towns differ from suburban areas and edge cities in several ways. Some satellite towns might be counted as part of a larger metropolitan area. However, those towns have characteristics that make them distinct from suburbs and edge cities.

A satellite town has more cultural autonomy than suburban areas. A satellite town might have some influences from a larger metropolitan area. Those influences, however, are not as strong as they would be for a suburban area. A satellite town has its own cultural amenities and attributes completely distinct from a larger metropolis nearby. Satellite towns are also distinct in having their own historic downtown areas. They are cities that have been established independent of the nearby large metropolitan areas. Their growth took place before the larger suburban growth took place. They have always existed as their own separate cities.

What is the Difference between a Satellite Town and a Suburb?

Economically, a satellite town stands out from a suburban town. For one thing, satellite towns have a distinct employment base. A satellite town has less economic influence from a larger metropolitan area than a suburb would have. Satellite towns often have their own business districts. This is a product of satellite towns having their own downtown areas. While some people living in satellite towns might commute to a larger city for work, a satellite town will have its own commuter base separate from the metropolitan area nearby. Satellite cities have stronger municipal governments than suburban areas. They will have its own urban cores. While some satellite cities are interconnected with larger metropolitan areas, they will be self-sufficient. Satellite towns will provide the same municipal services that larger cities provide. In this aspect, a satellite city is independent from a metropolitan area.

What is the Difference between a Satellite Town and Bedroom Community?

Satellite towns cannot be bedroom communities. This is what distinguishes suburbs from satellite towns. Satellite towns often have their own bedroom communities. They will have suburban areas that people will commute to and from. Suburban areas will serve as bedroom communities for larger cities. A satellite city will function similarly to a larger city.

A satellite town will have a large geographic separation from a larger metropolis nearby. Very often, there is a sizable expanse of rural area between a satellite city and a larger metropolis. In other cases, different geography barriers exist, such as a wide river.

Examples of Satellite Towns

Satellite towns are found throughout the world. Wherever there is a large metropolis, a satellite town can be found nearby. Piraeus is a satellite city near Athens, Greece. Although it is considered part of the Athens metropolitan area, Piraeus has its own economic base. It is a port city with a strong maritime economy, set apart from Athens. It is an integral part of the Athens area. However, Piraeus has its own suburbs. Those suburbs are part of the Piraeus urban area. Piraeus does not serve as a bedroom community for Athens. Instead, Piraeus is its own metropolitan area.

Another example of a satellite town is Racine, Wisconsin. This city is counted as part of the Milwaukee metropolitan area. However, Racine's growth did not come from Milwaukee's suburban sprawl. Racine developed independently. Its economy, while rooted in industry like Milwaukee, developed separate from Milwaukee. Its culture is different from that of Milwaukee. Rather than being a bedroom community for Milwaukee, Racine has its own suburbs. Racine has its own neighborhoods and downtown area.

Importance of Satellite Towns

In an era where suburban sprawl looms large, satellite cities could be viewed as a solution to the problem. In many cases, satellite towns are part of larger metropolitan areas, but still exist independently of the larger urban core. With suburban sprawl, the suburban areas and bedroom communities are less self-contained. Though not part of the city proper, they still fall within one commuter shed. Urban areas could exist with multiple nodes. Satellite cities can maintain self-contained economies and services, while still being interconnected with larger cities nearby. With better urban planning, satellite towns could play a role in reducing suburban sprawl. Regional planning would need to take place with satellite towns in mind.

MAJOR CAUSES OF URBANISATION

Following are the main causes of urbanization:

- **Industrial revolution**: Industrial employment catches the attention of people from rural to urban areas. In the urban areas, people work in modern sector in the occupations that assist national economic development. This represents that the old agricultural economics is changing to a new non-agricultural economy. This is the trend, which will build a new modern society.

- **Emergence of large manufacturing centres.**

- **Job opportunities:** There are ample job opportunities in mega cities therefore village people or individuals from town frequently migrate to these areas.

- **Availability of transportation:** Due to easy transport, people prefer to stay in big cities.

- **Migration:** Migration is main cause for rapid growth of mega-cities. Migration has been going on over centuries and it is normal phenomenon. When considering urbanization rural-urban and urban-rural and rural-rural migrations are very important. Urban-urban migration means that people move from one city to another. People may move to the city because they are forced by poverty from rural community or they may be pulled by the magnetism of city lives. Combination of these push and pull factors can force people to migrate to cities

- **Infrastructure facilities in the urban areas:** Infrastructure has vital role in the process of urbanization in the development of countries. As agriculture becomes more fruitful, cities grow by absorbing workforce from rural areas. Industry and services increase and generate higher value-added jobs, and this led to economic growth. The geographic concentration of productive activities in cities creates agglomeration economies, which further raises productivity and growth. The augments income and demand for agricultural products in cities.

- **Growth of private sector.**

URBANISATION: ISSUES AND PROBLEMS

Problems due to rapid rate of urbanization include

Degradation of environmental quality: Due to urbanization, there is environmental degradation especially in the quality of water, air and noise. With the influx of more people in cities, there is great demand of facilities such as housing. Some unlawful factories and even houses which have a poor infrastructure, the waste from buildings are directly channelled to the nearest river or water resources which directly pollute the water. The domestic waste, industrial effluents and other wastes that were dumped directly to the river, degrade the water quality. Another after effects of rapid urbanization is the air pollution which has also increased due to emanation from motor vehicles, industrial development and use of non-environmental friendly fuel sources. The noise pollution is produced from the various human actions which also degrade the environment and ultimately affect the human health. The growth of population has generated a very high quantity of solid waste and there is pressure to provide a waste disposal place in the urban areas.

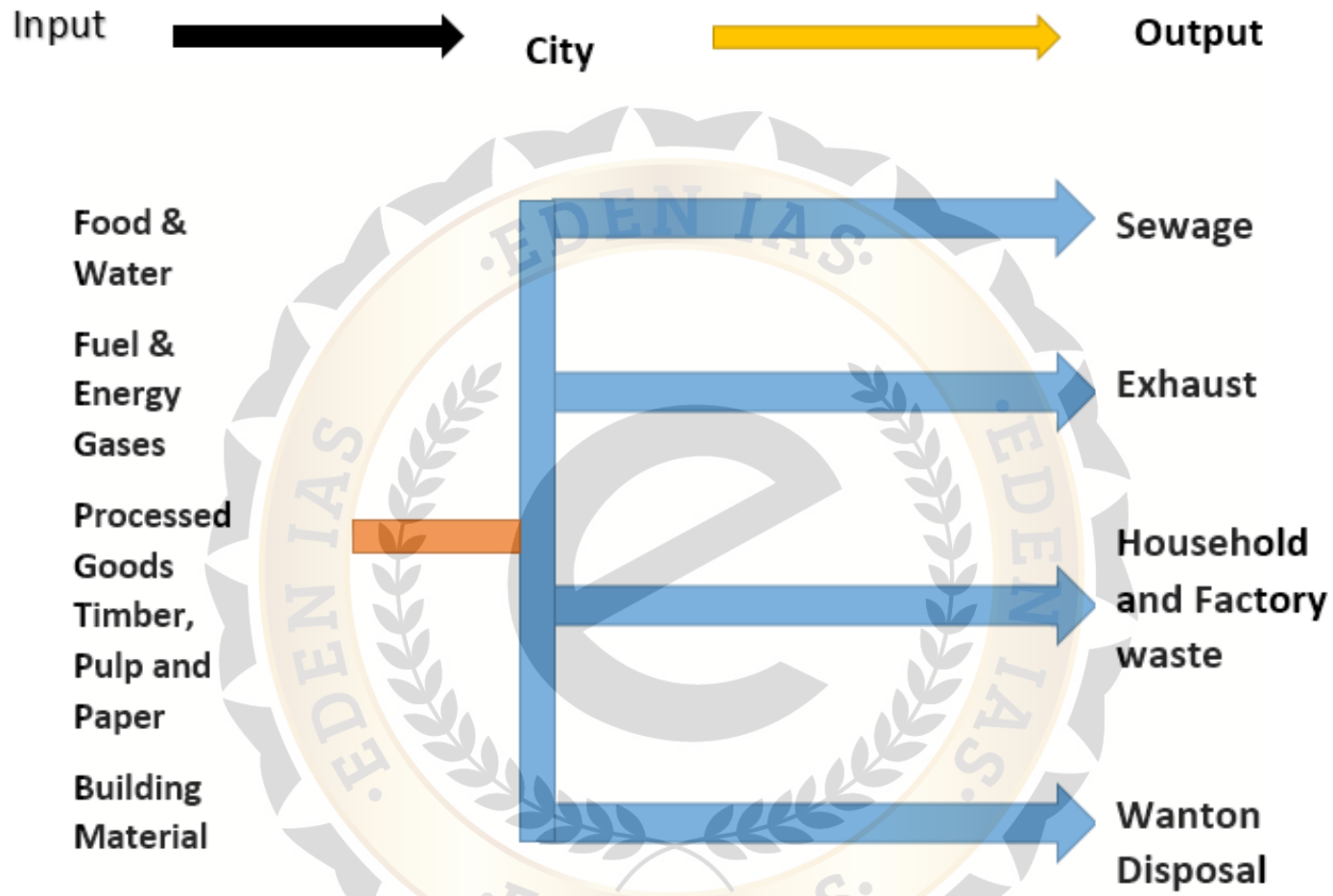
Inefficient transportation system: Urbanization created severe problem of transpiration. Due to movement of people into metropolitan cities, the number of vehicles on the road is increasing every year. Although various types of public transportation are provided in the cities but people in cities still prefer to drive private vehicles. This is due to the ineffective public transportation. The public transportation facilities are provided without referring to the need to integrate the different modes of transportation. Consequently it is difficult for the user to change the modes of transportation. Since the public transportation is not trustworthy, people usually travel from private vehicles which led to the severe problem of blockage in the cities. If any traffic jam happens, public transportation, especially bus and taxi and private vehicles are trapped together and cannot move. It creates lot of problem for people.

Decline in quality of living for urban dwellers: Urbanization is major concern for management researchers because it decline in quality of living for urban inhabitants. As the metropolis becomes a developed city, the land value will also increase. The housing provision will focus more to fulfil the needs of the high income group. As such, there will be a problem in the provision of housing, especially for the middle and low class people. The supply of housing for the urban poor is still inadequate as the cost of these houses is very high to which low and middle income group cannot afford. The lack of housing provision for the low income group has led to the continuation of unlawful resident settlements in the city. These unlawful tenant settlements will certainly lack in proper infrastructure that will bring about many hindrances to the urban environment and create social problems such as child education, crime, drugs, delinquency and others. Besides housing problem for low income group, the process of urbanization has also increased the demand on infrastructure and utility which cannot be fulfilled from the existing facilities. The maintenance of drains and debris collection is incompetent which can raise other serious problems such as flash floods and poor public health. The reappearance of flash floods is due to the drainage system being unable to contain surface water run-off that has greatly increased with the higher intensity of urban activities.

Unsuccessful urban governance: The urban authority undergoes with multifaceted challenges to manage a city. The fast speed of urbanization is major challenges which need every party to be more focused in undertaking each and every responsibility in urban development. However, the involvement of several agencies and departments in urban management made it complicated to synchronize many actions and resultant, it affects the efficiency of those actions. Besides this, the local authority also deals with the different goals and interests of community groups which they need to fulfil. The local authority also needs to find solution for different social issues.

Cities are developed on two percent of the land's surface. Their inhabitant uses over three-quarters of the world's resources and release similar amounts of wastes. Urban wastes have local impacts but these are issues at global scale. The impacts of the cities are usually seen both locally and globally such as air pollution, city populations, as the major users of energy, cause both regional and worldwide pollution. These factors have adverse impact on health of the people, air quality and biosphere

City consumption:

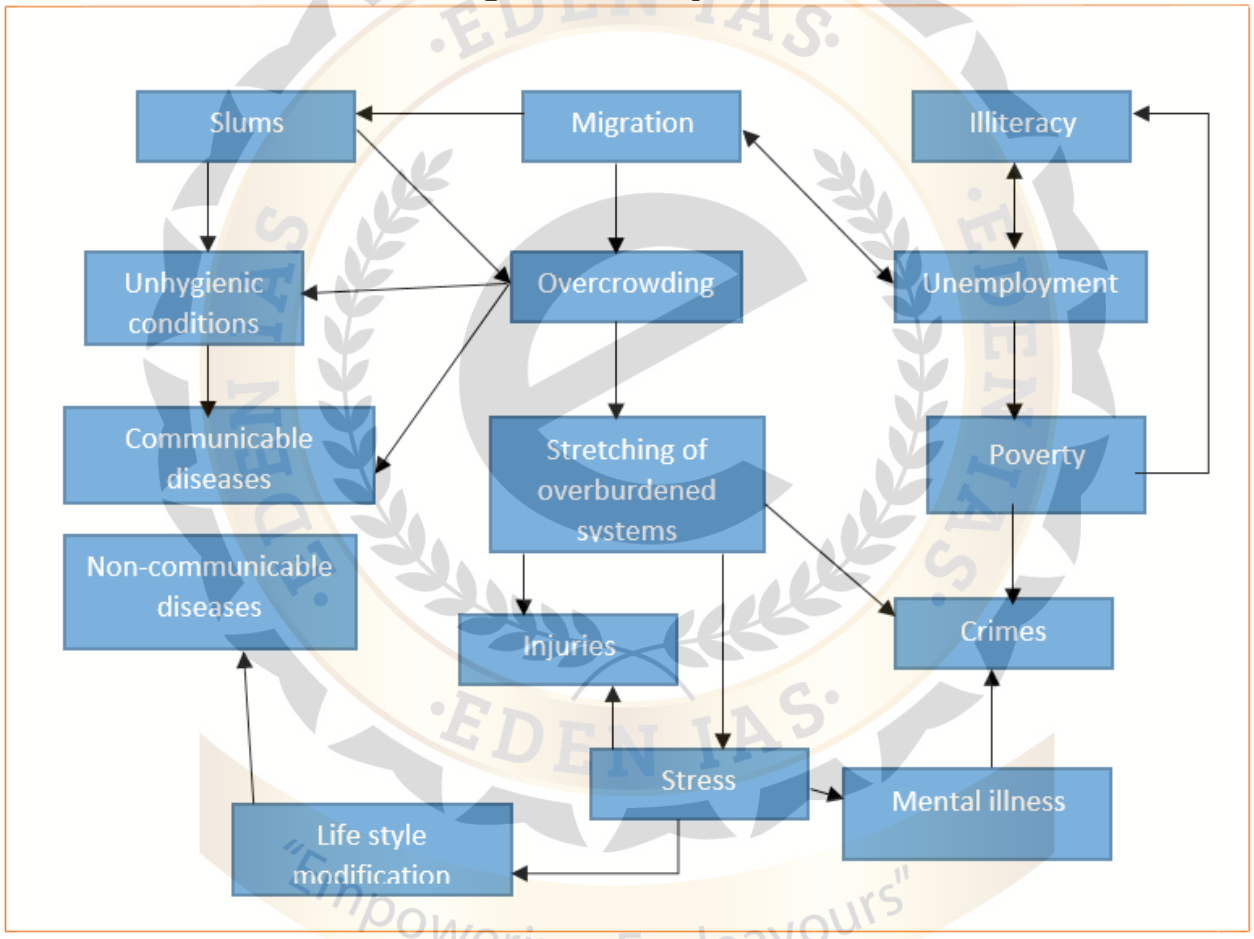


Urbanization issues in Indian context: India is known for its rural population in the world with about 73 percent of its population living in rural villages. The growth of urban population as well as the speed of urbanization has been usually slow as compared to most of the other Asian countries. When evaluating urbanizing process in Indian perspective, it is observed that major problems of urbanisation in this nation are Urban Sprawl, Overcrowding, Housing, Unemployment, Slums and Squatter Settlements, Transport, Water, Sewerage Problems, Trash Disposal, Urban Crimes, and Problem of Urban Pollution. While urbanisation has been a mechanism of economic, social and political progress, it can pose serious socio-economic problems. The absolute magnitude of the urban population, random and unplanned growth of urban areas, and lack of infrastructure are major issues in India due to urbanization. The fast growth of urban population both natural and through migration, has put immense pressure on public utilities like housing, sanitation, transport, water, electricity, health, and education.

Poverty, joblessness and under employment among the rural immigrant, beggary, thefts, dacoities, burglary and other social sins go wild. Urban slump is encroaching the valuable agricultural land. According to the statistical reports in 2001, the urban inhabitants of India were more than 285 million. It is estimated that by 2030, more than 50 per cent of India's population is expected to live in urban areas. Numerous problems need to be emphasized.

Urban sprawl or real development of the cities, both in population and geographical area, of rapidly increasing cities is the major cause of urban troubles. In most cities, the financial support is unable to deal with the problems created by their expansion. Huge immigration from rural areas as well as from small towns into large cities has occurred almost consistently and as a result the size of the city is increased. Historical records signify that initial large flow of migration from rural to urban areas was during the "depression" of late 1930s when people moved for searching employment. Afterwards during the decade 1941-51, another a million persons migrated to urban areas in response to period of war industrialisation and division of the country in 1947. During 1991-2001, more than 20 million people migrated to urban areas. It is commonly observed that such big cities attracted to majority of people to get employment opportunities and live in modern style. Such hyper urbanisation leads to increased cities sizes which challenge imagination. Delhi, Mumbai, Kolkata, Chennai, Bangalore are examples of urban slump due to huge migration of people from the nearby places.

Migration consequences:



Overcrowding is a situation in which large number of people lives in too little space. Overcrowding is a consistent result of over-population in urban areas. It is obviously expected that cities are increasing their size due to massive movement of people from undeveloped areas but it squeezed in a small space due to overcrowding.

Housing: It is another intense problem due to urbanization in India. Overcrowding leads to a constant problem of scarcity of houses in urban areas. This problem is particularly more severe in those urban areas where there is large invasion of jobless or underemployed immigrants who could not find place to live when they come in cities and towns from the nearby areas. The major factors for housing problems are lack of building materials and financial resources, insufficient expansion of public utilities into sub-urban areas, poverty and unemployment of urban immigrants, strong caste and family ties and lack of enough transportation to sub-urban areas where most of the available land for new construction is to be found.

Unemployment: The problem of joblessness is also serious as the problem of housing. Urban unemployment in India is estimated at 15 to 25 per cent of the labour force. This percentage is even higher among the educated people. It is approximate that about half of all knowledgeable urban unemployed youth are living in four metropolitan cities such as in Delhi, Mumbai, Kolkata, and Chennai. Additionally, although urban incomes are higher than the rural incomes, they are awfully low because of high cost of living in urban areas. Major causes of urban unemployment are the huge relocation of people from rural to urban areas.

Slums and Squatter Settlements: The natural development of unchecked, unexpected and random growth of urban areas is the growth and spread of slums and unlawful resident settlements which present a prominent feature in the environmental structure of Indian cities, particularly of urban centres. The fast urbanisation in combination with industrialisation has resulted in the enlargement of slums. The explosion of slums occurs due to many factors, such as, the lack of developed land for housing, the high prices of land beyond the reach of urban poor, a large influx of rural migrants to the cities in search of jobs.

Transport: Urbanization poses major challenge to transport system. With traffic blockage, almost all cities and towns of India are suffering from severe form of transport problem. Transport problem increases and becomes more complex as the town grows in dimension. With its growth, the town performs varied and complex functions and more people move to work or shop.

Water: Water is one of the most essential elements of nature to maintain life and right from the beginning of urban civilisation. However, supply of water started falling short of demand as the cities grew in size and number.

Sewerage Problems: Urban centres in India are almost consistently beset with inadequate sewage facilities. Resource crisis faced by the municipalities and illicit growth of the cities are two major causes of this pitiable state of affairs. Most cities do not have proper arrangements for treating the sewerage waste and it is drained into a nearly river or in sea as in Mumbai, Kolkata and Chennai and these activities pollute the water bodies.

Trash Disposal: Urbanization pushed Indian cities to grow in number and size and as a result people have to face the problem of trash disposal which is in alarming stage. Enormous quantities of garbage produced by Indian cities cause a serious health problem. Most cites do not have proper arrangements for garbage disposal and the existing landfills are full to the edge. These landfills are breeding grounds of disease and countless poisons leaking into their environs. Wastes putrefy in the open inviting disease carrying flies and rats and a filthy, poisonous liquid, called leachate, which leaks out from below and contaminates ground water. People who live near the decomposing garbage and raw sewage get victims to several diseases such as dysentery, malaria, plague, jaundice, diarrhoea, and typhoid.

Health problem due to urbanization: Factors affecting health in slums are Economic conditions, Social conditions, Living environment, Access and use of public health care services, Hidden/Unlisted slums and Rapid mobility. Environmental problems can cause many other problems such as Poor air quality that can produce asthma and allergies or contribute to physical inactivity, an impure water supply can cause the spread of infectious diseases through the water supply or through food such as waterborne and food borne diseases, climates changes can cause deaths from severe heat or cold , noise can cause sleep disturbances, and hence poor performance at work and in school, Lead poisoning leading to developmental and behaviour problems, Second-hand smoke and exposure to carcinogens can cause cancer. In general, poor environmental quality contributes to about

33% of global ill health. Physical, mental, and social health is affected by living conditions. There are numerous examples that impact on human living such as lead exposure, noise, asbestos, mould growth, crowding, respiratory disease, and spread of infectious diseases, accidents, and mental illness. Health impacts of inadequate housing conditions are an intricate issue involving variety of exposures (physical, chemical, biological, building, and social factors) and various health outcomes such as asthma and allergies, respiratory diseases, cardiovascular effects, injuries, poisoning, mental illnesses. Issues of overcrowding, lack of resources, poverty, unemployment, and lack of education and social services can lead to numerous many social problems for example crime, violence, drug use, high school drop-out rates, and mental health problems.

Urban Crimes: In developed cities of India, people get connected with different types of individuals who do not have similarity with one another. The problem of crimes increases with the increase in urbanisation. In fact the increasing trend in urban crimes tends to upset peace and tranquillity of the cities and make them insecure to live in mainly for the women. The problem of urban crime is becoming more complicated in current situation because criminals often get shelter from politicians, bureaucrats and leaders of the urban society. Dutt and Venugopal stated that violent urban crimes such as rape, murder, kidnapping, dacoity, robbery are more prominent in the northern-central parts of the nation. Even the economic crimes such as theft, cheating, breach of trust are concentrated in the north- central region. Poverty related crimes are prevalent in the cities of Patna, Darbhanga, Gaya and Munger. This may be due to poverty existing in this area.

Problem of Urban Pollution: Rising urbanisation in present situation led to develop industries and transport systems out of proportion. These developments are mainly responsible for contamination of environment, particularly the urban surroundings. Urban pollution is mainly the collection of impurities created by cities which would certainly shock city dwellers. It includes Air, water, ground the entire environment. Air pollution has dangerous consequences which emerge due to urbanization. Cities are the source of several dangerous gases, particularly vehicles like passenger cars, Lorries, buses which generate carbon dioxide (CO2), carbon monoxide (CO), sulphur dioxide (SO2), nitrous oxides (Nox), benzene, ozone in addition to fine particles released by diesel motors which create a serious threat to human health. Heating installations use fossil fuels which also contaminate the air of urban centres. However, in numerous urban agglomerations, the main source of the worsening of air quality is from industrial facilities which emit veritable poisons into the air, which is then inhaled by riverside dwellers. Water is also source of pollution in urban areas. Since earlier times, cities are attracting millions of rural residents to their recognizable shores. Each of these individuals has required water to live, and consume for other basic needs. Cities under continuous development must increase their water resources and their water treatment capacities. In many countries, this has created nearly insoluble problems and millions of human beings are not assured daily access to potable water. As regards wastewater, the lack of effective collection and treatment facilities means that wastewater is often quite simply dumped back into Nature, often into the ocean, which creates severe and long lasting pollution problems.

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UNIT- III

[ECONOMIC GEOGRAPHY]

HUMAN ACTIVITIES

Human beings are engaged in various kinds of economic activities that pertain to the production, exchange or distribution and consumption of goods and services. With the evolution of human society, the nature of economic activities has changed and has become more and more complex.

- **Primary activities** pertain to extraction of raw materials from the earth's surface. These include hunting and gathering, pastoralism, fishing, forestry, mining and agriculture.

- **Secondary activities** include industries that transform raw materials into finished goods having higher value. For example, manufacturing cotton textiles from cotton, and iron and steel from iron ore come under secondary activities.

- **Tertiary activities** include all kinds of services provided to people such as education, health, trade and transport.

- **Quaternary activities** represent a special type of service, which is related to high intellectual activities e.g. research and development, high order of professional and administrative service, information generation, processing and transmission.

While labeling human activities as primary, secondary, tertiary, and quaternary, let us not think that they are independent of each other. Their boundaries are often overlapping. With advancements in science and technology, the nature of production in all fields has changed so greatly that all these sectors have become interdependent.

PRIMARY ACTIVITIES

Primary activities in economically developed nations account for less than 5 per cent of employment but in many developing countries of the world, they still employ a major segment of labour forces. In any case, primary activities are almost the only source of food supply and raw materials for industries. Among these activities are included some of the most primitive activities like hunting and gathering, which sustained human beings for more than 95 per cent of their existence on the earth. Also included are the modern agricultural systems. In this chapter, we propose to discuss only the primitive agricultural activities and mining.

Hunting and Gathering

Until 12,000 years ago, all humans lived as hunters and gatherers. They occupied nearly all the liveable space on the planet. At present, not more than 1 in 100,000 persons (less than 0.0001 per cent) live mainly this way; probably none does so entirely without any contact with the modern world. Historically, this form of economy involved frequent migration in search of food. People lived in small groups, having virtually no private property. Simple implements like spears, bows and arrows were used for hunting. Locally available materials were used for their clothing and shelter. The foragers were very successful in occupying a wide variety of habitats having different climates and biological resources. Fish and mammals from the sea provided subsistence to the people inhabiting the harsh landscapes of the polar coast. On the other extreme, the hunting – gathering people successfully colonised the tropical rainforests. By and large, the foragers

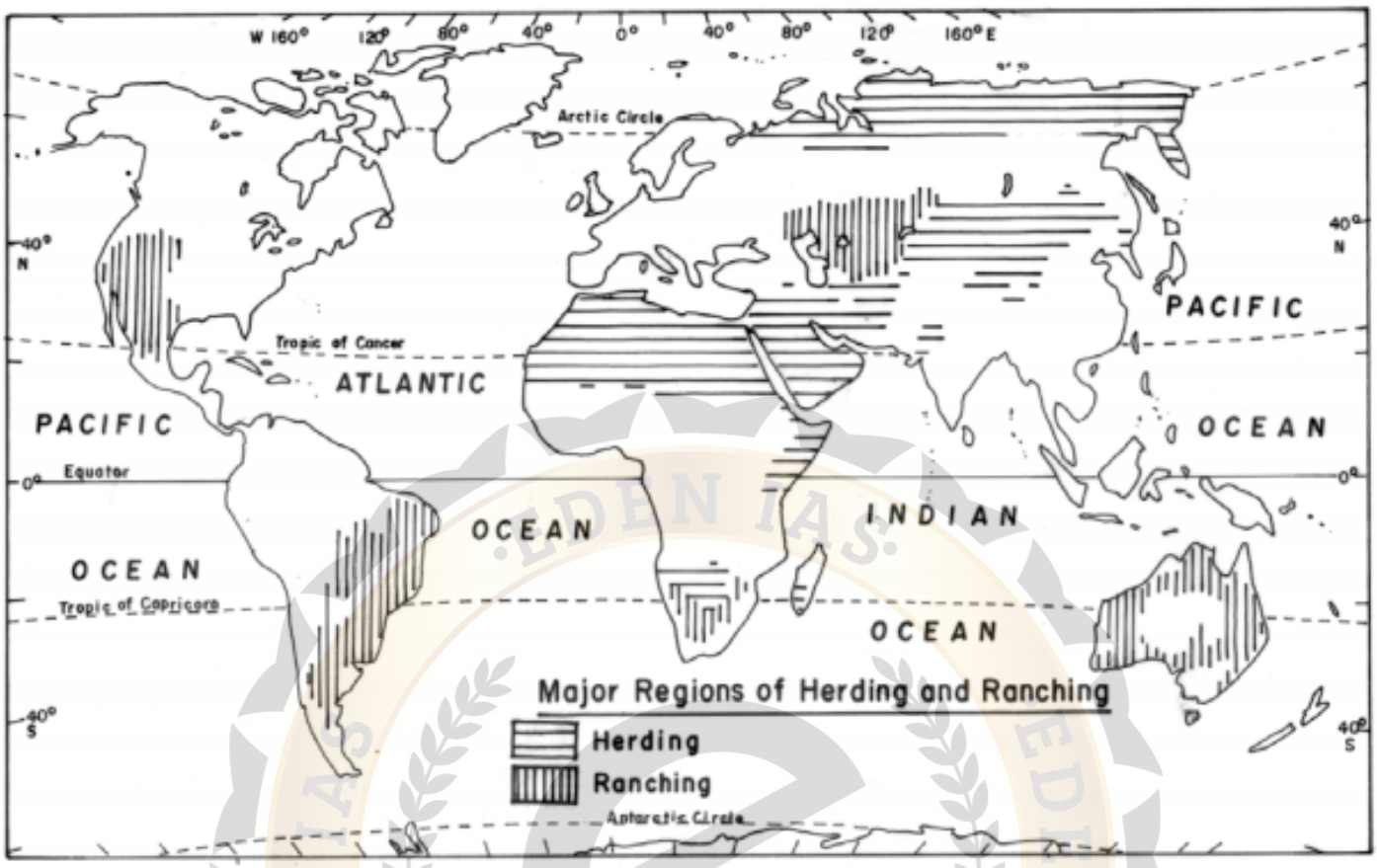
simply live off the land without changing the natural ecosystem in a major way. The hunting-gathering people have exhibited a great resistence. As recently as A.D. 1500, they occupied about one-third of the globe, including whole of Australia, most of North America and large tracts of South America, Africa and North-east Asia. Since, then their numbers have declined. The twentieth century has witnessed profound changes in their ways of living. Their land and resources shrank as industrialisation and urbanisation progressed. Present day hunters-gatherers are confined to a few pockets in Australia, Africa, Asia, North America and South America. The Arctic Inuit; Pygmies and Kalahari San of Africa; Aboriginal Australians such as Pintupi; Paliyan of South India; and Semang of Malaysia are some examples of the foragers, who represent the oldest adaptation to human environment.

Pastoralism

The domestication of animals was one of the early steps in the development of civilisation People living in different climatic conditions selected and domesticated animals found in those regions e.g. cattle and horses in the grasslands, sheep and reindeer in the tundra regions, camel in the tropical deserts, and llama and yak in the high altitudes of the Andes and the Himalaya respectively. These animals were the chief sources of milk, meat, wool and hides. In the tropical and temperate grasslands of the world, livestock herding and rearing continues even today either as traditional nomadic herding, also known as pastoral nomadism or commercial livestock rearing (ranching).

The Likely Distribution of the Ancestors of Domesticated Animals

Pastoral Nomadism: It is a subsistence activity depending on animals. Since these people do not live a settled life, they are called nomads. Each nomadic community occupies a well-defined territory. These people are aware of the seasonal changes in the availability of pasture and water supply within the area occupied by them. The animals depend entirely on natural vegetation. Cattles are reared in grasslands receiving more rain and having soft and long grasses. Sheep are reared in low rainfall areas with short grasses. Goats are common in the rugged terrain with scanty grasses. There are six widely distributed species reared by pastoral nomads: sheep, goats, camels, cattle, horses and donkeys. In some parts of the world, the movement of herders follows the change in seasons. For example, in the mountainous regions such as the Himalaya, Gujjars, Bakarwals, Gaddis and Bhotiyas migrate from the plains to the mountains in summers and from mountains to the plains in winters. Similarly, in the tundra region, the nomadic herders move from south to north in summers and from north to south in winters. Such seasonal migration of people with their animals is known as transhumance.



Areas of Nomadic Herding and Commercial Livestock Rearing

Pastoral nomadism is associated with seven distinct areas: high latitude Sub-Arctic; Eurasian steppe; mountainous south-west Asia; Saharan and Arabian deserts; Sub-Saharan savannas; the Andes; and the Asian high altitude plateaus. These may broadly be grouped under three broad regions. The largest region extends over nearly 13,000 km, from the Sahel and Sahara in Africa to Mongolia and Central China. The second region includes the southern border of the tundra region in Eurasia. The third region comprises of southwest Africa and the western part of Madagascar. These areas have either too hot and dry or too cold climates. In these regions, the social status of a person is measured on the basis of the number of cattle heads he possesses. International border restrictions and other developments are forcing nomads to abandon traditional migration routes and grazing lands. Today, nomadic herding supports only 15-20 million people in the world. Pastoralism is a distinctive form of ecological and cultural adaptation to certain types of ecosystem in which humans and animals live in a symbiotic community typified by a fierce independence and self determination.

Commercial Livestock Rearing: In modern times, the rearing of animals is being undertaken scientifically. Instead of depending upon natural grasslands, fodder crops and grasses are cultivated over extensive areas, and special breeds of animals are reared to give maximum yields of milk or meat. Emphasis is laid on genetic improvement, disease control and health care of animals. Cultivation of fodder crops, processing of milk and, meat, and packaging of animal products is carried out mechanically and on scientific lines. The large-scale livestock rearing (ranching) on a commercial basis is typical in developed countries.

Mining

The mining and quarrying of rocks and minerals is an age — old economic activity, though its nature and form has changed in many ways. Use of minerals by the early humans was probably restricted to picking up a rock and using it as a tool for crushing seeds or hunting animals. Gradually, humans switched over from tool-using to tool-making. The progressive and increasingly sophisticated use of mineral resources is marked with different stages of human civilisation. From flint spear head to clay pots, to copper dagger, to bronze vessels, to iron chains, and so on, humans have moved on discovering and using new minerals. On the basis of the mineral–use, eight ages of the human civilisation are usually identified.

Table : Minerals and Human Civilisation

Age	*Approximate Date of Beginning*
Paleolithic (Old Stone)*	500,000 B.C.
Neolithic (New Stone)	8,000 B.C.
Copper	5,000 B.C.
Bronze	3,000 B.C.
Iron	1400 B.C.
Coal	A.D. 1,600
Petroleum	A.D. 1,850
Nuclear	A.D. 1,950

* Use of Stone Tools

Mining probably began about 100,000 B.C. In simple terms, it means removing the rock materials from the earth's surface for processing, so that they are made more beneficial. It can be as simple as shoveling sand or as complex as drilling tunnels, blasting rock and lifting ore from thousands of metres deep beneath the ground. Nature of mining activity has undergone many changes over the years. In the early days of the feudal period, mining was a work of prisoners and slaves. Greeks and Romans in the ancient time operated their mines with captive armies or indigenous peoples under their control. By the middle Ages, mining was considered a noble profession. Mining guilds in England and Germany were powerful organisations as they controlled the production of metals needed for arms and coinage. In modern times, mining is no longer a major employer. Mechanisation has increased efficiency and productivity and hence only a small percentage of work force is required in this kind of activity now compared to earlier times. Globally, the mineral use has increased over time. Since the industrial revolution, associated technological developments and growing population have increased the use of minerals at very high rates. During last century, mineral use increased 13 times or more.

Table : Minerals : World Reserves, Uses and Major Producers

Mineral Resources	*Uses*	*World Reserves (Metric Tons)*[a]	*Major Producing Countries*
Bauxite	Ore of aluminium	21,559,000	Australia, Guinea, Jamaica, Brazil
Chromium	Alloys, electroplating	418,900	South Africa, CIS[b], India, Turkey, Zimbabwe
Copper	Alloys, electric wires	3,21,000	Chile, USA, Canada, CIS
Gold	Jewellery, circuitry in computers, communications equipment, dentistry	42	South Africa, USA, CIS, Australia, Canada
Iron ore	Iron and steel	64,648,000	CIS, Brazil, Australia, China, Canada, Venezuela, Mauritania
Lead	Storage batteries, solder, pipes	70,440	CIS, USA, Mexico, Canada, Peru
Manganese	Iron and steel production	812,800	CIS, South Africa, Gabon, Australia, Brazil, France.
Nickel	Stainless steel	48,660	CIS, Canada, New Caledonia, Norway, Dominican Republic
Silver	Jewellery, photography, dentistry	780	Mexico, USA, Peru, CIS, Canada
Tin	Coating on metal, tin cans, alloys, solder	5,930	China, Brazil, Indonesia, Malaysia
Titanium	Alloys; white pigment in paint, paper, and plastics	288,600	Australia, Norway, CIS
Zinc	Iron and steel, alloys, rubber products, medicines	143,910	Canada, Australia, CIS, China, Peru, Mexico, Spain

[a] One metric equals approximately 1.102 British tons.
[b] Commonwealth of Independent States (includes much of the former Soviet Union).

Minerals: Types and Importance

Minerals consist of one or more elements and have specific chemical composition. They are one of the most valuable resources of the earth because of their various uses. They are exhaustible or non-renewable. Besides, they are distributed very unevenly. They are generally found in the form of ores, which contain several impurities. Minerals are separated from the ores involving a number of distinct processes. Minerals occur in different types of formations e.g. igneous intrusions, sedimentary ore deposits, alluvial deposits and oceanic deposits. Many important mineral deposits are contained within igneous intrusions and are found at different depths as they solidified at different temperatures. As such some of them are often found in association with the other such as silver with lead and zinc because they solidify at a similar temperature. Other minerals may be found at different levels e.g. tin is found at a greater depth than copper. Minerals are broadly divided into two groups: metallic and non-metallic. Metallic minerals are those which yield metals such as iron, copper, silver and gold. They are indispensable to the contemporary society. All other minerals such as salts, sulphur, coal and petroleum belong to the non-metallic group. Majority of the minerals are inorganic in nature. Coal and petroleum or mineral oil owe their origin to the fossils of plants and animals

(buried vegetation and animals) and hence are organic in nature. Since they are used as fuel, they are also known as fossil fuels or mineral fuels. Minerals are distributed unevenly. Commercially viable mineral deposits are found only in selected places. However, because of the extensive use, many of the world's richest mineral deposits have either been depleted or are on the verge of depletion. Minerals found in insufficient concentration are not worth extraction because of high production cost. Economically important minerals include iron, manganese, lead, aluminium (bauxite), copper, nickel, tin and zinc.

Distribution and Production of Some Minerals

Iron

Iron is one of the most important metals, which is used most widely because of its certain qualities — hardness, strength, durability, malleability and above all the possibility of its conversion into different forms. Iron is found in the form of iron ores. They are of different types: haematite, magnetite, limonite and siderite. The metallic content of iron in these ores is highly variable. If the iron content of an iron ore is more than 30 per cent, only then it is worth extraction

Like several other metals, iron ore deposits are associated mainly with the major igneous intrusions. Good quality iron ore is found in Russia, Ukraine, China, the USA, Canada, Sweden, France, Germany, Spain, the UK, Liberia, South Africa, Brazil, India and Australia. Russia has the largest proven reserves of iron ore in the world. China emerged as the biggest producer of iron ore in the world since 1999, followed by Brazil, Australia, India and Russia.

Copper

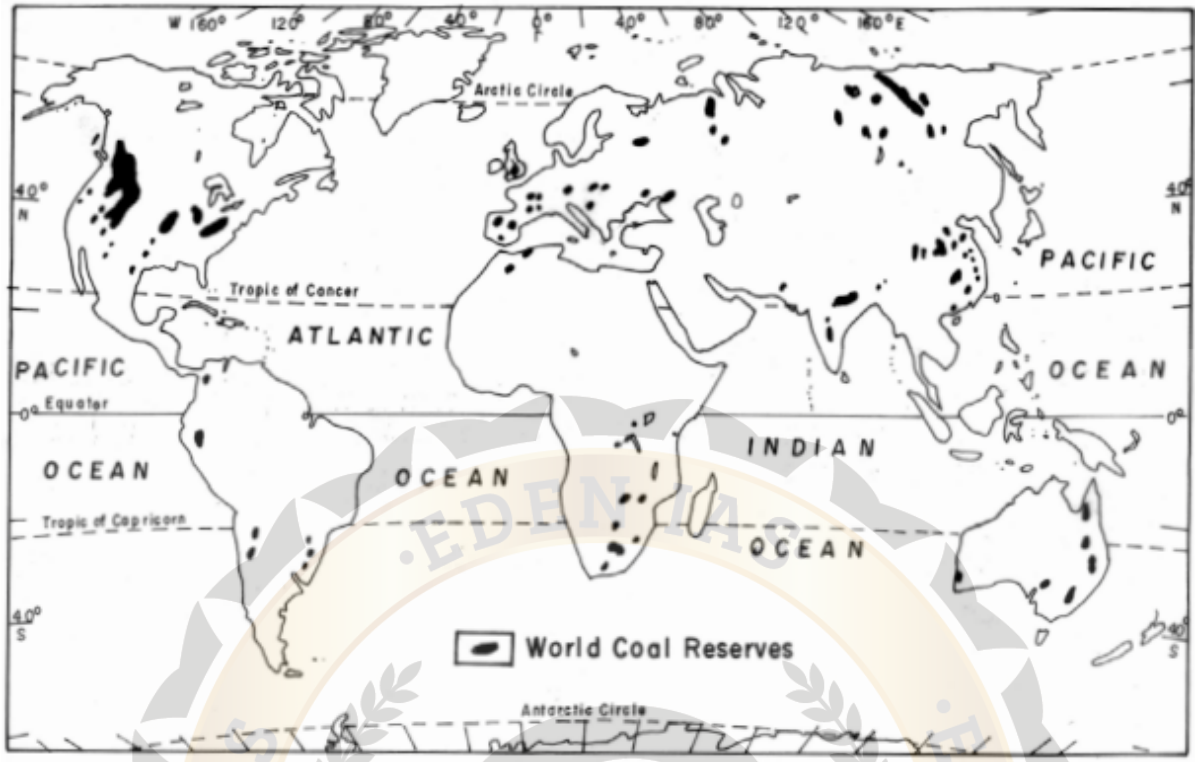
Copper as a metal has been in use since ancient time. It is malleable and corrosion resistant. It is used mainly in the electrical industry because it is a good conductor. However, in recent years, the increasing use of glass fibres has reduced the pressure on copper. Copper is used for making different kinds of alloys. For example, copper is mixed with tin to make bronze. Similarly, copper and zinc are mixed to make brass. Copper is found in Chile, Peru, Mexico, the USA, Canada, Russia, Poland, Congo Democratic Republic, Zambia, Australia, Indonesia and India. Chile is the largest producer of copper. India's contribution in the world production of copper is negligible.

Bauxite

Bauxite is the ore of aluminium. Like iron, it is being used widely in a variety of ways — machine tools, electricals, utensils, aeroplanes, packing and construction. Extraction of aluminium from bauxite requires large amount of electricity. It is, therefore, called an energy intensive industry. Many major dams in the world have been constructed to supply cheap hydro-electricity for smelting aluminium. The Hoover dam on the river Colorado in the USA and the Akosombo dam in Ghana are such examples. Large deposits of bauxite are found mainly in the tropical regions — Australia, Surinam, Jamaica, Venezuela, Guyana, Malaysia, Indonesia and India. They are also found in China, Yugoslavia, the USA, Greece and Hungary. Aluminium production is, however, concentrated mainly in the developed countries, where electricity is cheap and abundant. Bauxite, if not available locally, is imported from outside.

Coal

It is one of the most important sources of energy. It formed the basis of industrial revolution, though its importance has declined after the entry of mineral oil and natural gas later on. Still, it is the world's most abundantly used fuel sources.



Coal is found in seams of sedimentary rocks, mostly belonging to the carboniferous period. The quality of coal is judged by the amount of the carbon content. With age, the carbon concentration in the coal seams increases, while the moisture content decreases. Newly formed coal is of the most inferior quality for this reason. There are three types of coal. Anthracite (more than 90 per cent carbon) is the best quality of coal. It is very hard, shiny, free of impurities, and less smoky, when burnt. It burns well and leaves little ash. This type of coal has comparatively small reserves. Bituminous coal containing 70-90 per cent of carbon is black and shiny. When it is burnt, it gives smoke and leaves much ash. It yields bitumen or tar and hence called bituminous. Coal reserves of this type are quite large. Lignite or brown coal contains 45-70 per cent of carbon. It gives out highly smoky flames because of the presence of more moisture compared to bituminous and anthracite coals. It is, therefore, of the lowest grade. Coal is found in large quantities in the UK, France, Germany, Belgium, Poland, Ukraine, Kazakhstan, Russia, China, South Africa, India, and Australia. China and the USA, together contribute about 60 per cent of the total coal production in the world. Coal production has been fluctuating over the years.

Mineral Oil

Mineral oil is of great economic importance because of its efficiency and versatility. One unit weight of oil gives more energy than the same weight of coal. Mineral oil is generally, formed in the dome-shape structures of the sedimentary rocks. Invariably natural gas and mineral oil are found together. Though sedimentary rocks are widely distributed on the earth, all of them do not contain mineral oil. Only a few regions in the world have very rich mineral oil resources.

Iraq, Saudi Arabia, Kuwait, Iran, United Arab Emirates, Qatar and Bahrain are the most important oil producing regions of West Asia. The United States of America, Venezuela, Mexico, Russia, Georgia, Armenia, Azerbaijan, the North Sea (shared by the UK, Norway, Denmark, Germany and the Netherlands), China and India have extensive oil reserves. Saudi Arabia is the largest producer of mineral oil, followed by the USA and Russia. There has been a steady rise in the mineral oil production in the world.

Types of Mining

Depending upon the location of mineral ores, mining is of two types: surface and underground. The surface mining, which is also known as open cast mining or quarrying, is easier. At present about 90 per cent of all mines and 99 per cent of non-metallic mines are surface mines. The mode of occurrence and the nature of the ore determine the method of extraction. Sedimentary or bedded ores lying close to the surface are called open cast mines. Underground mining, in contrast to the open cast mining, is inherently risky. Poisonous gases, fires, floods and cavings lead to fatal accidents. In this kind of mining, vertical or inclined shafts and horizontal tunnels are made and connected with underground galleries. Rocks are extracted and transported to surface through these passages. It requires specially designed lifts, drills, haulage vehicles and ventilation system for safe and efficient movement of people and materials.

Factors Influencing Mining Activity

The mining activity is influenced by both physical and economic considerations. Mere existence of minerals in the earth is not a sufficient condition for mining activity. The physical characteristics of ore formation — size, depth and quality, are important factors as they determine the cost of working. Desirable knowledge and technology available for the use of minerals, sufficient demand for the ore, adequate supply of labour and capital to develop the requisite infrastructure as well as the mines are the major economic consideration. Mineral production is extremely important in the economies of many developing countries. Several countries in Africa and a few in South America and Asia have over 50 per cent of their export earnings from minerals alone. Mining employs millions of artisan miners across the world. In Latin America, about 1 million artisan miners are engaged in gold mining alone. Mining 'rushes' whether involving artisan or corporations quite often cause social conflicts. Much of the mining activity in today's world is dominated by the Transnational Corporations (TNCs). They serve the global markets through intense exploitation of mining areas, frequently at the cost of environment and local people. The Akosombo dam in Ghana, built in the 1960s to provide hydropower to smelt bauxite for an US company, flooded more than 5 per cent of the country. It displaced 80,000 people to create the largest artificial lake on the earth.

AGRICULTURE

Among all primary activities, agriculture is the most important. Nearly half of the world population is still dependent on it. In developing countries, the proportion of people dependent on agriculture is over 65 per cent. About 12,000 years ago, the first farmers selected their crops and animals for domestication from the existing flora and fauna, particular to the world's biomes, and began the cultivation of plants. Different crops and animals were domesticated in different parts of the world, some in more than one place simultaneously. Despite all the developments since then, humans are still dependent basically on the choices made by people in particular climatic regions thousands of years ago. Only about 20 crops out of several thousands species of wild plants are grown the world over as the major food sources. It is clear from the brief description below that the initial selections were influenced by the climate and the natural vegetation.

The distribution of biomes reflects the distribution of solar radiation, temperature and rainfall resulting in the spread of vegetation types from equatorial forest to the tundra of the sub-Arctic and the high mountains. This broad climatic framework is still the main influence on the pattern of agriculture, though the limits of growing particular crops have now changed under human influence. With the beginning of agriculture, the nomadic herding gave way to a comparatively settled life.

The most primitive form of agriculture is known as shifting cultivation, which still persists in some parts of the world. It is mainly practiced in the tropical forests. Trees are cut and burnt to make a clearing in the forests. Using simplest tools, fields are prepared for planting crops. After a few years of crop production,

the soils get exhausted. These fields are then left fallow and new clearings are made in the forest. This kind of cultivation is known by different names in different parts of the world e.g. as Jhuming in the north-east India, Chengin in Philippines, Roka in Brazil and Masole in Democratic Republic of the Congo. Though, shifting cultivation is also migratory in nature, it allowed people to stay in a place for a longer duration. Subsequently, sedentary agricultural systems with permanent fields and villages emerged in areas of favourable climate and fertile soils. Great civilisations were built on the foundation of sedentary agriculture in the fertile river valleys – the Euphrates, the Tigris, the Nile, the Indus, the Huang He and the Chang Jiang, about 6,000 years ago. Gradually, the sedentary system of agriculture spread over most parts of the world.

The industrial revolution, which took place in the eighteenth century in Europe, influenced Asia, Africa and Latin America indirectly. It boosted agricultural production in Europe and changed the cropping pattern in the Asian, African and Latin American colonies. These colonies specialised in the production of crops such as cotton, sugarcane, rice, tea, coffee and rubber, which were processed in the European factories. As demands for these crops grew in Europe, the large-scale commercial farming of some of these crops, commonly known as plantation agriculture, was started.

Large estates of monocrop were established. They were managed scientifically with the sole objective of export or trading for earning money. One of the effects of colonisation was worldwide diffusion and exchange of several species of plants and animals. For example, potatoes, a native of the Andes, flourished in the cool damp environment of the northern Europe and soon became a world crop. Similarly, corn (maize) spread across the world to become the third most widely grown grain after rice and wheat. The industrial revolution in Europe provided more efficient and more specialised agricultural implements such as plough, reaper, threshing machines, harvesters, tractors and milking machines.

They changed the character, scale and geography of agricultural production. In North America, mechanisation enabled farmers to expand and specialise in the production of commodities that could be sold for the maximum profit. Thus specialised commercial agricultural systems emerged there, which gave rise to distinct crop regions— wheat belt, cotton belt, Corn Belt, dairy farming and truck farming (fruits and vegetables) regions. In other parts of the world also, similar technological revolutions brought power driven machines. In addition, adoption of hybrid seeds, chemical fertilisers and pesticides increased the yield of crops dramatically in many areas, though at varying rates. Plant dispersal and industrialisation of agriculture improved agricultural production profoundly. Large number of people were freed to pursue other economic activities because high yields could be achieved with less number of people and using scientific and technological innovations. The industrialised countries of the world, therefore, witnessed a perceptible shift of population from primary activities to secondary and tertiary activities in a sequential manner viewed as a sign of economic development, though in developing countries employment structure has moved directly from primary to tertiary sectors.

CROP DISTRIBUTION: A GLOBAL PATTERN

Physical environment, which includes climate, soil and relief, imposes certain broad limits within which particular crops may be successfully cultivated or certain types of livestock profitably reared. Besides, socio-economic institutions are also important factors in crop production. Climate Temperature and rainfall are the two most important climatic factors in limiting the areas for the growth of a particular crop.

Temperature

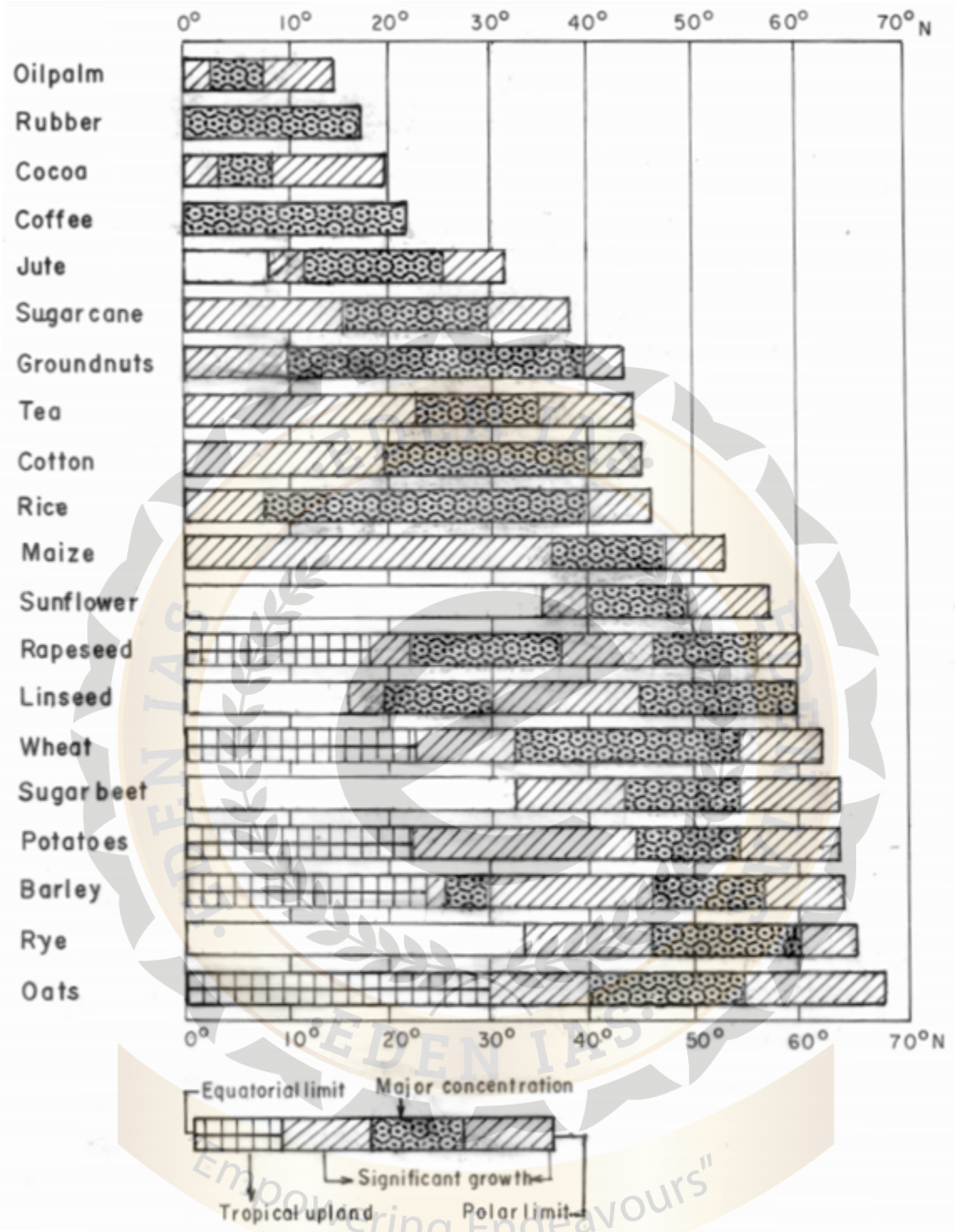
It is an important determinant of the distribution of crops because suitable temperature conditions are essential for the successful germination of seeds and plant growth.

On the basis of the temperature requirements, crops may be divided into two categories: crops adapted to the high temperature conditions of the tropics, and those adapted to the lower temperature conditions of

the sub-tropical and temperate areas. Tropical crops, adapted to high temperature conditions (31- 37o C) may be damaged, if temperature falls below 0o C and frosts occur. A few of them are so susceptible to cold that they will die at a temperature below 10o C. However, some of the temperate crops can be grown in the tropics at higher altitudes such as apples, wheat and oats. Crops grown in the sub-tropics and the temperate regions are adapted to lower temperature. The growing season (between the last frost in winter and the first frost in autumn) is very crucial for the growth of plants in these regions. As one moves towards the poles, this period gets smaller. As such, the number of crops that can be grown polewards also declines. North of the Arctic Circle only rye and oats have some significance. Similarly, many crops also have limits towards the equator. Some of them need a cold period to trigger growth and cannot withstand high rainfall. They are also susceptible to diseases found in the tropics. There are a few crops e.g. flax and olives that are grown in a very narrow zone due to such climatic limitations. Despite varying temperature requirements, most of the crops need 5°C -7°C temperature during seed germination.

Rainfall

It provides moisture to the soil that is essential for crop growth. Every plant has a root system with an enormous total surface area to draw water from the soil. Water-need of plants varies. While wheat requires about 1,500 kg of water to produce 1 kg of wheat, for the same amount of rice, 10,000 kg of water is required. In the absence of sufficient amount of water, the plants cannot grow. It, however, does not mean that crop yields will increase proportionally with increasing amount of water supply. In contrast, if the supply of water is more than the plant's requirement, there will be decline in the crop yield. There is an optimum amount of water for every crop and this requirement varies significantly from one crop to the other. Rubber and tea, for example, need over 150 cm of annual rainfall. Wheat, on the other hand, can be grown in regions having the annual rainfall between 25 and 100 cm. Since more than 50 per cent of the land surface on the earth receives the annual rainfall between 25 cm and 100 cm, wheat is the most widely grown crop. About 10 per cent of the land has more than 178 cm of annual rainfall and only 5 per cent of the land receives over 254 cm. As such tea and rubber, have a much more restricted distribution. The deficiency in the rainfall can be overcome with the help of irrigation either from groundwater or from rivers and tanks. The amount of water available in the soil for the crop also depends on the rate of evaporation, which increases with temperature. Hence, crops in the tropics need higher rainfall than in the temperate zone.



Soil

Soil is the essential material upon which all agriculture is based. Soil characteristics are largely the product of the climate. In addition to temperature and rainfall, plants need nutrients, which are mostly obtained from the soil. We have already read about the soil formation process in earlier classes. As we know, interaction and mixing of weathered rock with organic (plant and animal) matter along with groundwater produce the soil in which the plants grow. They contain minerals, which are essential for plant growth. The soil forming process makes the original elements of the rock more mobile so that plants could use them as nutrients. There are six major nutrient elements. They are: nitrogen, phosphorus, potassium, calcium,

magnesium and sulphur. Besides, iron and small quantities of trace elements such as boron and iodine are also required by plants. The capacity to provide nutrients varies greatly among different soils depending on the composition of the original rocks and the climatic factors — temperature and rainfall of the region. In tropical regions, the nutrients are easily leached out because of high rainfall. In temperate regions, the soils have more nutrients. Desert soils have high concentration of nutrients but the lack of water makes them immobile and unavailable. The nutrients are replaced in the soil naturally through decomposition of plant and animal organisms. It is a slow process. Hence, for faster nutrient replacement, chemical fertilisers, mainly nitrogen, phosphorus, and potassium are added to the soil. Loamy soils are generally, considered ideal for agriculture because of their richness in plant nutrients, good drainage and ease in working. Heavier clay soils with adequate drainage are more suitable to certain crops. Sandy soils are usually infertile, although they may be used for cultivation after heavy application of fertiliser.

Relief

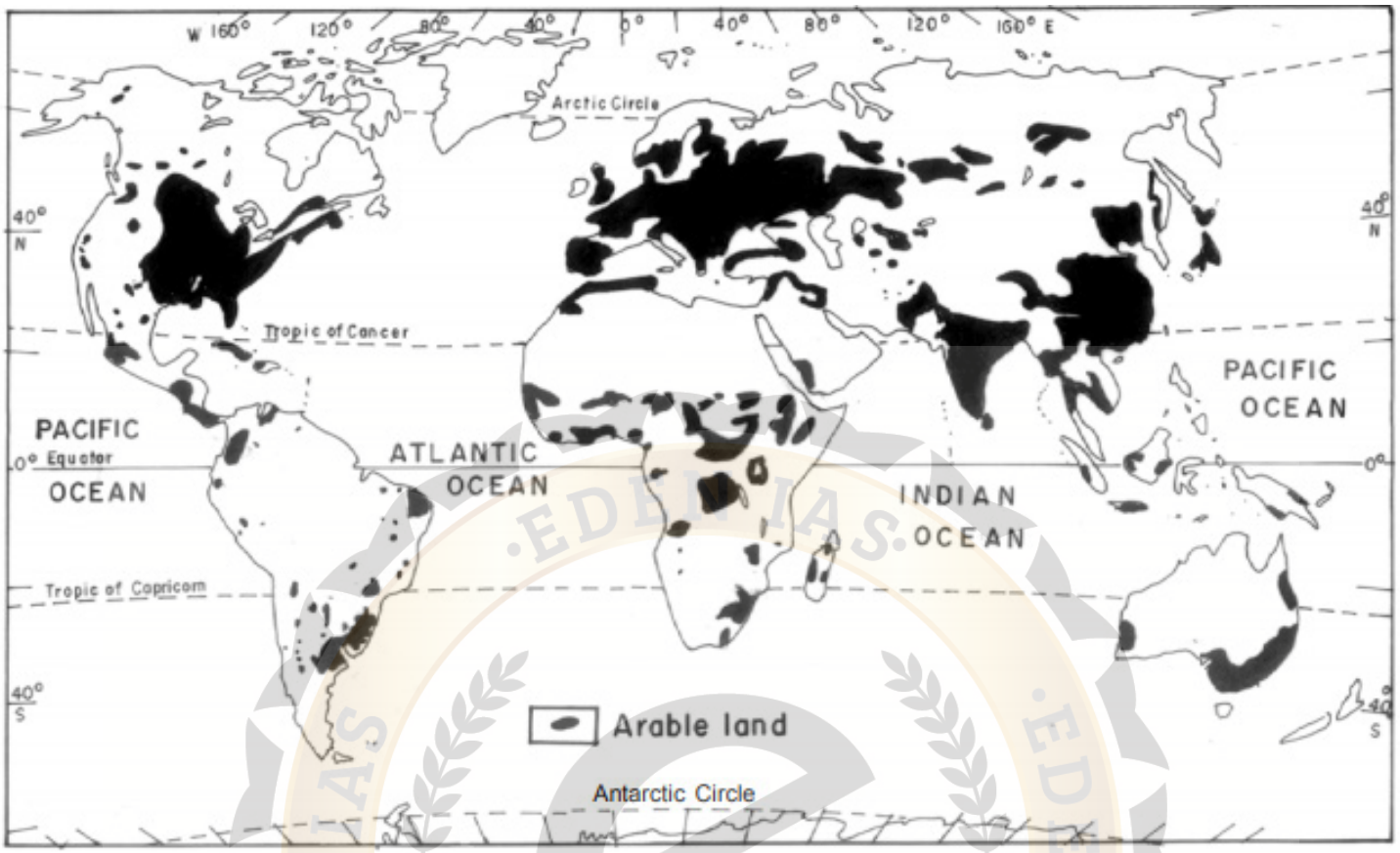
Three elements of relief — altitude, orientation of slope to sunlight and gradient, influence the pattern of agricultural activities. In middle latitudes, high altitudes restrict the number and types of crops that may be grown. In the tropics, on the other hand, increased altitude provides some relief from the excessively high temperature and humidity of the lowland plains. On a local scale, orientation of the slope is an important element of relief. In the northern hemisphere, south-facing slopes receive more intensive sunshine for a longer period than their north-facing counterparts. The gradient of slopes affects the type of agriculture as well as methods of cultivation. Steep gradient restricts the use of heavy machineries. Besides, the risk of soil erosion is also greater here.

Socio-Economic Institutions

While factors of physical environment impose basic limits upon agricultural production, they alone will not adequately explain patterns of agricultural land use. The scale, intensity and extent of production within physical limits is determined by social and economic conditions such as farm size, type of tenure (freehold ownership, various forms of tenancy and state ownership), consumer demand, transport and marketing facilities, the availability of capital, and government subsidies and support policies. The physical limits of production are relatively stable and can be extended only within narrow limits. But the economic margin of production fluctuates according to demand. Hence, within any particular environment many choices and options are normally open to the farmer. The actual farming pattern is determined by the farmer's evaluation of the possibilities offered by the physical environment as well as various social and economic factors.

AGRICULTURAL LANDUSE: FOOD AND NON-FOOD CROPS

The land under cultivation in the world is rather limited. Constraints of climate, slope, soil and pests continue to limit the arable land use to a comparatively small percentage of all land uses. Much larger areas are useable as pasture and forests. If we compare the three major land uses at the global scale during last three centuries, it would be evident how humans have increased croplands by encroaching on forests and grasslands.

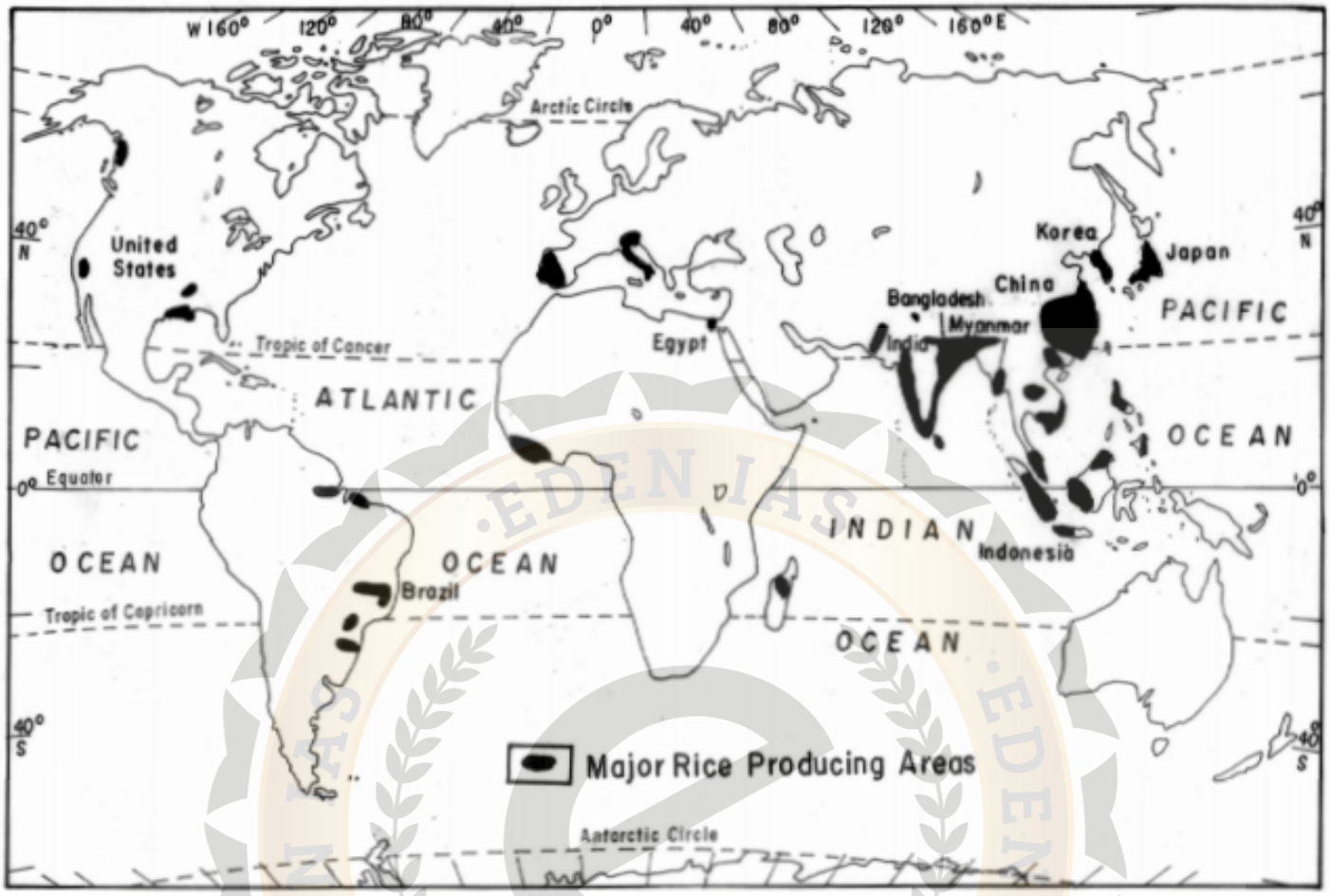


Crops are generally, categorised on the bases of their various uses such as cereals, pulses, oilseeds, fibres and beverages. The other way is to group them under food crops and non-food crops. Few crops have been selected for a detailed study keeping in view their importance and area under their cultivation. In our discussion we will be covering mainly food crops – their distribution pattern, production and sustainability.

FOOD CROPS

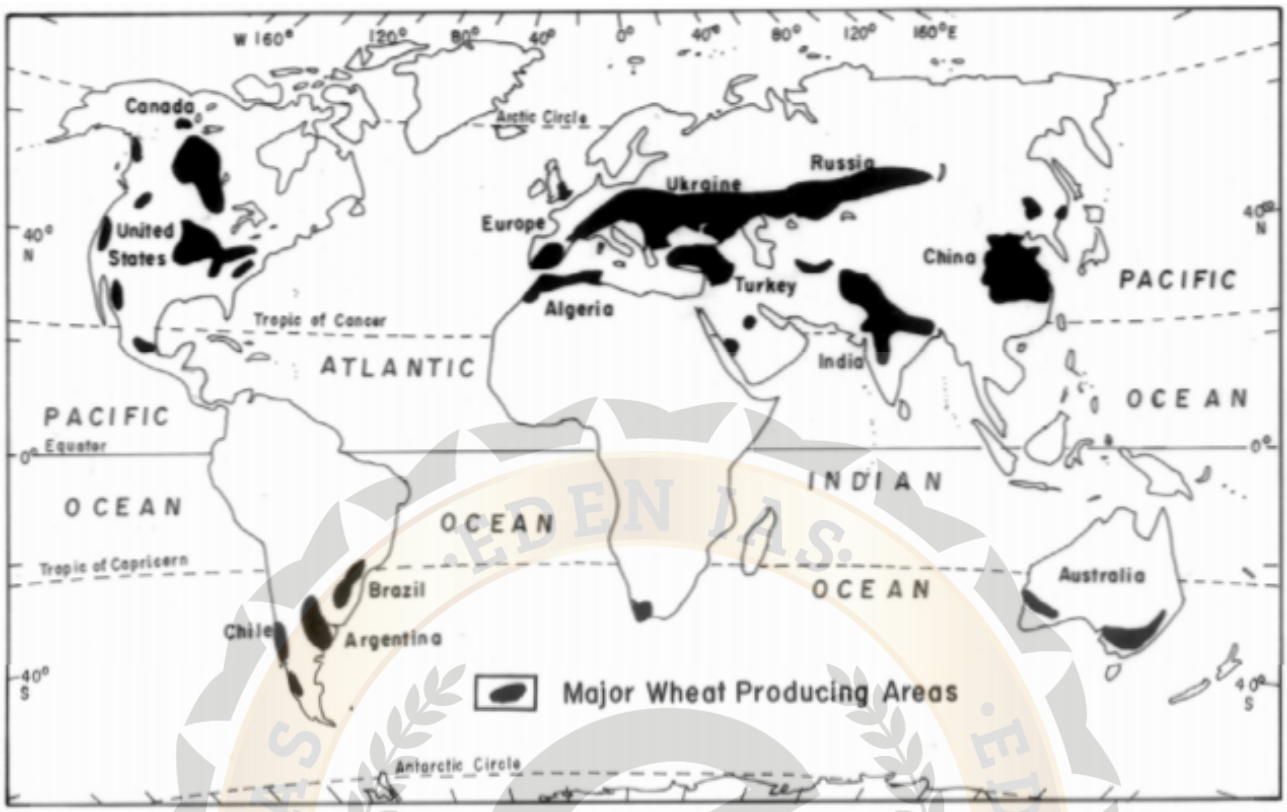
Food for the world's population is obtained almost entirely from plants. Of the immense varieties of plants, only a few were domesticated thousands of years ago and they still continue to be the major food sources. These species have three common characteristics: high production per unit of land; high food value; and storage ability. It is interesting to note that the world's food supply is dominated by five crops. Of these, three are cereal grains: wheat, rice and maize (corn), and the other two: potatoes and cassava are tubers. All of them share the above mentioned qualities. In combination they provide the staple food to nearly all the humans on the earth.

The difference in the area of the five major food crops is mainly because of the climatic requirements of the crop, which limit their cultivation. The developing countries in comparison to the developed countries have higher per hectare yield due to their relative access to agricultural technology such as the range of pesticides, fertilisers, hybrids and machineries



Rice

It is suggested that rice originated in the foothills of the eastern Himalayas in north-east India, Indo-China and south-west China perhaps on the basis of the large concentration of several perennial species. Based on the archaeological evidences, the earliest date of rice cultivation is supposed to be 7,000 years ago in the Chang-Jiang delta. Its cultivation spread to the remaining southern and eastern Asia over the next 6,000 years. While its cultivation was originally carried out in swamps, it spread to new areas, which meant its adaptation to a wide range of environmental conditions — temperature, day-length, rainfall and different soil types. As a result, the range of rice varieties is very broad, varying from the less humid upland conditions to the varieties of 'floating' rice, which can be grown in water upto 5 metres deep. There are more than 65,000 local varieties of rice grown the world over. Rice is mainly the crop of the monsoon Asia, having hot and humid climate. Traditionally, rice was grown in the well watered river valleys and deltas. However, with the help of irrigation it is now grown even on uplands and dry areas. The rice-plant (paddy) requires high temperature (27o -30o C) and high rainfall (about 100 cm) during its growth period. In fact, in the initial stages, the plant needs more of stagnant water. Hence, the paddy fields are flooded with 10-25 cm of water. On hill slopes, rice is grown in terraced fields. Clayey loam soil is best suited for its cultivation because it can retain water. Rice is a labour intensive crop. Most of the farming operations are done manually — uprooting the seedlings from nurseries transplanting them in the flooded fields, removing weeds from time to time and harvesting. The nutritional value of rice is good especially when the outer layer containing important vitamins is not removed in the processing. Ninety per cent of the worlds' rice in grown in East and South Asia. It is the principal food crop for half the population of the world.

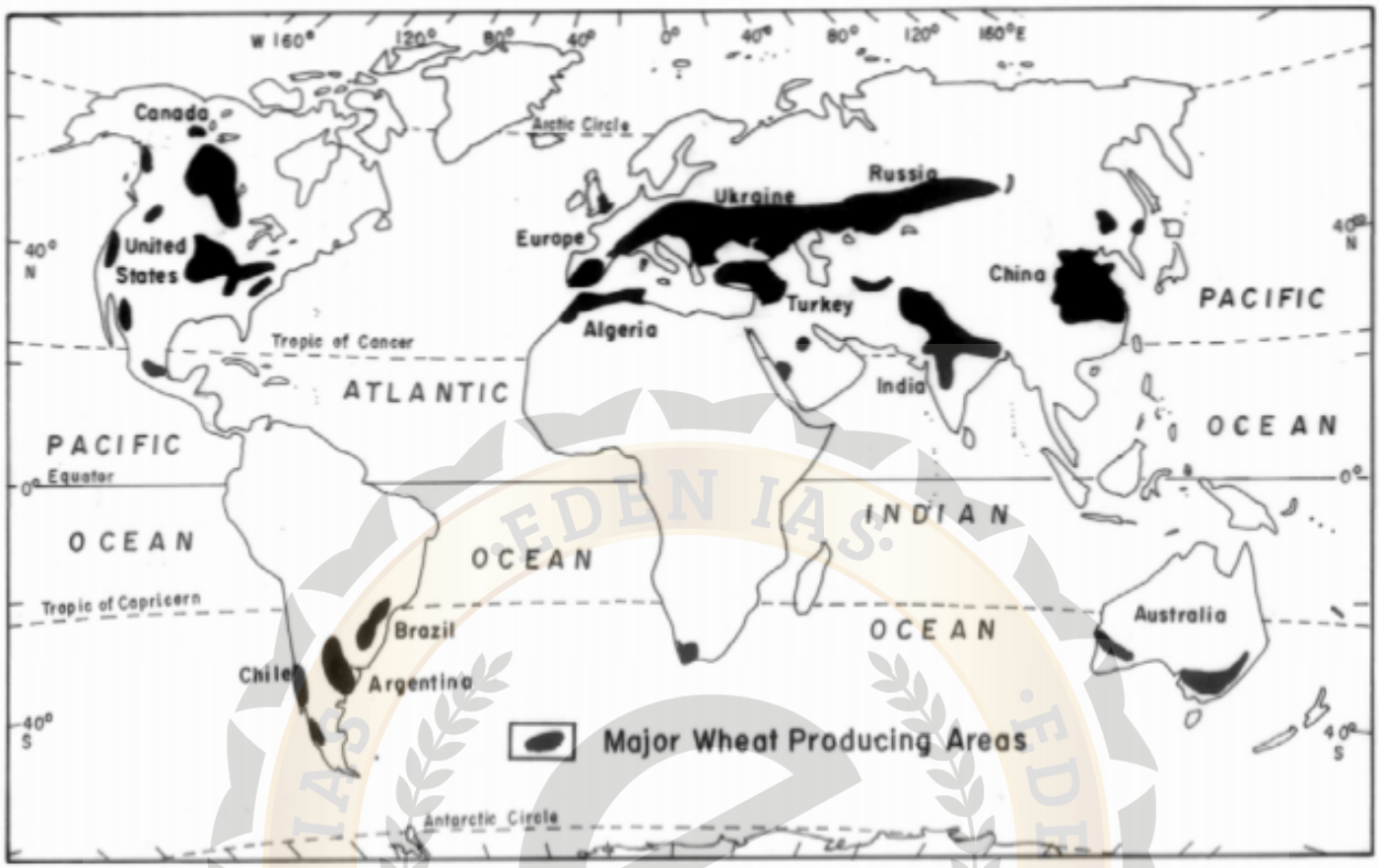


Wheat

It is mainly a crop of the temperate region. But it is now the most widely grown of all the cereal grains because of its adaptability. There is hardly any country which does not grow some amount of wheat. With fair amounts of protein as well as carbohydrates, it is one of the most nutritious grains. It is the staple diet of people in a large part of the world. Although wheat is hardy, it does not grow well under conditions of high temperature and humidity. At the time of germination, it requires cool weather and sufficient moisture in the soil. The annual rainfall should be between 40-75 cm. An average temperature of 16o C and clear sky are required at the time of ripening. Loam and chernozem soils are best suited for wheat cultivation. On the basis of the climate, there are two types of wheat: winter wheat and spring wheat. Regions with mild winters grow winter wheat, whereas those with severe winter grow spring wheat. Wheat is also divided into two types on the basis of its quality i.e. soft and hard wheat. They are grown in humid and dry regions respectively. Although yields are highest in the humid mid-latitudes, the major wheat belts are in the drier semi-arid climates. The areas of greatest production are the Great Plains of the United States, and Canada, the Steppe region of Asia and the North China Plain. Wheat is cultivated under intensive as well as extensive farming. Large-scale commercial production also occurs in Australia and on the Pampas of South America. Wheat is grown in almost every country of Europe but most of it is consumed locally. France is the largest producer and the only exporter of wheat among these countries.

Maize (Corn)

It is another new world crop that has spread over the world from its origin in Central America to all over the world. It is a fairly high-yielding crop. It grows best where summers are warm and humid. Its nutritional value is less than wheat and rice as it does not contain as much protein. It is an important food crop in Central America, South America, Africa and to a lesser degree in India and China. About half of the world's maize is grown in the United States, but 80 per cent of it is used for animal feed and corn oil and not for direct human consumption.

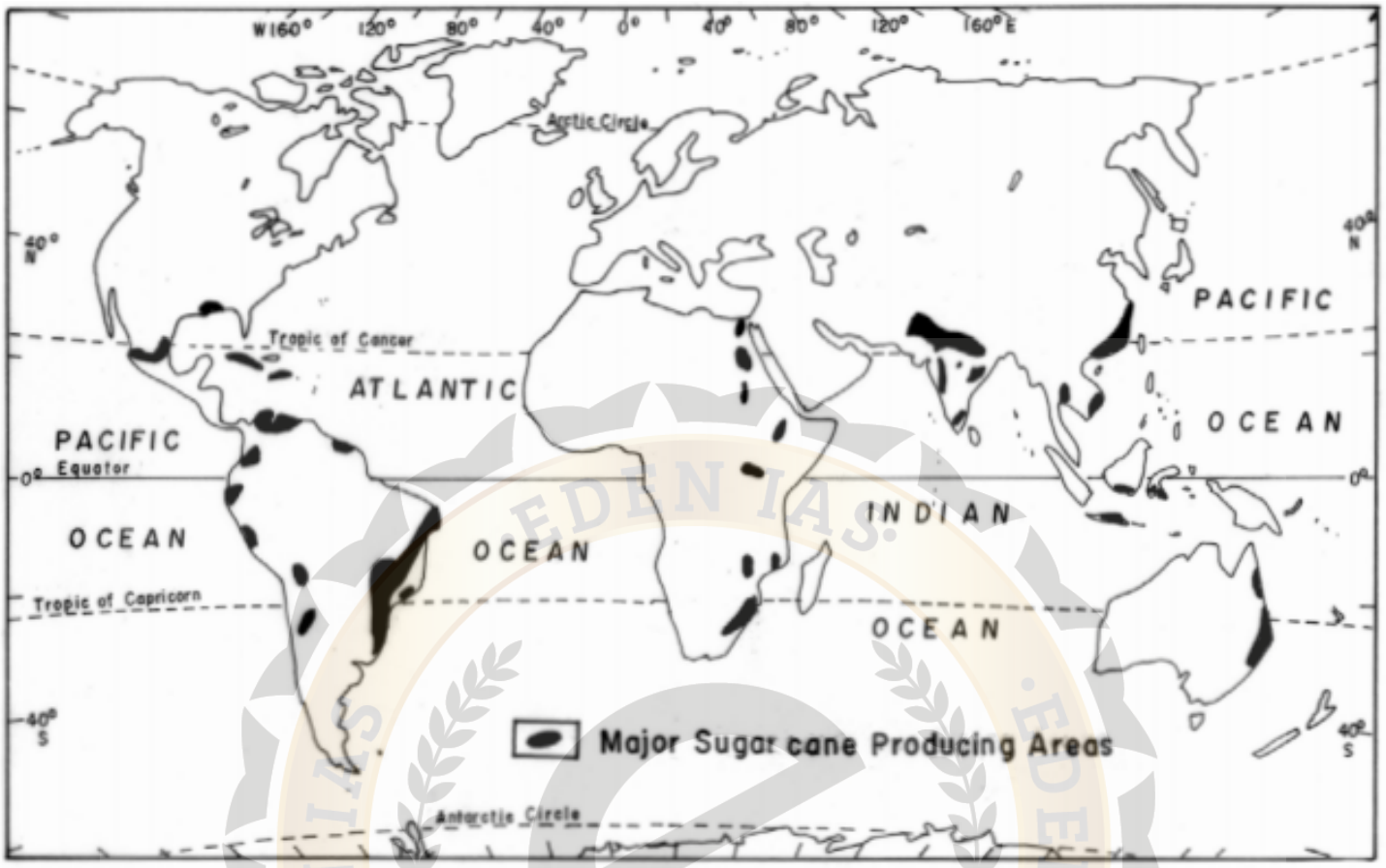


Potatoes

It is an important food crop that grows best in a mild and humid climate. It is now grown throughout the humid mid-latitudes. Eastern European countries and the CIS produce more than 50 per cent of the world's crop. United States, Peru, China, India and Japan are the other major producers.

Cassava

It is strictly a crop of the tropical region, which originated in South America. Compared to the other four food crops, it is deficient in protein and minerals. However, there are several compensating advantages. It grows under a variety of tropical conditions where other crops cannot be grown. Besides, it is relatively immune to most of the pests that affect food crops. Ripe tubers can be left in the ground for long periods without any deterioration. It is an extremely advantageous attribute in a tropical region. Dry tubers are pounded to make flour. For these reasons, it is a staple crop for a large number of people in Southeast Asia, Central Africa and tropical South America. In addition to the above mentioned five major staple food crops, there are many other food crops such as cereals (barley, rye), pulses, oil seeds, sugarcane and sugar beet, beverages (tea and coffee), vegetables and fruits, which come under this category. Pulses include lentils, black gram, peas, soyabeans and several other kinds of beans. Most of these crops are of local and regional importance only. Oil seeds refer to a wide variety of seeds, which are the sources of the edible oil e.g. seasame, mustard, rape seed, groundnut, coconut, sun-flower, olives and maize. Like pulses, there is a great regional variation in oil seeds grown in different parts of the world.

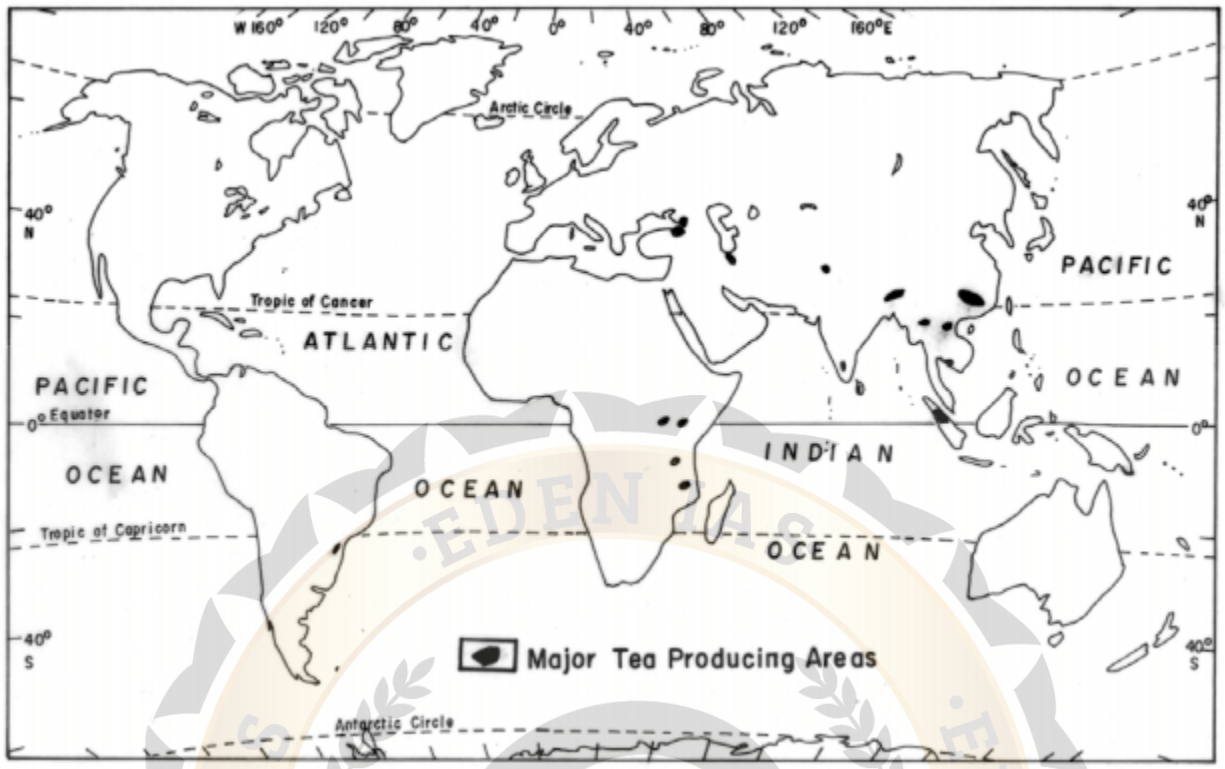


Sugarcane

It is a tropical crop, which is an important source of sugar. In temperate countries, however, sugar beet is the main source of sugar. Sugarcane requires hot and humid climate. Temperature ranging between 20°C and 27°C and a rainfall between 75-120 cm are ideal. At the time of ripening, a low temperature, but not falling below 20°C, and dry weather enhance the sucrose content of the crop. Once cultivated, crop can give yield for at least three years. Deep soil with high moisture retention capacity is most suited. Loam, clay, alluvial and black soils are good for sugarcane cultivation. Compost manures and chemical fertilisers are necessary for maintaining soil fertility. Brazil, Cuba, Mexico, India, Pakistan, China, Thailand, Indonesia and Australia are main producers of sugarcane.

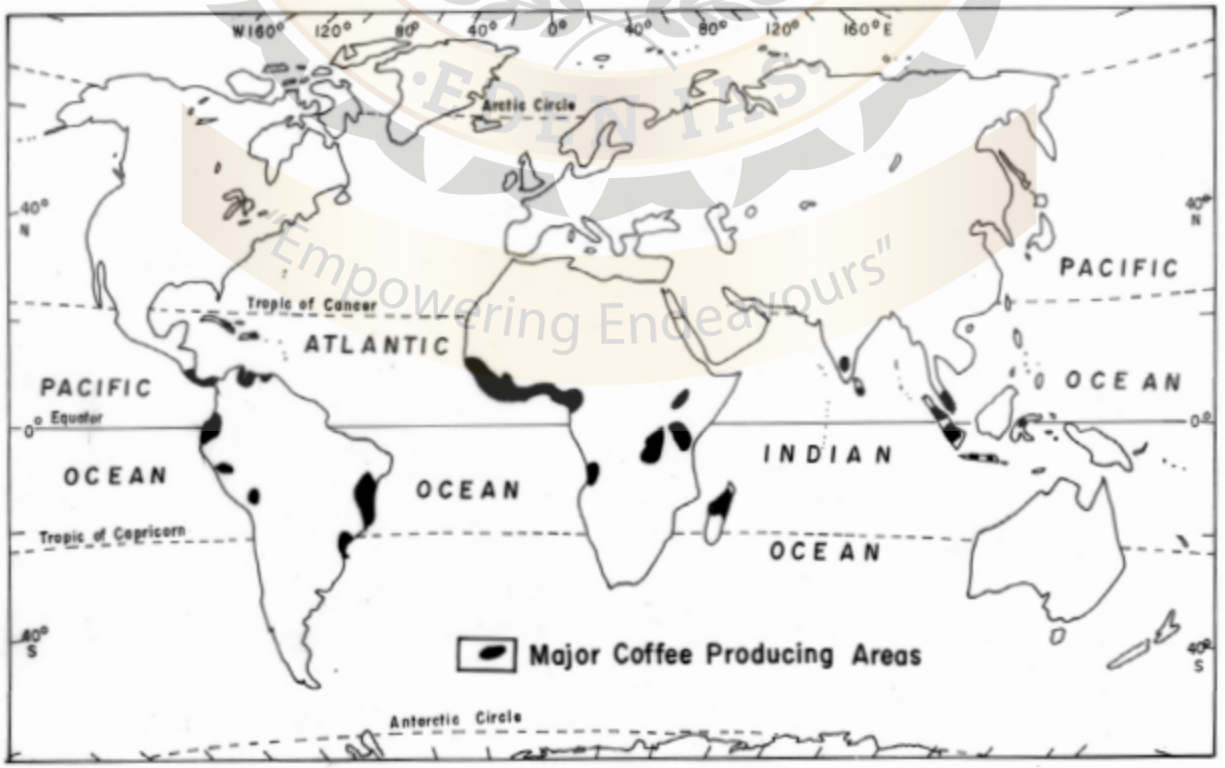
Tea

It is a very popular beverage obtained from the tender leaves of an evergreen bush. It requires warm and humid climate but water should not stagnate near the roots. It is, therefore, grown mainly in a region between 27° south and 43° north latitudes on hill slopes, where annual rainfall is between 125 and 750 cm. Tea plants need fertile soils with high humus. Tea is a plantation crop. It is grown in large tea — estates. Tea plant is not allowed to grow beyond a height of 40-50 cm. The total life span of a tea plant is about 40-50 years. Application of nitrogen fertilisers is essential to maintain soil fertility. Tea leaves are picked up by hand. As such availability of cheap labour is an essential factor. India, China, Sri Lanka, Bangladesh, Japan, Indonesia, Argentina and Kenya are the main tea producing countries



Coffee

It is also a plantation crop, which grows in the tropical highlands at an altitude between 500 and 1,500 metres above the sea level. Coffee plant cannot tolerate frost. It is, therefore, grown under shady trees. It requires high humidity and hence, grows well in the areas having rainfall between 160 and 250 cm. It is, generally grown in deep, porous and water retentive soil with high humus content. Brazil, Colombia, Venezuela, Guatemala, Haiti, Jamaica, Ethiopia and Indonesia are major producers. In India, coffee is grown mainly in Karnataka



NON-FOOD CROPS

Fibre crops such as cotton and jute, rubber and tobacco are the major non-food crops. Cotton and jute are the crops of the tropical region. However, the climatic conditions i.e., temperature and rainfall, for their growth are totally different. Rubber tree is found widely in the Amazon and Congo basins. Its plantations in South-east Asia, India, China, Sri Lanka and Kenya have also been successful.

Cotton

It is one of the most important fibre crops. The quality of cotton is judged on the basis of the length of its staples. The best quality of cotton has a long staple, more than 5 cm. This variety of cotton is grown on the south-eastern coast of the USA and in the West Indies. The medium variety of cotton having a staple length between 3.75 to 5 cm is produced in the Nile Basin, the USA and Central Asian Republics of Tajikistan, Kazakhstan, Turkmenistan and Uzbekistan, and the USA. The small stapled cotton having a length of less than 2.5 cm is grown in India and Brazil. Cotton is a tropical crop. It can tolerate high temperature, but ideally it should be between 21°C and 27°C during its growth-period. Its plant cannot tolerate temperature below 21°C and frost. A rainfall of 50 cm is enough, but it should be distributed evenly during its growth period. Cloudless sky at the time of the ripening of the cotton balls is essential. A well-drained soil is suitable for its cultivation. Volcanic, black and alluvial soils are good for it. In addition to the countries mentioned earlier, cotton is grown in China, Pakistan, Sudan and Turkey

AGRICULTURAL REGIONS OF THE WORLD

One of the earliest but one of the most satisfactory classifications was proposed by **D.Whittlesey** in 1936. He employed five criteria to classify agricultural regions of the world: crop and livestock combination; intensity of land use; processing and marketing of farm produce; degree of mechanisation; and types and associations of buildings and other structures associated with agriculture. In this scheme, 13 main types of agricultural regions were identified as follows:

(i) Nomadic herding;

(ii) Livestock ranching;

(iii) Shifting cultivation;

(iv) Rudimental sedentary tillage;

(v) Intensive subsistence, rice dominant;

(vi) Intensive subsistence, without rice;

(vii) Commercial plantation;

(viii) Mediterranean agriculture;

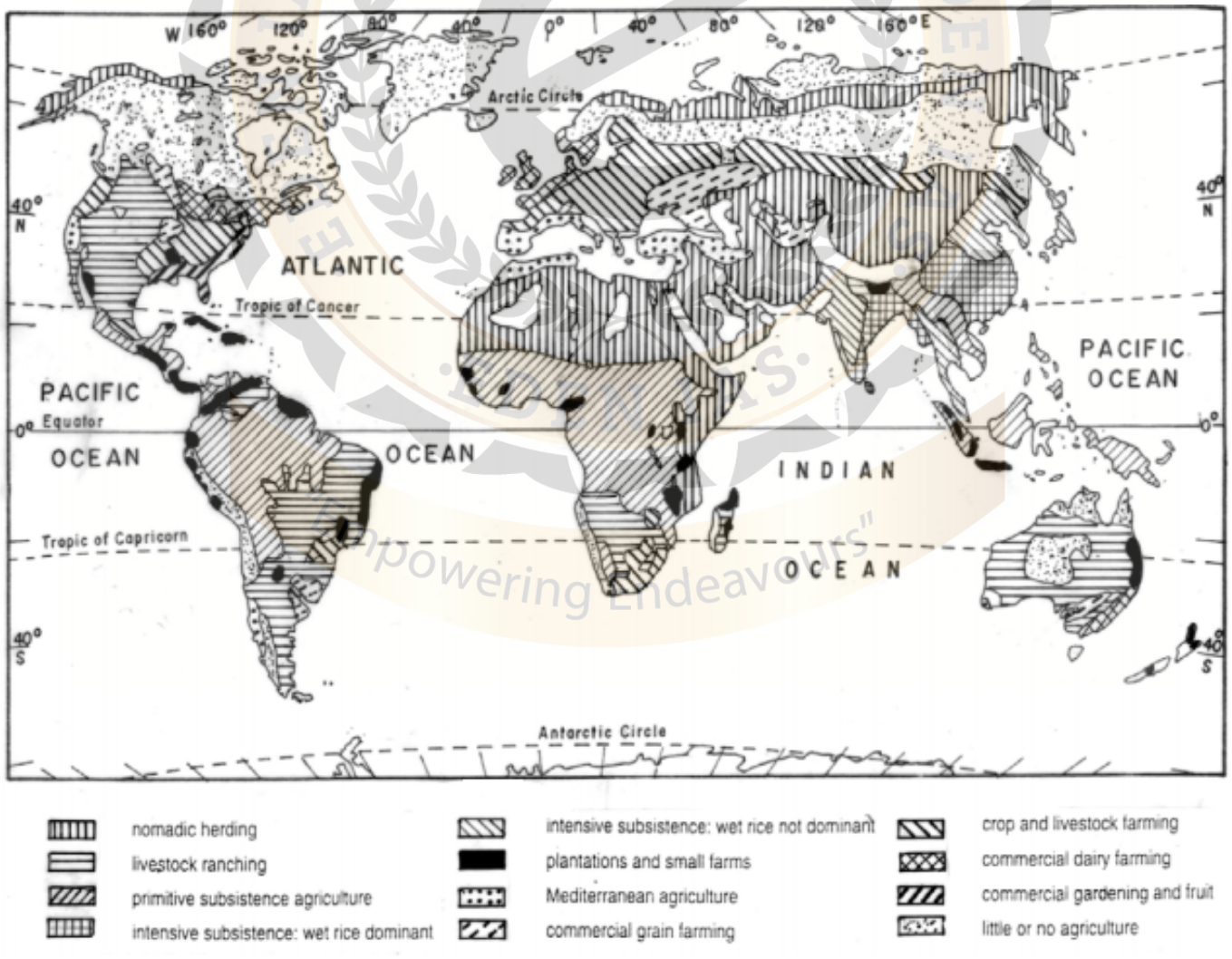
(ix) Commercial grain farming;

(x) Commercial livestock and crop farming;

(xi) Subsistence crop and livestock farming;

(xii) Commercial dairy farming; and

(xiii) Specialised horticulture



Assessment of the factors selected for the above classification seems to be subjective rather than quantitative. In spite of this, Whittlesey's classification provides the foundation for latter attempts in this direction. On the basis of the main characteristics of the farming practices and the production characteristics, agricultural systems of the world can be broadly grouped into subsistence agriculture and commercial agriculture, though the distinction between the two, at times is quite blurred.

Subsistence Agriculture

It is the most widespread form of agricultural production. It is a way of life for almost half of the world's population i.e. some 3.5 billion people. In most of the developing countries, food production is so important that a majority of the people in the work force are subsistence farmers. The sole objective of the farmer is to sustain her/his family. Typically, the production units (farms, fields or livestock herds) are small and relatively self sufficient, so that in good years basic needs of the family are met leaving a small surplus for storage or trade. Three traditional subsistence systems are: nomadic herding, shifting agriculture and intensive subsistence agriculture. We have already discussed nomadic herding and shifting agriculture earlier. Here, we will look at the main characteristics of the intensive subsistence agriculture. More than 3 billion people are supported by intensive subsistence agriculture. In the densely populated countries of Monsoon Asia such as India and China, it provides the economic base. It produces relatively high yields per unit of agricultural land as a result of heavy input of labour. Rice is the principal crop in areas with long, warm and rainy growing seasons. Wheat, upland rice and other grains are the staple crops in the regions having cooler and drier climates. The specialisation of crops is not possible because the farmers like to grow as many crops as required by the household and are possible to be grown. Multiple cropping, which produces two or even three crops in a year on the same field is, therefore, common especially in areas where soils and climates (temperature and rainfall) are most favourable. Such intensive food production is also illustrated by vegetables and fruits, intercropped or grown along paddy dykes and by fish raised in the flooded rice fields. Poultry, cattle and other livestock are also raised as they are required by the household. Over the last two decades or so, the productivity has increased significantly in those areas where hybrid varieties of rice and wheat have been adopted. In addition, with the use of chemical fertilisers, pesticides, insecticides, and irrigation facilities, the traditional subsistence form of agriculture in certain areas has developed some characteristics of commercial agriculture.

Commercial Agriculture

In contrast to the subsistence agricultural system, commercial agricultural system emphasises on specialised production of crops and livestock for sale. Most commercial farms are relatively large. They utilise specialised machinery, seeds, fertilisers, and other products to increase production efficiency. Through commercial farming, a single farmer can produce enough food to feed a large number of people. As such less than 10 per cent of the population of developed countries are directly engaged in farming. For example, each US farmer produces enough to feed more than 60 additional people. The production efficiency is realised in two ways. Improved inputs such as seeds, fertilisers and pesticides promote higher yield. Specialised machinery speeds up production and reduces the human labour required for cultivation, irrigation, harvesting and other farming operation. In the USA, agricultural output has doubled over the past half – century, while its agricultural work force has declined more than three times. At the same time the number of farmers has dropped from 6.5 million to just over 2 million, with less than 500,000 full time farmers today. Reduction in the number of farms and farmers and increase in food production reflect the trend towards large size of farms, fields and livestock herds. It thus creates more savings in labour and production costs. The full time commercial farm in the developed countries is more like a business enterprise than a traditional way of life as in developing countries. Agricultural operations and management strategies must consider production costs and market prices that are driven by the interplay of economic, political and institutional forces at work in the national and global economies.

CLASSIFICATION OF INDIAN AGRICULTURAL REGIONS

India is a vast country and is endowed with diverse geographical conditions which are bound to bring in regional variations in agriculture. Several scholars have attempted to delineate the agricultural regions of India. Prominent among them are E. Simkins (1926), D. Thomer (1956), M.S. Randhawa (1958), L.D. Stamp (1958), Chen Hang-Seng (1959), O.H.K. Spate and A.T.A. Learmonth (1960), Ramchandran (1963), F. Siddiqui (1967), O. Slampa (1968), Miss P. Sengupta (1968), R.L. Singh (1971) and Jasbir Singh (1975) The scheme suggested by the Indian Council for Agricultural Research (ICAR) is simple and comprehensive and is reproduced here. It is based on the predominance of crops and crop associations. Accordingly India can be divided into following agricultural regions:

Rice-Jute-Tea Region:

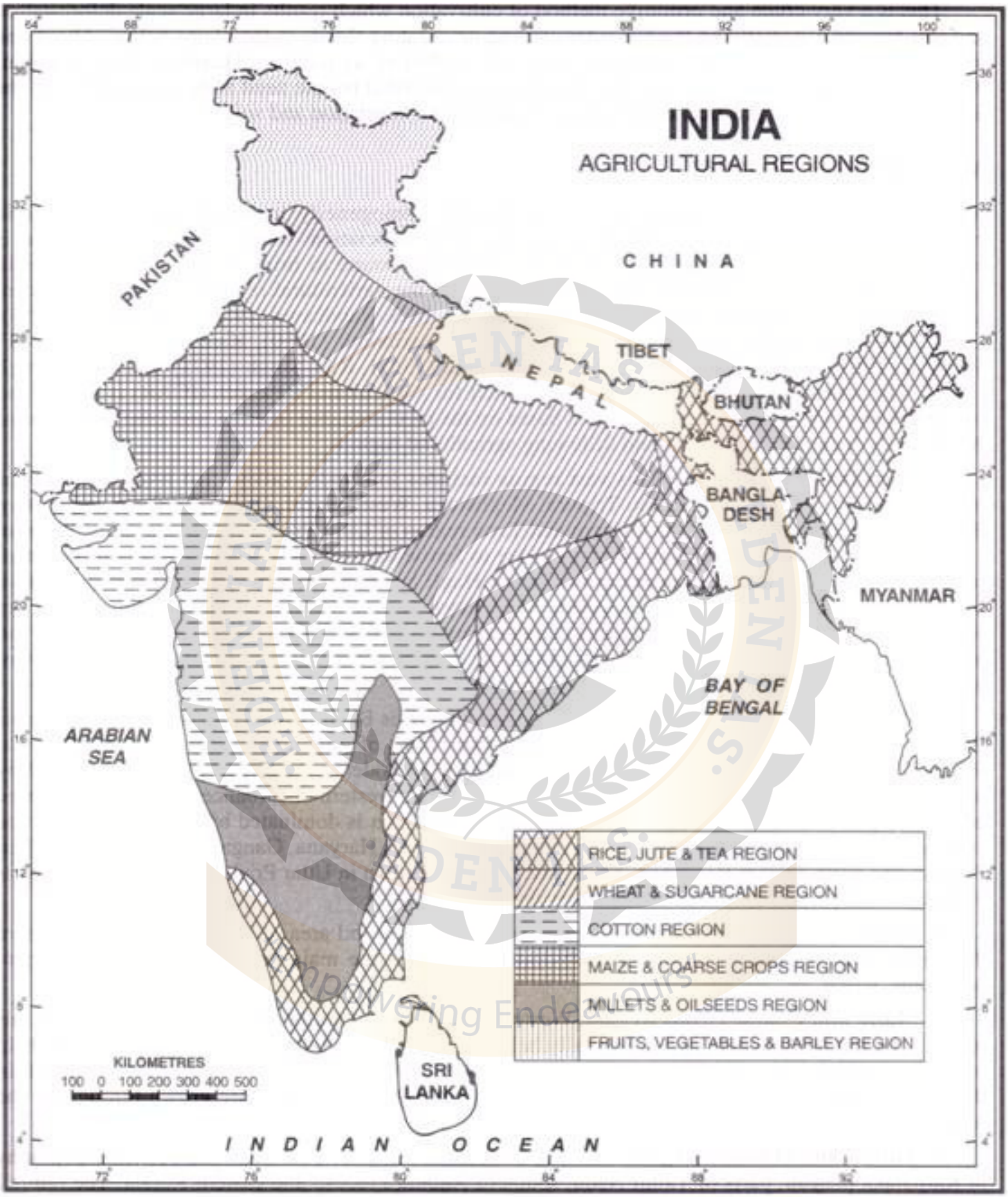
This vast region includes lowlands, valleys and river deltas in the states of Assam, Arunachal Pradesh, Tripura, Meghalaya, West Bengal, Odisha, northern and eastern Bihar parts of Jharkhand and Chhattisgarh and Tarai region of Uttar Pradesh. The rainfall vanes from 180 to 250 cm. Rice are the predominant crop due to fertile alluvial soils, abundant rainfall and high summer temperatures. Jute is mainly grown in the Hugli basin of West Bengal but some areas have been brought under jute cultivation in Assam, Meghalaya, Tripura, Orissa and Tarai region of U.P. Tea is mainly grown in Assam, Darjeeling and Jalpaiguri areas of West Bengal and Tripura. Sugarcane and tobacco are grown in Bihar. Coconut is grown in coastal areas. Mango, pineapple, betal leaves, bananas, jack fruits, and oranges are the main fruit crops.

Wheat and Sugarcane Region:

This region comprises Bihar, Uttar Pradesh, Punjab, Haryana, Western Madhya Pradesh and north eastern Rajasthan. Most of the areas have rich fertile alluvial soils with some parts having black and red soils. Rainfall is moderate, large part of which is caused by south-west monsoons in summer. Some rainfall is caused by western disturbances in winter. Irrigation is a vital input in drier areas. As its name indicates, this region is dominated by wheat and sugarcane cultivation. The main wheat belt of India extends over Punjab, Haryana, Ganga-Yamuna doab of Uttar Pradesh and north-eastern Rajasthan. Sugarcane is mainly grown in Uttar Pradesh and contiguous parts of Bihar. Rice, pulses and maize are the other important crops.

Cotton Region:

It spreads on the regur or black cotton soil area of the Deccan plateau, where the rainfall varies from 75 to 100 cm. Albeit cotton is the main crop but jowar, bajra, gram, sugarcane, wheat, etc. are also grown.


INDIA
AGRICULTURAL REGIONS
PAKISTAN
CHINA
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RICE, JUTE & TEA REGION
WHEAT & SUGARCANE REGION
COTTON REGION
MAIZE & COARSE CROPS REGION
MILLETS & OILSEEDS REGION
FRUITS, VEGETABLES & BARLEY REGION

Maize and Coarse Crops Region:

Western Rajasthan and northern Gujarat are included in this region. The rainfall is scanty and is normally below 50 cm. Agriculture is possible only with the help of irrigation. Maize is mainly grown in the Mewar plateau where wheat and ragi are also produced. In the southern part, rice, cotton and sugarcane are grown. Bajra and pulses are grown throughout the region.

Millets and Oilseeds Region:

This region includes areas of poor soils and broken topography in Karnataka plateau, parts of Tamil Nadu, southern Andhra Pradesh and eastern Kerala. The rainfall varies from 75 to 125 cm. The millets include bajra, ragi and jowar while the oilseeds grown are groundnut and caster. Pulses are also grown. Mangoes and bananas are important fruit crops.

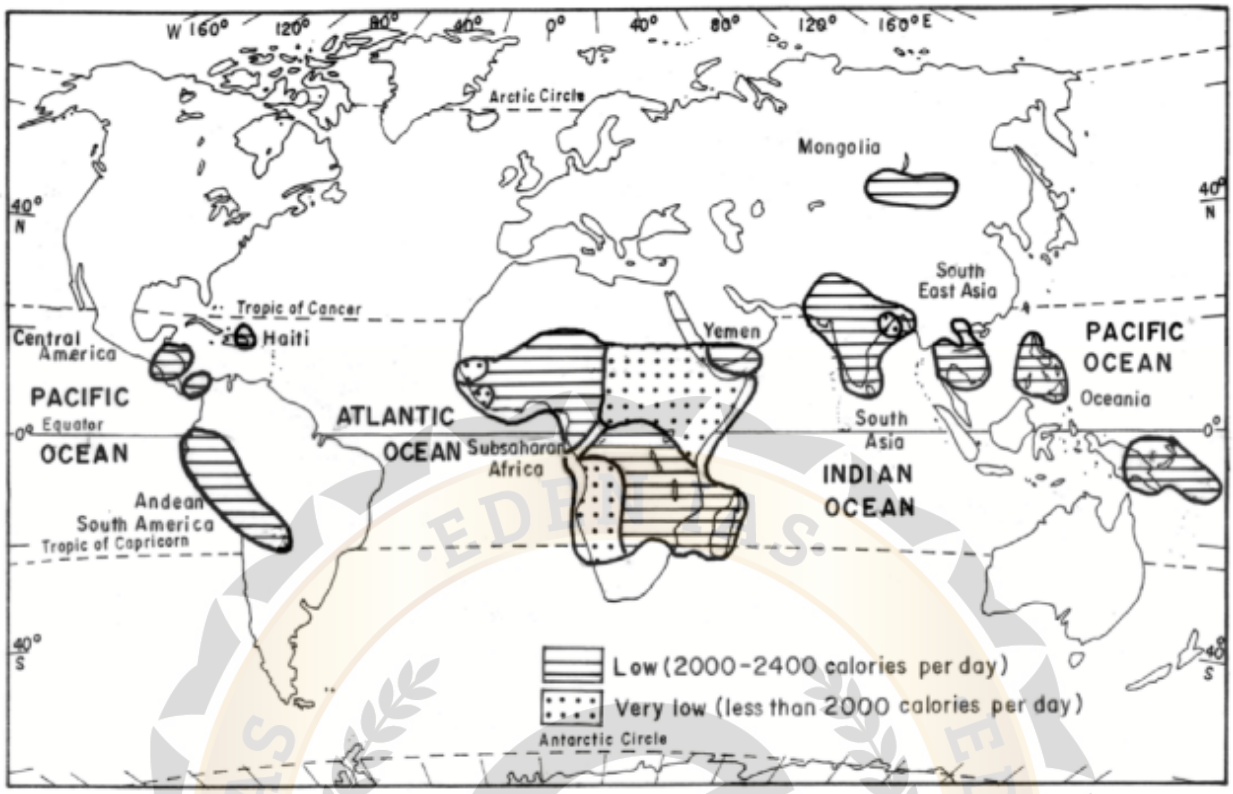
Fruits and Vegetable Region:

This region extends from Kashmir Valley in the west to Assam in the east. The rainfall varies from 60 cm in the west to 200 cm in the east. Apple, peach, cherries, plum, apricot are grown in the west while oranges are important in the east. Besides the above mentioned fruits, rice, maize, ragi potatoes, chillies and vegetables are also grown.

WORLD HUNGER, MALNUTRITION AND FOOD SECURITY

Despite significant increase in agricultural production, more than 1 billion people, about one out of every six persons suffer from chronic hunger and nutrient deficiencies. Hunger means that the daily diet does not provide the quantity and type of food needed to maintain health, normal growth and productive work. For estimating global hunger, four indicators are used: starvation, undernutrition; micronutrient deficiencies; and nutrient depleting diseases and parasites. Widespread starvation most often occurs as a consequence of famines — the acute shortage or absence of food within a region due to crop failure or destruction or by withholding or blocking food shipments into a country or a region. Although famines are associated with widespread crop failure, most are the result of social or political processes that disrupt traditional agricultural production strategies. Food security refers to the access by all people at all times to the food required for a healthy life. In Sub-Saharan Africa in the 1970s and 1980s, famines caused widespread sufferings and deaths. These famines were associated with recurrent droughts and subsequent failure of crops and lack of forage for livestock. Changes in the traditional agricultural practices prompted by the government policies to increase production of non-food crops for export resulted in the shortfall of the subsistence food crops for local consumption during the string of dry years. Besides, the ongoing military conflicts and civil unrest in some areas aggravated the famine situation further. As a result, hundreds of thousands starved in Sudan, Ethiopia, Somalia, Angola and Rwanda. Today, about 15-35 million people are at the risk of starvation in any given year.

Why are so many million hungry and malnourished when there is more than enough food produced in the world each year, and which is adequate to feed everyone? There are a number of social, economic, political and environmental reasons. War, the ownership of land and the structure of agriculture, commercialisation, poverty, the geography of food production and food aid are some of the important reasons. The hungry throughout the world have one common trait that they are poor. The landless and unemployed do not have means or money to acquire food. Commercialisation is aimed at exports, rather than providing subsistence food for the local people. It also means growing non-food crops having more market value in place of traditional food crops. The poor obviously cannot compete for food in the global market place.



The world's food supply is unevenly distributed. Only a few regions produce large grain surpluses — North America, Western Europe and Australia. These developed regions sell their grains at world market price. The poor developing countries hardly can afford to buy grains at the world market prices. Only a small fraction of the grain entering international trade is given as food aid. It is often provided to suit the foreign policy rather than given where and when it is needed most. For example, in 1980s when Sub-Saharan Africa was struck by the famine, USA shipped nearly four times more food to its political allies — Central American countries than the entire famine-ravaged Africa. Grain stockpile is often used as a measure of food security. The fast rate of growth in food production started with the introduction of the hybrid varieties of rice and wheat to subsistence agricultural economies, nearly 50 years ago. It ushered an era of green revolution. It has now started slowing down. Since 1990, world grain yields have risen only about 0.5 per cent annually compared to over 2 per cent annually between 1950 and 1990. As a result, the stock pile of grain has declined. New strategies are, therefore, required to improve the sustainability of food production and to increase food security. Most likely the greatest potential for expanding food production will be in the areas that already are the granaries and bread-baskets of the world. Plant breeders are currently exploiting the long over looked genetic resources of seed banks –repositories that contain more than 6 million varieties of the seeds of some 100 crop species and their wild ancestors. One such experiment in China has produced rice varieties that may yield 20-40 per cent more than current hybrids by using genes from uncultivated rice varieties. New strategies also focus on the most efficient use of the limited resources coupled with the traditional intercropping method that have sustained land productivity for centuries. It is advantageous both environmentally and economically compared to monoculture i.e. single crop cultivation. Sharing of certain crops enhance soil fertility, control soil erosion and increase the crop yield. Besides, the risk of total crop failure is also reduced. In areas of shifting agriculture, agro-forestry and nutrient recycling increase the productivity of the soil. For example, in Sahel region of Africa, shifting cultivation system is being modified to an agroforestry system in which nitrogen-fixing acacia tree are intercropped with traditional millet and sorghum crops. The trees improved the productivity of the soil in several ways. Similarly nutrient-recycling cropping system has been developed in the Peruvian-Amazonian region to suit its infertile acid soils. High yielding acid — tolerant rice and nitrogen-fixing cowpea varieties are rotated without fertilisers, lime or tillage. Crop residues are returned to fields and human labour is used to control weed. After several

satisfactory harvests, a cover of tropical Kudzu (a local plant) is planted to choke the invading weeds. After one year, this cover is buried and the nutrients of soil are restored. In recent years, genetic engineering and genetically modified crops has systematically altered the genetic structure of plants and animals. It is still in the early stages of development and it is difficult to assess its impact on human society. However they do augur well for the future and can be a sustainable solution for addressing chronic hunger.

SECONDARY ACTIVITIES

With industrial revolution, the use of inanimate power by harnessing the energy of water, coal, and petroleum brought tremendous changes in the primary sector. It helped in the evolution of large manufacturing system, which utilised products of the primary sector and hence, called secondary. Production of raw materials for both domestic and industrial uses grew. As a result, the purchasing power of the people engaged in primary activities increased and it led to the growth in the demand for manufactured goods. It thus, promoted growth of the secondary activities. At the outset, it would be useful to explain what do we mean by the terms 'industry' and 'manufacturing'.

We, very often, use terms like film industry, fishing industry, steel industry and tourism industry, but each of these represents a different kind of economic activity. However, geographers usually use the term 'industry' to describe those activities which are concerned with processing, fabricating and manufacturing of primary products obtained from agriculture, forestry, fishing and mining. Industry is called a secondary activity to distinguish it from primary activities. Manufacturing literally meant 'making by hand', but now it also includes goods made by machines. It is a process, which involves transformation of raw materials into finished goods of higher value. For example, cotton is an agro-product. It is used as a raw material in the manufacture of cotton textiles, which may further be transformed into garment. Cotton textiles and garments are products of manufacturing. The United Nations defines manufacturing as 'the mechanical and chemical transformation of inorganic or organic substance into new products, whether the work is performed by power-driven machinery or by hand, whether it is done in a factory or in the worker's home, and whether the products are sold wholesale or in retail.' This is, however, a very broad definition. Usually modern manufacturing industry is characterised by complex organisation, specialised labour, use of machinery and inanimate power and mass production.

CLASSIFICATION OF INDUSTRIES

Industries can be classified in many ways: size, nature of products and raw materials, and ownership.

Classification by Size

The amount of capital invested, number of people employed and the volume of production determine the size of an industry. Accordingly, industries may be classified into the following groups: cottage or household, small scale and large scale industries. Cottage or household industries are the smallest manufacturing units. The craftsmen or the artisans with the help of their family members manufacture goods within their homes using local raw material and simple tools. The skills of production are passed on from one generation to the other. The scale of operation is small.

The tools and equipments are ordinary. The goods produced are generally, sold locally. Thus potters, carpenters, weavers and blacksmiths produce goods in the household sector. In many countries of Asia and Africa, this sector is quite important and some of the handicraft items are in great demand in the developed countries. Small scale industries are differentiated from the former by the technique of production. They use modern power driven machines and employ labour as well. The raw materials are also obtained from outside, if not available locally. These industries are larger in size than cottage industries.

Their products are sold through traders beyond local markets. In many developing countries, the role of these industries are crucial as they provide employment to a large number of people. In countries like India and China, a large number of goods such as clothes, toys, furniture, edible oil and leather goods are produced by small scale industries. Large scale industries include mainly heavy and capital intensive industries, which use heavy machineries, employ large number of workers and produce goods for a bigger market. The management is hierarchy-based and complex. Emphasis is laid on quality control and production specialisation. Such industries require a very large resource base and hence, raw materials are obtained from various places.

The production of goods is also on a large scale, which is sent to distant markets. These industries, therefore, require good infrastructure facilities such as roads, railways, and power supply. Iron and steel industry, petro-chemicals, textiles and automobiles fall under this category. Some geographers prefer to divide manufacturing industries on the basis of size of operation and the nature of products together. Accordingly, there are two classes. Heavy industries are of large-scale. They deal in bulky products and are heavily dependent on the raw materials and hence, tend to be located near the source of raw material e.g. iron and steel industry. Light industries are usually small-scale in operation. They deal in lighter and compact products. For them, accessibility is the most important factor. The electronics is one example of this kind.

Classification by Outputs

Industries whose products are used to produce other goods are called basic industries. Iron and steel industry is one of the basic industries because steel produced by this industry is used in many other industries as a raw material. Some basic industries produce machines which are used to produce other goods. Industries which produce goods for direct consumption such as tea, bread, soap and television are known as non basic or consumer goods industries.

Classification by Inputs

Depending upon the raw materials used for the industries, they may be classified as agro-based, forest-based, mineral-based industries, and chemical industries. Agro-based industries are those which utilise agricultural products as raw materials. Cotton Textiles, tea, sugar and vegetable oil industries are its examples. Forest-based industries are those which utilise forest products as raw materials e.g. paper and furniture industry. Mineral based industries are those which use minerals as raw materials. Industries based on metals are known as metallic industries. These are further divided into ferrous and non-ferrous industries. Industries based on metals having iron content are called ferrous industries e.g. iron and steel industry. On the other hand, industries based on metals without iron content fall into the category of non-ferrous industries e.g. copper and aluminium. Industries based on chemicals are called chemical industries e.g. petrochemicals, plastics — synthetic fibres and pharmaceuticals. Some of these industries use raw materials found naturally e.g. minerals such as mineral — oil, salts, sulphur and potash, and vegetable products. Some chemical industries use the by-products of other industries.

Classification by Ownership

On the basis of the ownership pattern and management practices, industries can be classified into government or public, private and joint sectors. When the ownership and management of an industry is in the hands of the state, it is called a public sector industry. The state establishes and runs these units. Industries owned and managed by an individual or a corporate body belong to the private sector. Individuals invest their own capital to establish these industries and they manage them as private enterprise. Sometimes individuals join together under partnership to establish industries. The share of partners, both in the capital investment and profits, is pre-decided. Industries are also established by corporations. Such a body is

formed by individuals or organisations to fulfill pre-determined objectives and goals. Capital for the industry is collected by selling shares. The large multinational corporations such as Pepsi, Hindustan Lever and General Electric have set up industries in several countries across the globe. An industry own and managed jointly by the state and private initiatives falls in the joint sector.

FACTORS AFFECTING LOCATION OF INDUSTRIES

The location of industry at a particular place is governed by many factors. Traditionally, these were grouped under geographical and non-geographical factors. While geographical factors included relief, climate, raw materials, energy sources, labour market and means of transportation, non-geographical factors comprised of governmental policies, capital, market and management. This view is highly deterministic because location cannot be explained in absolute terms. For example, the location of cotton textile in Lancashire (UK) cannot be explained only in terms of the presence of the humid climate, soft water, abundant coal and the position of Liverpool in the Atlantic trade.

Similar conditions were present at many other places including South Wales. Lancashire, therefore, had the relative rather than the absolute advantage of time and space. To get over this shortcoming, industrial location is now explained in terms of factors associated with assembly, processing and distribution, government policies, environment, industrial inertia and the human factor. These factors do not operate in isolation, but in a complex system of interrelationships. The relative importance of these factors varies with time, space, type of industry and also the economy. It is important to remember that not all factors at a particular time are favourable, and that most of the good locations have been those where the number of favourable factors have outweighed the unfavourable ones. In fact, an optimum location is a relative term.

Assembly, Processing and Distribution Factors

A number of factors associated with the assembly, processing and distribution of materials and products are crucial in the location of an industry.

Distance

It is one of the most important factors explaining the location of industries. It is not simply a question of physical distance in terms of km, although it is not unimportant. It is a question of cost and time involved in moving goods. It is, therefore, appropriate to talk in terms of economic distance, which is determined by the mode of transport, the type of commodity and freight rates. The prime concern of a manufacturer is to reduce the economic distance and hence, transport plays a crucial role in location of industries.

Raw Materials

All industries use raw materials which should be available economically. In early times, location of industries was tied to the location of raw materials. With improvements in transportation and handling facilities, the movement of raw materials has become easier. Industries are becoming more and more specialised and complex. As a result, fewer and fewer firms are directly based on crude and bulky raw materials. In countries like USA and Japan, most of the manufacturing industries use semi-produced products. Technological advancements have intensified the use of raw materials by reducing waste in manufacturing and also improving them at the source itself so that they can be easily transported.

Nevertheless, there are certain industries in which raw materials play an important role. For example, industries which lose either bulk or weight in the manufacturing process such as copper smelting or in industries where the raw material is perishable such as fruit canning, the processing takes place near the raw material.

Energy Sources

Historically, energy sources have had considerable effect on the location of industry. Even today there is a strong correlation between industry and coalfields. Industries using large amount of energy such as electro-chemical and electro–metallurgical industries, are still located near the sources of electricity generation. But it is declining in importance as a location factor because fuel efficiency has been improving considerably. While in the eighteenth century, more than 8-10 tonnes of coal were required for smelting 1 ton of pig iron, today less than 1 ton is needed. Besides, development of electric grids and oil and natural gas pipelines has made the energy source as a locational factor less important.

Water

It is used in most industrial plants for processing, steam raising or cooling. As such, water supplies both in terms of quantity and quality are important in considering the location of industry. Water requirement of industries varies considerably. While some need more such as iron and steel industry (200,000 litres to produce one ton of steel), others like electronics need less. Yet, shortage of water in an area can be a serious deterrent for locating an industry.

Access to Labour Market

It is also an important locational factor. Differences are found not only in the quantity of labour available but also the quality of labour as represented by the skills that an area can offer. For example, diamond cutting and polishing need skilled workers. It explains the concentration of diamond cutting and polishing in Surat (India).

Access to Good Management

It is an important factor in the choice of sites. For example, it is vital to know whether the selected site will be able to attract good managers.

Capital

It is yet another important locational factor because it is less mobile internationally. Unstable areas with high risk and uncertain returns are likely to be less favoured. However, with the development of banking services money capital has become much more mobile within a country.

Government Policies

Governments encourage or restrict developments in certain areas. Economic and social considerations are important factors influencing the government's decision. It is the duty of a government to ensure that the country's resources are used to the best advantage and that there are no great inequalities in the distribution of wealth. Similarly, political and strategic considerations also have strong influence on industrial location. In order to reduce regional imbalances, many countries and regions demarcate certain areas for location of industries.

Environment

Physical attraction of an area is an important factor. Congenial living conditions are preferred while setting up industries. For example, in the USA, the aircraft industry has moved to the southwestern part of the country because of climatic advantage. Due to warm climate, hangar heating costs are less in this region.

Industrial Inertia

Many industries remain at a particular location even after the disappearance of initial advantages. Avail-

ability of infrastructure facilities such as transport and services, and immobile physical capital such as building encourage inertia and new industries are attracted. Some industries are location leaders, either because they provide raw materials for other industries, or because they require specialist firms to supply parts.

The Human Factor

Among several considerations, the ultimate decision is taken by the humans. Their personal choices thus, influence locational decisions.

CHANGING TRENDS

Locational factors, discussed earlier are not equally significant for all industries. Over the years these factors have become less and less important especially in industrialised developed world. Energy and materials efficiency through waste avoidance, recycling, substitution and alternatives in recent years have contributed positively towards enhancing environmental sustainability in these regions. Logging, mining and heavy industries like iron and steel are already far less important today than they were once for economic growth. Modern industrial activity and its spatial distribution has changed in many ways. It can be understood better in the context of the development process. W. Alonso (1980) talked of 'five bell shapes in development'. He observed that during a period of development several features moving in the same direction rise to a peak and then subside. These features are : (a) the economic growth rate; (b) the level of social inequality; (c) the level of regional inequality ; (d) the level of spatial or geographical concentration (urban-industrial growth in a few centers); and (e) the population growth rate in demographic transition. All these five features do not rise and fall simultaneously, though they are interconnected. According to him geographical concentration was the first process followed by economic growth and then by social and regional disparities. As such, concentration has a positive value in the process of development. With the progress of economy and scientific and technological advancements, structure and form of industries change. For example, textile industry in Germany witnessed constant growth since World War II till late seventies. It declined with the shift of whole textile industry to less developed countries where labour costs were low and labour laws were less rigid. Accordingly, industries with sophisticated parts are kept in advanced countries and those with low technology, labour-intensive units are exported to poor countries. This kind of change observed by the early eighties was known as 'new international division of labour'. This meant that while there was a continuous technological change and new industries were in the centre, some less demanding industries could be located in the periphery. If, in the past, Germany made steel and Brazil produced iron ore for it, now Brazil might make steel and Germany would work these into engineering products such as cars.

The other change is noticed in terms of large factories giving way to smaller units dispersed over a large area. Some of the nineteenth century factories were spread over very large areas and they employed several thousands people e.g. Douglas's Long Beach aircraft plant employed 100,000 and steel mill complex at Tienshan, China held over 200,000 workers. Instead, mini steel plants are in vogue today. New trends can be observed for certain kinds of industrial production which are organised in more flexible ways. There are two broad types of flexiblity: flexible production and flexible specialisation. Both of these allow smaller volumes of production to be handled economically, enabling rapid changes in matters such as design or even the process used in manufacturing. It is popularly known as 'post-Fordism' in advanced countries of the world, which is in contrast to 'Fordism'. Henry Ford endorsed the use of mass production lines, the excessive division of labour and the manufacture of highly standardised products in developing the North American car industry. It served as a model for many industries for a long time, and was known as 'Fordism'. Flexible production involves the use of automation in order to be able to programme designs and rapid changes of design (computer-aided design or CAD). The machines used in manufacturing may be computer controlled and hence, flexible. One well-known form of flexible production is the system entitled 'Just in time'.

Components are not stocked at the factory but brought in from nearby factories on demand to meet the requirements of production for the next few hours. Toyota car manufacturing plant at Toyota City is a typical example of this kind of production. The system has the advantage of little waste, since faulty products may be identified immediately and their supply stopped. Quality control is, therefore, easy. Besides, flexibility of output, in types and quantities and low inventory cost are other advantages. Such a system clearly depends on a closely linked network of factories, with good transport and communication links. Such a system has a definite spatial form with subsidiaries and support activities constituting a kind of industrial district. In recent decades the Japanese model has been transferred to other countries. In order to establish a new work pattern and work ethic, new industrial space adjacent to old industrial belts are preferred. In the USA, for example, industrial relocation by General Motors, Ford and Chrysler to outer Mid West has become an important feature. However, Toyota pattern is not being followed by all companies. Many countries specialise in the production of components which could be put together in a number of final assembly plants. While flexible production is related to vertical linkages i.e. first level producers of components to second — level assemblers, flexible specialisation refers to a more complex, horizontal inter firm network of linkages. In this system, many firms in one kind of industry are involved in the production of specialised items. Further flexibility in such a system is endowed by moving the work amongst the different specialist firms. If a normal run of business is disrupted by a sudden demand for a large quantity, flexibility in cooperation allowed the contracting firm to share the order with several firms in the same business, or to subcontract some of the business to outside firms.

Technopoles

The locational impact of these high-tech activities is already emerging in advanced industrialised countries. The most noticeable phenomena is the emergence of new technology — oriented complexes or technopoles. A technopole is a planned development within a concentrated area, for technology innovative, industry related production. Technopoles include science or technology parks, science cities, and other high-tech industrial complexes.

High-tech Industrial — States and Technology Parks : Footloose industries tend to be attracted to purpose — built industrial estates or technology parks on the edge of towns and cities as is the case with London or Tokyo.

These places offer a number of advantages over inner city locations:

- Space for single-storey factories and future expansion;
- Cheaper land values on edge-of-city;
- Accessibility to main roads and motorways;
- Pleasant environment (often located on a greenfield site);
- Labour supply from nearby residential areas and commuter village.

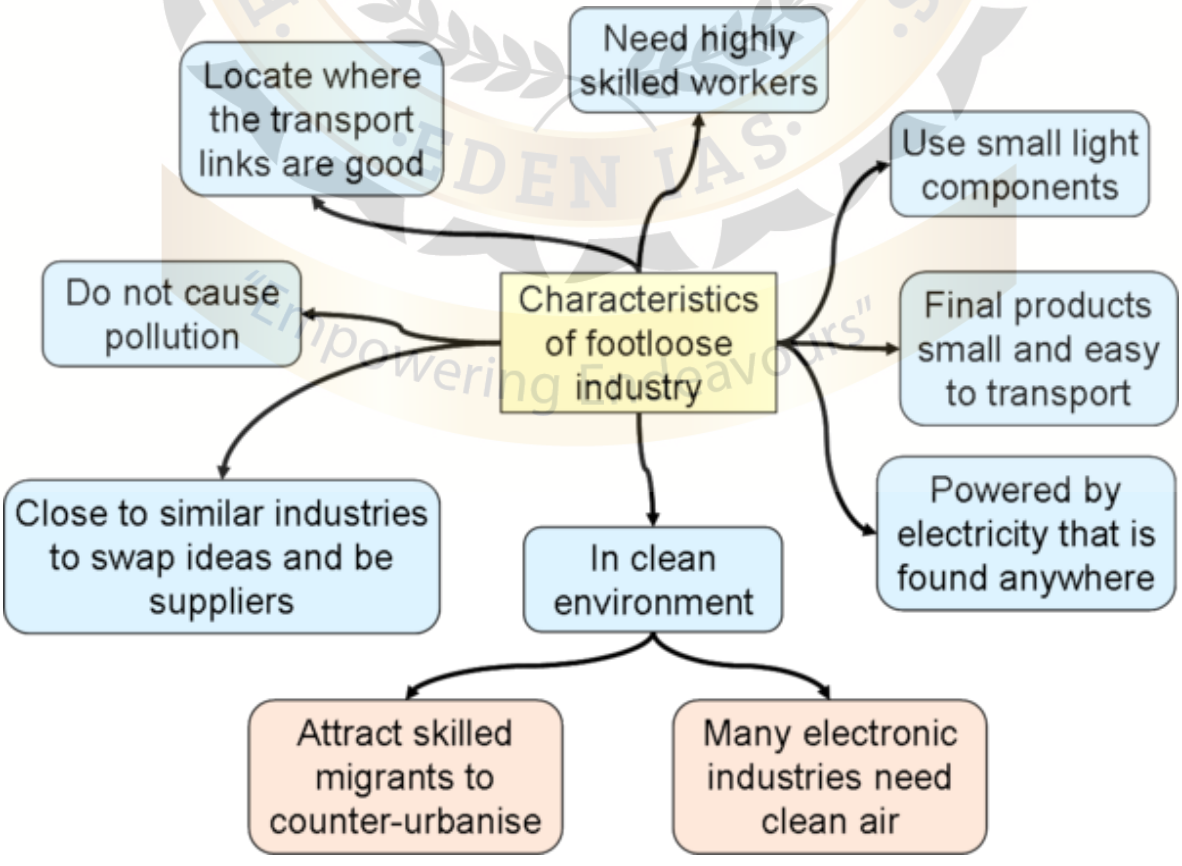
Silicon Valley — A Technopolis: The Silicon Valley is located in the north - western part of Santa Clara County of California. In 1930s, F. Terman, a professor and later, Vice-President of Stanford University at Palo Alto encouraged his students in electrical engineering to establish their own companies. One of the first companies was set up by William Hewlett and David Packard in a garage near the University campus. Today, it is one of the world's largest electronic firm. By the end of 1950s, at the persuasion of Terman, Stanford University developed a special industrial park for such new high-tech firms. It created a hot house

of innovation and generated a significant specialised work force and producer services. It has sustained the continued agglomeration of high-tech electronics and has also attracted other high-tech industries. For example, nearly a third of all employment in biotechnology in the USA is located in California. Of this, over 90 per cent is located in the San Francisco Bay area. Stanford University has been receiving increasing amount of donations from grateful companies, which runs into millions of dollars annually. The linkage between the research in universities and high-tech activity is key to the success of these industries. While the new industries thrive on a symbiotic relationship with one another and university research departments, key workers also tend to favour technology complexes associated with top ranking universities. It provides them a job market and abundant socio-cultural activities. It soon acquires a reputation as 'the right place to be'. Such techno-poles have also emerged in other countries. But except Germany, most of them are centred around big metropolitan cities such as London, Paris, Milan Tokyo, Shanghai, Taipei, Moscow, Singapore and Sao Paulo.

FOOTLOOSE INDUSTRY

Footloose industry is a general term for an industry that can be placed and located at any location without effect from factors of production such as resources, land, labour, and capital. These industries often have spatially fixed costs, which means that the costs of the products do not change despite where the product is assembled. Diamonds and computer chips are some examples of footloose industries. These industries can be located at a wide variety of places, as these are not weight-losing nor raw-material-specific.

Footloose industries became prevalent in geographic parlance during the quantitative approach in geography from the 1950s onward. Economic geographers interested in industrial location borrowed ideas and methodology from neo-classical economics. The basic premises of footloose industries are derived from the work of German economist Alfred Weber, who was probably the first to theorize on the location of industries in the beginning of the 20th century. (Least Cost Location Model)



MAJOR INDUSTRIAL REGIONS OF THE WORLD

The North American Region

About four-fifth of the industrial output in this region is contributed from United States of America. Another major producing country is Canada. USA is the most dominant industrial super-power in the world. The industrial units in USA may broadly fall into following regions:

- The New England Regions.
- The New York-Mid-Atlantic Region.
- Mid-Western Region.
- North-Eastern Region.
- The Southern Region.
- Western Region.
- The Pacific Region.

The New England Region:

The vast New England industrial region comprises six states, namely Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire and Maine. This is the largest single industrial region on earth. The nucleus of the region is Boston Metropolitan region. The major industries in this region are electrical machinery, textiles, machinery, leather, fabricated metals and other industries.

In fact, industrial structure here is very diversified. This is one of the oldest industrial regions in USA, contributing 15 per cent of the yearly output of the nation. The major centres in this region are Connecticut, Massachusetts, and Rhode Island. This industrial region enjoys advantages of huge capital, good communication, export facilities, cheap and skilled labour and vast market.

The entire industrial region is broadly divided into eastern and western part. In the eastern part, the major industrial areas are Providence, Brookston, New Bedford and Merrimac valley. In the western part, the major centres are Hartford, New Heaven and Springfield. Most of the traditional industries are located in the eastern region, while western region possesses the industries of high growth rate.

The New York and Mid-Atlantic Region:

This region extends from New York to Baltimore. In Middle Atlantic States, industrial centres are scattered over New Jersey, Pennsylvania, Maryland, Delaware, Philadelphia and Baltimore. Other smaller centres are Sparrows Point, Bethlehem etc. In New York region, the centres are Rochester, Syracuse, Buffalo, Utice etc. This industrial region contributes variety of manufacturing items but steel production in the region is quite spectacular.

The Mid-Lake Region:

This is the region having greatest concentration of ferrous industries. This region accounts about 1/4th of ferrous and Ferro-alloy products of the country. The famous Youngstown-Pittsburg-Johnstown iron and steel triangle is located in the region. The other steel producing areas are Wheeling, Cleveland, Louisville, Rook-ford, Flint, Steubenville and Detroit.

The other manufacturing centres engaged in diversified manufacturing activities are Chicago, Anderson, Midland, Iowa, St. Louis, Minneapolis etc. In cities like Detroit, several industries have developed including motor vehicles, machinery, fabricated metals, machine tools and electronics. The Lake Superior iron ore and Appalachian coal provide major raw materials and extensive hinterland for marketing facilities mostly helped for the massive development of this region.

North-Eastern Region:

This region covers the industrial regions of the Ohio, Michigan, and Wisconsin etc. The combined output of the manufacturing goods in this region is very high.

The Southern Industrial Region:

The southern industrial region extends from North Carolina in the east to the Texas in the south central region of the country. The major industrial states in this region are Texas and North Carolina. The other states having considerable industries are Mississippi, Tennessee, Georgia, Florida, Alabama, Oklahoma and Texas. Basically, this industrial region produces more agro-based items rather than the basic industrial goods. The major industrial product includes textiles, food and beverages, tobacco and furniture. Apart from these industries, Texas region is having industries like petro-chemicals, aircraft and heavy chemicals. The industrial development in south is the recent phenomenon. Only after Second World War this region became the leading industrial region. The major industrial cities are Jackson, Baton Rouge, Houston, Oklahoma, Montgomery etc.

The Western Region:

This is one of the less developed region in industry, comprises the states of Wyoming, Utah, Colorado, Nevada and Arizona. This sparsely populated region is backward in industrial activities. Very recently, industry started to grow within the region.

The Pacific Coastal Region:

A narrow coastal strip running through Washington, Oregon and California is the great industrial agglomeration of the Pacific coast. The major industrial nucleus of the area are San Francisco and Los Angeles. The major products of this industrial region are food and beverages, automobiles, aircraft, metal fabrication, petro-chemical and heavy chemicals etc. The smaller industrial centres are Portland, Seattle, Eugene, Sacramento, San Diego etc.

Canada is the second biggest industrial country in North America. The country possesses huge amount of iron ore, petroleum and forest resources. Hydro-electric power is also abundant in Canada. Canada is moderately developed in petro-chemicals, paper, textiles, iron & steel and aluminium industry. The major industrial region in Canada are:

- Ontario and St. Lawrence Valley.
- Prairie Region.
- Pacific Coastal Region.

Ontario and St. Lawrence Valley:

This is one of the most important manufacturing regions in Canada. The major products are paper, cheese, flour, agricultural machinery, copper and nickel smelting, iron & steel industry and chemical industry. The major industrial centres are Quebec, Ontario, Ottawa, Toronto, Hamilton etc.

Prairie Region:

As far as manufacturing industry is concerned, this region is not very developed. The major centres of production are Manitoba, Winnipeg, and Edmonton, Alberta etc. Besides agro-based industries, the other noted industries in the region are petroleum refinery and chemical industry.

Pacific Coast:

The leading centred are Vancouver and Prince Rupert. The major industries are paper and pulp, furniture, agricultural machinery and hydel power stations.

The European Region

In Europe, particularly in Western Europe, most of the countries are highly industrialized. Some of the countries are leading manufacturing countries in the world. These are Germany, United Kingdom, Italy, France, Spain etc.

1. United Kingdom:

United Kingdom is one of the most industrialized countries of the world. In fact, modern industrialization largely took its birth in British soil. Great Britain is having almost all types of manufacturing industries. The major manufacturing items are engineering, ferrous, chemical, textile, ceramic, electrical, leather, food and beverages and even electronics. The manufacturing region of Britain may be sub-divided into following groups:

- Midland.
- Lower Scotland.
- North-East Coast.
- South Wales.
- Lancashire.
- London Basin.

The Midland:

This is one of the oldest regions in Great Britain. The nucleus of this industrial region is Birmingham. The other industrial centres are Nottingham, Leicester. This region manufactures almost all types of metal products. The early coalfields of the region provided opportunity for the rapid growth of the industry.

The Lower Scotland:

This region had developed as a textile centre. After the discovery of coal and iron ore within the region, diverse type of manufacturing activities evolved throughout the region. The major centres of production are Glasgow, Edinburgh, John-stone, Clyde Valley, Aberdeen, Dundee and Perth. Apart from cotton textile, iron-steel engineering factories, ship building, petro-chemical, heavy chemical industries also developed in the region.

The North-East Coast:

The north-east coast industrial region contributes heavy industrial output. The major centres of industrial production in the north-east coast are New Castle, Hartlepool, Stockton, Sunderland, Middles-borough etc. The area was once developed as a major iron and steel centre in Britain.

At present, iron and steel industry in this region has largely been reduced, heavy chemical industry is now thriving greatly. Originally, iron-steel and chemical plants were influenced by the presence of raw material within the region.

The South Wales:

The vast reserve of coal within South Wales region principally attracted iron and steel industries in the region. Non-ferrous industries were also developed near coal mines. The major industrial centres in South Wales are Newcort, Swansa, Cardiff, Cornwall etc. Petro-chemical, electrical and other consumer goods are now produced in this region.

The Lancashire:

The development of Lancashire as an industrial centre was directly related with the development of cotton textile industry. The major cotton textile centres in this region are Manchester and Liverpool. At present, due to the decline of mammoth textile plants, the area now produces high quality textile goods. The centres of production in this region are Rochdale, Bolton, Blackburn and Preston.

The London Basin:

The London metropolitan region is the largest industrial centre in UK which houses various types of industries like engineering, refining, chemical, metallurgical, and electrical, electronics, paper and cement. The greater London region with all its suburbs produce vast amount of consumer goods.

2. Germany:

The United Germany is one of the most dominant industrial powers in Europe. Even before unification, West Germany was considered as a great industrial power. The major manufacturing regions in Germany are:

- Rhine Industrial Region.
- The Saar and Middle Rhine Industrial Region.
- The Hamburg Industrial Region.
- Berlin Industrial Region.
- Leipzig Industrial Region.

The Rhine Industrial Region:

The Rhine industrial region, popularly known as Ruhr- Westphalia industrial region, is one of the largest industrial regions in Europe. The large reserve of Ruhr coal and Siegerland iron ore and transportation route through Rhine were the major factors for massive growth of industries. Almost every type of manufacturing industries were developed in this region which includes iron and steel, heavy chemicals, metallurgical, textiles and different consumer goods.

The early industry which developed in this region was iron and steel, centred around Essen and Dortmund, later on heavy chemicals were developed within Dusseldorf and Dortmund metallurgical at Duisburg, Essen, Dusseldorf and textiles at Wuppertal, Solingel etc. At present, almost all the good quality coal has been mined out.

The Saar and Middle Rhine Industrial Region:

The great urban centres of Frankfurt, Mannheim and Saar region is highly developed in some of the sophisticated industries. The major industries in this region are motor vehicles, petro-chemicals, textiles, paper, machine tools, aircraft and precision industries.

The Hamburg Industrial Region:

In reality, Hamburg is not a region but a metropolitan city. Here also specialized industries developed to a great extent. Among the industries, notable are ship building, light chemicals, tobacco, non-ferrous industries, petro-chemical, petroleum refining and engineering industries.

The Berlin Industrial Region:

West Berlin area was developed as a major industrial centre under West German occupation. It was the capital of undivided Germany and derived advantage as a seat of administration. Most of the industrial products contributed by this region are of non-conventional type, including electrical, electronics, cosmetics, light chemicals and precision engineering.

Leipzig Industrial Region:

This was the principal industrial centre of erstwhile East Germany. This region produces optical instruments, leather products, engineering goods and machine tools.

3. France:

France is tine other forerunner in manufacturing world. This is the third largest industrial power in Europe, next to Germany and UK. The leading manufacturing regions of the country are:

- The Northern Industrial Region.
- The Lorraine Industrial Region.
- The Paris Industrial Region.

The Northern Industrial Region:

This is the oldest and major industrial region in France. The coal deposit of Sambre Meuse and nearby Lorraine iron ore promoted large iron-steel industry in Valenciennes, Lens etc. The textile based industries were developed at places like Cambrai, Roubaix-Tourcoing etc.

The Lorraine Industrial Region:

Greatest iron and steel centre in France. Lorraine iron ore deposits helped to the growth of several metallurgical industries. Other than steel, Lorraine also produces a good amount of chemical, textile, glass, ceramics, leather and electrical products.

The Paris Industrial Region:

Large amount of consumer goods, scientific and precision instruments, automobiles and chemical industries were developed in this region.

4. Italy:

During the early phase of industrialization throughout Europe, Italy was a non-starter. Only before Second World War real industrial development began in Italy. Since very early period, industrial growth had been concentrated in the northern part of the country. The industrial regions in Italy may be sub-divided into two broad regions:

- The Northern Region.
- The Southern Region.

The Northern Region:

About four-fifth of the industries is concentrated in Northern Italy. The major industrial regions are Lombardy, Piedmont, Liguria etc. Most of the manufacturing units are concentrated in urban centres, e.g., Venice, Trieste, Genoa, Savona and in Milan and Turin in great Po river valley. Entire region is highly developed with several types of industries. Important among these are textiles, silk, iron and steel, paper, paper pulp, agricultural machinery, aircraft, machine tools, electrical and automobiles.

The Southern Region:

This region is far less developed in manufacturing than its northern counterpart. Naples is the only major industrial centre, having textiles, machinery and iron & steel plants.

The Other European and Central Asian Regions

Several other industrial regions are scattered in different other European countries. Important among these regions are Swiss Plateau in Switzerland, Stockholm region in Sweden, Rotterdam-Amsterdam region in Holland, Brussels-Antwerp industrial region in Belgium. It is an uphill task to separate one European industrial zone from the other. In reality, all these regions are only sub-regions of a vast European industrial zone.

The Moscow-Tula Industrial Region:

This is one of the oldest industrial conurbations in Russia. Even prior to Communist take-over, this region developed as industrial centre. Moscow, the capital city and several other urban centres like Tula, Gorky, Ivanovo and Yaroslav consist of numerous industrial establishments. In its early period of growth, iron ore of Tula and brown coal of Moscow proved advantageous. The mineral resources, however, declined later on. But the growth of this region remain unabated.

The largest concentration of industries occurs within Moscow-Tula region. Major industries are iron-steel, heavy chemical, metallurgy, machine tools, refineries, textile, electrical, automobile etc. This industrial agglomeration produces nearly one-fourth of the national industrial output.

Gorky and Lipetsk produce high quality steel and heavy engineering products. The cities of Yaroslav and Lipetsk produce agricultural machinery and electronics, respectively. Ivanovo and Yaroslav cities produce aluminium and other metallurgical products. Moscow-Tula-Vladimir triangle produces huge amount of textile goods. Ivanovo attained such a high fame in textile production that it became famous as 'Manchester of CIS'.

The Southern Industrial Region:

The great Ukraine region is the greatest industrial area in this region. This area contributed largest amount of iron-steel and other metallurgical products. The famous Donetz coal and Krivoi Rog iron ore was the basis for the overall economic and industrial growth of the region. Besides this, Nikopol manganese is also used widely in iron- steel industry. Zaparzhye limestone is another raw material found in the region. The two large plants, one each at Donbas and Krivoi Rog, provided necessary infrastructure to other industries. The symbiotic growth between Donetz coal and Krivoi Rog iron ore or 'combine' is the fundamental principle, first adopted here. The other precision manufacturing units are situated at Odessa and Zaparzhye. The other industrial centres are Konstantinovka, Zhdanov.

Caucasus Industrial Region:

This region is famous for the manufacturing of heavy chemical industries. The discovery of enormous amount of crude oil within the region also helped to establish refineries and petro-chemical industries at Baku, Grozny, Maikop and Batum. The other noted centres were developed at places like Tbilisi, Kirovakam and Sumgait.

The Ural Industrial Region:

The development of Ural industrial region owes much to the huge iron ore deposits of Magnitogorsk, Nizhny Tagil and Serov. After the initiation of Communist regime, development of Ural received priority and for rapid industrialization of the region 'Ural-Kuznetsk Combine' was constructed. According to the plan, a symbiotic or reciprocal relationship was established between Ural and Kuznetsk region. Ural iron ores sent to Kuznetsk, in lieu of Kuznetsk coal.

Large iron-steel centres were developed at Nizhniy Tagil, Sverdlovsk, Serov, Chelyabinsk, Magnitogorsk and Novotroits etc. After the discovery of Karaganda coal reserve, this system was to some extent modified. This region has a very good communication system, specially railroads. Gradually several other industries developed. Among these, machine tools, agricultural machinery, chemicals etc. are important.

The Volga Industrial Region:

The development of manufacturing activities is a comparatively recent phenomena in Volga region. Even in the first phase of Communist regime, industrialization in Volga region took place at a slow pace. The Tartar oilfield and Kuybyshev oilfields helped to develop industrial base at Volga valley. Kuybyshev-Kazan and Volgograd are the most important industrial centres having chemical and machine tool plants.

The Kuznetsk Industrial Region:

The once deserted and sparsely populated region of Kuznetsk Basin is now having sprawling Industrial Township having large number of industries, of which iron-steel is most important. The exploration of vast amount of coal reserve and subsequent development of Ural-Kuznetsk combined system, which provides iron ore of Ural to Kuznetsk in lieu of coal, helped great development of iron-steel industry here.

Various coal based industries developed in places like Kemerovo, Osirniki etc. Great development of iron-steel industry occurred in Novokuznetsk, Nosibirsk and several other places. Machine tools, textile and chemical industries were also developed in this region.

The Central Asia Region:

Considering the volume of productions, Central Asia is now a very significant industrial region. After Communist take-over, due to planned dispersal of the industry for strategic reasons and to avoid regional imbalance, fertilizer and machine tool factories were developed at Taskent, Samarkhand and Stalinabad. Apart from these regions, Vladivostok, Komsomolsk are the other leading industrial centres developed in the far east of Europe.

The East Asian Industrial Region:

Until very recent period, no country in Asia had a sound industrial base. But, with the emergence of some countries like Japan, China, India, Korea, Taiwan in industrial sector, this region is now posing grave threat to the traditionally developed nations. In fact, regarding future industrialization of the world, Asia is frequently regarded as the dark horse. However East Asia is relatively more industrialized than any other part of Asia.

(i) Japan:

The meteoric rise of Japan in the industrial scenario has shattered the long-established domination of European and North American countries. The output and efficiency of Japanese industry is now comparable with any other industrialized country in the world.

Japan now dominates almost all key industries, ranging from heavy chemical, iron-steel, petro-chemical to Ferro-alloy, electrical, electronics, motor vehicles and other consumer products. Though Japanese industry had undergone a massive transformation in last two decades, the spatial distribution pattern of industries remained unchanged. The intricate relationship between import of raw materials and export of finished products forced the industries to locate near coastal areas. The major industrial regions in Japan may be sub-divided into the following zones:

- The Tokyo-Yokohama Region.
- The Osaka-Kobe Region.
- The Chukyo Region.
- The North Kyushu Region.

The Tokyo-Yokohama Region:

This great industrial region covers the areas of two prefectures, namely Tokyo and Kanagawa. The entire region gradually developed taking base of two separate core, Tokyo on one hand and Yokohama the other, The industrial boom of Japan and shortage of plane land forced the areas to merge with one another. Even in recent period, industry invaded into the neighbouring prefectures of Satima and Chiba.

The reasons liable for this decentralization trends are:

- A heavy contestation in the area, which resulted escalation of land price, high wage rate of labours, worn out condition of the old and out-dated machinery etc.
- High land value and shortage of land, and
- Stiff competition etc.

In this famous industrial region, almost all types of industries are found. In Tokyo and adjacent territories of Yokohoma, Kawasaki, the major products are: iron and steel, refined oil, petro-chemical, heavy chemical, cement, footwear, toys etc. The eastern Tokyo, where industry first flourished, is still producing the traditional items. But most of the production is on the cottage industry level.

Along the coast lines of Tokyo Bay, the heavy manufacturing industries are located. Due to growing shortage of space for the new industrial ventures, efforts are on to reclaim the lands from the sea. In the west of Tokyo, new industrial centres like Fugigawa and Zame were developed to meet the growing demand of industrial space.

The oldest and most productive Tokyo-Yokohama industrial region possesses some distinct relative advantage over the other industrial regions of the country. These reasons are:

- The rare flat lands of Kwanto region, un-parallel in mountainous Japan.
- Wonderful communication network, through rail, road and water ways with the rest of Japan.
- Presence of coal resources in nearby Joban coalfield initially favoured the growth of the industry.
- The abundant supply of skilled labour at a much cheaper rate.
- Rugged Mountain Rivers provided water resources for industrial purpose and hydel power generation.

The Chukyo Region:

Among the four industrial regions, development of Chukyo region is a comparatively recent phenomena. Here, separate group of industries flourished in separate region. Maximum concentration of industries in this region occurred in Nagoya. The other notable agglomeration of industries occurred in Tokai, Yokkojchi etc. The major industrial establishments are iron & steel, petro-chemical, heavy chemicals and automobiles. The famous Toyota automobile manufacturing unit is situated in Chukyo region. The earliest industrial establishments were mostly textile-based. But in the later period, the region had witnessed complete diversification of industries. At present, big industrial houses like Nippon, Mitsubishi and Toyota have their plants in Chukyo region. The major factors responsible for the growth of the region are as follows:

- Like Tokyo-Yokohama, large extensive plain land favored the growth of industries in the Chukyo region.
- Large home market in Honshu and export facilities to foreign market through nearby ports.
- Easy communication provided by several trunk routes, rail, water and air routes.
- Availability of cheap, skilled labours.

The Osaka-Kobe Region:

The region situated around Osaka Bay was famous for industrialization from the middle of 17th century. Osaka-Kobe as industrial area was always in the forefront of industrial development and cheap competitor of Tokyo-Yokohoma from the very early phase of industrialization. After Meiji restoration, the pace of industrialization in this region had been accelerated.

The early industries in this zone were all traditional, like cotton textile, manufacturing of agricultural implements etc. After World Wars, pace of industrialization and diversification plan forced the industries to switch over to other non-traditional technology based industries, like petrochemical, high quality steel, electrical equipment's etc.

Though at present Osaka-Kobe region is the fore-runner among the industrial regions, acute shortage of space limits the growth of the region spatially. Moreover, this zone is gradually becoming dependent on the foreign market. The port of Kobe facilitates export.

Different industrial agglomerations like Moriguchi, Ibaraki, Kodoma etc. are now no more enjoying all the original locational advantages. Rather a migratory trend is noticeable in the last couple of years. Till now, the big industrial houses having big industrial enterprises are: Hitachi, Mitsubishi, Matsuhita etc.

The North Kyushu-Setouchi Region:

Despite having no considerable flat land area within this industrial zone, industrial establishments thrived here, to serve the large hinterland on both sides on north and south. The area covers large tracts of Hiroshima, Yamaguchi and Okayama and Kitakyashu. Large reserves of local coal and limestone reserves provided ample opportunities for early development of industries.

Compared to other three giant industrial agglomerations, this region is comparatively smaller both in area and industrial output. The major industrial establishments of this region are coal-based industries, cement, petrochemicals and heavy machinery manufacturing. The major centres of production in this region are. Tokuyama, Kokura, Yawata and Wakamatsu.

Besides these four industrial regions, there are numerous industrial establishments scattered all over Japan. Of late, Hokkaido is also developing a sound industrial base. Considering the dynamic nature of Japanese industrial character and magnitude of production output, prospect of Hokkaido as a future site of industrial growth is very bright.

Japanese industrial regions had undergone several ups and downs. The relative position of the industrial regions experienced a sea-change following the remodeling of the industrial establishments; and to keep pace of changing mood of the customers, mostly foreign customers, manufacturing units in the nation also favoured the growth of machine tool industry.

The active participation of government, wage cut, cheap labour and high technological know-how helped the industry to grow vigorously. The industry now provides job to at least 7 million people.

(ii) China:

China is gradually becoming one of the most dominant industrial powers in the world. The real development of industry in China began only after the installation of Communist rule in 1949.Chinese industrial system had gone through a complete transformation in last 50 years of Communist Rules. Old industrial policies were discarded and new policies were adopted. States power is supervising industrial development of the country in a planned manner. Eradication of regional imbalance and dispersion of the industries were encouraged. Basic industries like iron- steel, chemicals, textiles were given priority. On the basis of concentration of industries and their output, Chinese industrial regions may be sub-divided into following regions:

- The Manchuria Region.
- The Yangtze Valley Region.
- The North China Region.
- Other Regions.

The Manchuria Industrial Region:

Even prior to Communist regime, Manchuria developed as a industrial region. Several factors were responsible for the growth of this region. These were, developed agricultural hinterland, good transportation network, skilled labour, local capital and Japanese participation.

The setting up of Anshan steel plant in 1917 initially boosted the industrial growth. The Penki, Kungyuan, Heilungkiang, Kirin, Linkow steel plants were gradually established. During 1960, Manchuria was able to contribute half of the Chinese iron-steel production.

For availability of Fushun, Pehpiao coal, Penki, Kungchuling iron ore, not only iron and steel industry, several other metallurgical industries like machine building and heavy engineering industries were set up in Mukden, Harbin, Fushun and Dairen. Besides, ferrous industries, heavy chemical plants were also developed in Manchuria.

The Yangtze Valley Region:

This is one of the leading industrial region in China. The major manufacturing units are concentrated in the regions of Wuhan, Nanchang, Chungking and Shanghai. Shanghai is the most important of all these regions. The port locations of the city enabled it to import raw materials and export finished products.

The old developed textile centres, within the region, initially helped to build up a large trading centre. In the later periods, small and diversified manufacturing units sprang up to feed the large hinterland of Shanghai.

The old steel plant, constructed by Japanese at Wuhan, attracted several other manufacturing units. The Anshan, Tayeh metallurgical region contributed more than half of Chinese steel output. The new centres at Hwangsikang, and Hankow possesses several industries like cement, heavy chemicals, automobiles, rail wagons, agricultural implements etc. The Nanchang-Kiangsi area was a traditional centre of pottery and ceramic manufacturing. Since Ming period, Nanchang became famous for the fine work of porcelain.

The North China Industrial Region:

The populous and mineral rich provinces of Shansi, Shensi, Shantung, Hopei, Jehol and Honan are well-developed in manufacturing activities. This is also one of the oldest industrial agglomeration of China. The earliest development in the region was of iron and steel industry.

The major plants were located around Tientsin and Taiyuan. The Beijing and Hopei also contains several mini steel plants. The Hopei iron ore and Tsingsing and Kailan coal were the early impetus for manufacturing units. Apart from iron and steel, heavy chemicals, textiles, paper, cement, leather, petro-chemical, aluminium production units are also concentrated at Beijing, Singtai, Shishkiaching etc.

Other Regions:

In recent decades, several small cities and interior river valleys were selected for the setting up of manufacturing units. The planned development of neglected and backward areas of Southern China received priorities. Selected centres were marked for rapid industrialization and overall development of the area. Canton, Swatow and Minhow were the old port cities, where due to geographical advantages some industries came into being.

The Other Asian Industrial Zones:

Besides these major industrial regions, there are some isolated and scattered industrial centres in Asia. Among these notable are Seoul, Chongtu, Taejon, Taegu, Pohang, Ulsal and Kwangju in South Korea, small islands like Hong Kong and Singapore are important. Of the smaller centres Karachi in Pakistan, Kuala Lumpur in Malaysia and Kuwait are important.

INDUSTRIAL REGIONS OF INDIA

Mumbai-Pune Industrial Region:

This region extends from Thane to Pune and in adjoining districts of Nashik and Solapur. In addition, industries have grown at a rapid pace in Kolaba, Ahmednagar, Satara, Sangli and Jalgaon districts also. This region owes its origin to the British rule in India.

The seeds of its growth were sown in 1774 when the island-site was obtained for construction of Mumbai port. The opening of the first railway track of 34 kms between Mumbai and Thane in 1853, opening of the Bhor and Thai Ghats respectively to Pune and Nashik and that of Suez Canal in 1869 led to the development of Mumbai. The growth of this industrial region is fully connected with the growth of cotton textile industry in India. As the coal was far removed, hydel power was developed in Western Ghats. Cotton was cultivated in the black cotton soil area of the Narmada and Tapi basins.

Cheap labour-force came from the hinterland, the port facilities for export-import and communication links with the peninsular hinterland made Mumbai the '**Cottonopolis of India'.** With the development of cotton textile industry, the chemical industry developed too. Opening of the Mumbai High petroleum field and erection of nuclear energy plants added additional magnetic force to this region. Now the industrial centres have developed, from Mumbai to Kurla, Kolaba, Thane, Ghatkopar, Ville Parle, Jogeshwari, Andheri, Thane, Bhandup, Kalyan, Pimpri, Pune, Nashik, Manmad, Solapur, Ahmednagar, Satara and Sangli.

In addition to cotton textile and chemical industries, engineering goods, leather, oil refineries; petro-chemicals, synthetic and plastic goods, chemicals, drugs, fertilizers, electricals, electronics, software, ship-building, transport and food industries have also developed here.

The partition of the country in 1947 adversely affected this region because 81% of the total irrigated cotton area growing long staple cotton went to Pakistan. Mumbai, the nucleus of this industrial region, is facing the current limitation of space for the expansion of the industry. Dispersal of industries is essential to bring about decongestion.

The Hugli Industrial Region:

Located in West Bengal, this region extends as a narrow belt running along the river Hugli for a distance of about 100 km from Bansbaria and Naihati in the north to Birlanagar in the south. Industries have also developed in Midnapur district in the west. The river Hugli offered the best site for the development of an inland river port as nucleus for the development of Hugli industrial region.

The old trading centre of late 17th century has developed into the present industrial hub of Kolkata. Thus Kolkata-Haora forms the nucleus of this region. It is very well- connected by the Ganga and its tributaries with the rich hinterland of Ganga-Brahmaputra plains. Besides navigable rivers, roads and the railways provided subsequent links to the great benefit of Kolkata port.

The discovery of coal and iron ore in Chotanagpur plateau, tea plantations in Assam and northern parts of West Bengal and the processing of deltaic Bengal's jute led to the industrial development in this region. Cheap labour could be found easily from the thickly populated states of Orissa, Bihar, Jharkhand and eastern part of U.P. Kolkata, having been designated capital city of the British India (1773-1912) attracted large scale British investment of capital.

Establishment of first jute mill at Rishra in 1855 ushered in the era of modem industrial clustering in this region. A chain of jute mills and other factories could be established on either side of Hugli River with the help of Damodar valley coal. The port site was best-suited for export of raw materials to England and import of finished goods from that country.

Kolkata's industries have established by drawing in the raw materials from adjoining regions and distributing the finished goods to consuming points. Thus, the role of transport and communication network has been as important as the favourable locational factors in the growth of this region. By 1921, Kolkata-Hugli region was responsible for two-thirds of factory employment in India.

Just after the partition of old Bengal province in 1947, the region faced, for some years, the problem of shortage of jute as most of the jute-growing areas went to East Pakistan (now Bangladesh). The problem was solved by gradually increasing home production of jute. Cotton textile industry also grew along with jute industry.

Paper, engineering, textile machinery, electrical, chemical, pharmaceuticals, fertilizers and petrochemical industries have also developed in this region. Factory of the Hindustan Motors Limited at Konanagar and diesel engine factory at Chittaranjan are landmarks of this region.

Location of petroleum refinery at Haldia has facilitated the development of a variety of industries. The major centres of this industrial region are Kolkata, Haora, Haldia, Serampur, Rishra, Shibpur, Naihati, Kakinara, Shamnagar, Titagarh, Sodepur, Budge Budge, Birlanagar, Bansbaria, Belgurriah, Triveni, Hugli, Belur, etc.

Alarming rate of silting of the Hugli River was a very serious problem. The depth of water in the channel from bay head to Kolkata docks must be kept at 9.2 metres for big ocean ships to come in. Dredging out of the silt rapidly filling up the water channel was very costly and not a permanent solution to save the life of Kolkata port.

The construction of Farakka barrage about 300 kms upstream on Ganga and flushing of the channel are the only possible answers. The construction of Haldia port in the lower reaches of Hugli to the south of Kolkata is another landmark in relieving the great pressure of cargo ships on the port of Kolkata.

However, the industrial growth of this region has slowed down as compared to the other regions. There are several reasons for this sluggish growth but decline in jute industry is said to be one of the main reasons.

Bangalore-Tamil Nadu Industrial Region:

Spread in two states of Karnataka and Tamil Nadu, this region experienced the fastest industrial growth in the post-independence era. Till 1960, industries were confined to Bangalore district of Karnataka and Salem and Madurai districts of Tamil Nadu. But now they have spread over all the districts of Tamil Nadu except Viluppuram.

This region is a cotton-growing tract and is dominated by the cotton-textile industry. In fact cotton textile industry was the first to take roots in this region. But it has large number of silk-manufacturing units, sugar mills, leather industry, chemicals, rail wagons, diesel engines, radio, light engineering goods, rubber goods, medicines, aluminium, cement, glass, paper, cigarette, match box and machine tools, etc.

This region is away from the main coal-producing areas of the country but cheap hydroelectric power is available from Mettur, Sivasamudram, Papanasam, Pykara and Sharavati dams. Cheap skilled labour and proximity to vast local market as well as good climate have also favoured the concentration of industries in this region.

Coimbatore has grown rapidly mainly owing to its industrial growth based on Pykara power, local cotton, coffee mills, tanneries, oil presses and cement works. Coimbatore is known as Manchester of Tamilnadu because of its large-scale cotton textile industry. The establishment of public sector units at Banglore like Hindustan Aeronautics, Hindustan Machine Tools, Indian Telephone Industry and Bharat Electronics etc. has further pushed up the growth of industries in the region.

Madurai is known for its cotton textiles. Visvesvarayya Iron and Steel Works is located at Bhadravati. The other important centres of this region are Sivakasi, Tiruchirapalli, Madukottai, Mettur, Mysore and Mandya. Petroleum refinery at Chennai and Narimanam and iron and steel plant at Salem are recent developments.

Gujarat Industrial Region:

The nucleus of this region lies between Ahmedabad and Vadodara as a result of which it is also known as Ahmedabad-Vadodara industrial region. However, this region extends upto Valsad and Surat in the south and Jamnagar in the west. The region corresponds to the cotton growing tracts of the Gujarat plains and the development of this region is associated with the location of textile industry since 1860s.

This region became important textile region with the decline of cotton textile industry in Mumbai. Mumbai has the disadvantage of paying double freight charges for first bringing the raw cotton from the peninsular hinterland and then despatching the finished products to inland consuming points in India.

But Ahmedabad is nearer the sources of raw material as well as the marketing centres of the Ganga and Satlui plains. Availability of cheap land, cheap skilled labour and other advantages helped the cotton textile industry to develop. This major industrial region of the country, mainly consisting of cotton textile industry, is expanding at a much faster rate in providing a greater factory employment.

The discovery and production of oil at a number of places in the Gulf of Khambhat area led to the establishment of petrochemical industries around Ankleshwar, Vadodara and Jamnagar. Petroleum refineries at Koyali and Jamnagar provide necessary raw materials for the proper growth of petrochemical industries.

The Kandla port, which was developed immediately after independence, provides the basic infrastructure for imports and exports and helps in rapid growth of industries in this region. The region can now boast of diversified industries.

Besides textiles (cotton, silk and synthetic fibres) and petrochemical industries, other industries are heavy and basic chemicals, dyes, pesticides, engineering, diesel engines, textile machinery, pharmaceuticals, dairy products and food processing. The main industrial centres of this region are Ahmedabad, Vadodara, Bharuch, Koyali, Anand, Kheda, Surendranagar, Surat, Jamnagar, Rajkot and Valsad. The region may become more important in the years to come.

Chotanagpur Industrial Region:

As its name indicates, this region is located on the Chotanagpur plateau and extends over Jharkhand, Northern Orissa and Western part of West Bengal. The birth and growth of this region is linked with the discovery of coal in Damodar Valley and iron ore in the Jharkhand-Orissa mineral belt. As both are found in close proximity, the region is known as the 'Ruhr of India'.

Besides raw materials, power is available from the dam sites in the Damodar Valley and the thermal power stations based on the local coal. This region is surrounded by highly populated states of Jharkhand, Bihar, Orissa and West Bengal which provide cheap labour.

The Kolkata region provides a large market for the goods produced in the Chotanagpur region. It also provides the port facility to the region. It has the advantages for developing ferrous metal industries. The Tata Iron and Steel Company at Jamshedpur, Indian Iron Steel Co., at Bumpur-Kulti, Hindustan Steel Limited at Durgapur, Rourkela and Bokaro are the important steel plants located in this region.

Heavy engineering, machine tools, fertilizers, cement, paper, locomotives and heavy electricals are some of the other important industries in this region. Important nodal centres of this region are Ranchi, Dhanbad, Chaibasa, Sindri, Hazaribagh, Jamshedpur, Daltonganj, Garwa and Japla.

Vishakhapatnam-Guntur Industrial Region:

This industrial region extends from Vishakhapatnam district in the north-eastern part of to Kurnool and Prakasham districts in the south-east and covers most of the coastal Andhra Pradesh. The industrial development of this region mainly depends upon Vishakhapatnam and Machilipatnam ports.

Developed agriculture and rich mineral resources in the hinterlands of these ports provide solid base to the industrial growth in this region. Coal fields of the Godavari basin are the main source of energy. Hindustan Shipyard Ltd. set up at Vishakhapatnam, set up in 1941 is the main focus.

Petroleum refinery at Vishakhapatnam facilitated the growth of several petrochemical industries. Vishakhapatnam has the most modern iron and steel plant which have the distinction of being the only plant in India having coastal location. It uses high quality iron ore from Bailadila in Chhattisgarh.

One lead-zinc smelter is functioning in Guntur district. The other industries of this region include sugar, textiles, paper, fertilizers, cement, aluminium and light engineering. The important industrial centres of this region are Vishakhapatnam, Vijaywada, Vijaynagar, Rajahmundry, Kurnool, Elum and Guntur. Recent discovery of natural gas in Krishna- Godavari basin is likely to provide much needed energy and help in accelerated growth of this industrial region.

Gurgaon-Delhi-Meerut Industrial Region:

This region developed after independence, but is one of the fastest growing regions of India. It consists of two industrial belts adjoining Delhi. One belt extends over Agra-Mathura-Meerut and Saharanpur in U.P. and the other between Faridabad-Gurgaon- Ambala in Haryana.

The region is located far away from the mineral and power resources, and therefore, the industries are light and market oriented. The region owes its development and growth to hydro-electricity from Bhakra-Nangal complex and thermal power from Harduaganj, Faridabad and Panipat.

Sugar, agricultural implements, vanaspati, textile, glass, chemicals, engineering, paper, electronics and cycle are some of the important industries of this region. Software industry is a recent addition, Agra and its environs have glass industry. Mathura has an oil refinery with its petro-chemical complex. One oil refinery has been set up at Panipat also.

This will go a long way to boost the industrial growth of this region. Gurgaon has Maruti car factory as well as one unit of the IDPL. Faridabad has a number of engineering and electronic industries. Ghaziabad is a large-centre of agro-industries. Saharanpur and Yamunanagar have paper mills. Modinagar, Sonipat, Panipat and Ballabhgarh are other important industrial nodes of this region.

Kollam-Thiruvananthapuram Industrial Region:

This is comparatively small industrial region and spreads over Thiruvananthapuram, Kollam, Alwaye, Emakulam and Allapuzha districts of south Kerala. The region is located far away from the mineral belt of the country as a result of which the industrial scene here is dominated by agricultural products processing and market oriented light industries.

Plantation agriculture and hydroelectricity provide the industrial base to this region. The main industries are textiles, sugar, rubber, match box, glass, chemical fertilizers, food and fish processing, paper, coconut coir products, aluminium and cement. Oil refinery set up in 1966 at Kochi provides solid base to petro-chemical industries. Important industrial centres are Kollam, Thiruvananthapuram, Alluva, Kochi, Alappuzha and Punalur.

Besides the above mentioned eight major industrial regions, India has 13 minor industrial regions and 15 industrial districts. Their names are mentioned below:

Minor Industrial Regions:

1. Ambala-Amritsar in Haryana-Punjab.
2. Saharanpur-Muzaffanagar-Bijnaur in Uttar Pradesh.
3. Indore-Dewas-Ujjain in Madhya Pradesh.
4. Jaipur-Ajmer in Rajasthan.
5. Kolhapur-South Kannada in Maharashtra-Karnataka.
6. Northern Malabar in Kerala.
7. Middle Malabar in Kerala.
8. Adilabad-Nizamabad in Andhra Pradesh.
9. Allahabad-Varanasi-Mirzapur in Uttar Pradesh.
10. Bhojpur-Munger in Bihar.
11. Durg-Raipur in Chhattisgarh.
12. Bilaspur-Korba in Chhattisgarh.
13. Brahmaputra Valley in Assam.

Industrial Districts:

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

TERTIARY AND QUARTERNARY ACTIVITIES

As discussed earlier, tertiary activities revolve round the intangible outputs which encompass a diversity of services ranging from that of a technician or a plumber to that of a restaurant chef or a lawyer, a teacher or a computer operator. Services are usually defined as 'activities,' which are relatively detached from material production and hence, are not directly involved in the processing of physical materials. Thus, they stand in contrast to manufacturing, the product of which can be seen in the form of goods. But how can we measure the output of a plumber or a lawyer? It is impossible to measure these outputs except indirectly in terms of wages and salaries. However, there are some services, which can generate tangible output e.g. a fast-food franchise. Nevertheless, measuring outputs in services in general cannot be based on nature of output. The main difference between manufacturing and service products thus, seems to be that the expertise provided by services relies much more directly on workforce skills, experience and knowledge than on physical techniques embodied in machinery or process of production.

SERVICES

Services are an important constituent of modern economic development, which include retailing and the sale of goods to the people, the provision of services of all kinds — education, health and welfare, leisure, recreation and business services. Business services refer to those services that enhance the productivity or the efficiency of other firms' activities or that enable them to maintain their specialised roles e.g. advertising, recruitment and personnel training. This sector was not given as much attention earlier as was given to the production of goods. In advanced economies, service-based development has been very rapid. As statistical data show, employment shifts continuously into services in these countries. In developing countries too, the service sector is growing faster than the manufacturing sector. Its contribution to national wealth is also increasing. But the services are still very poorly accounted because many people are engaged in unorganised services, often referred to as informal sector. The informal sector in cities offers employment to a large number of rural migrants, who are poorly paid especially if they are unskilled. Then, there are housewives and child labourers whose services are not accounted. During the development process, a normal course of events takes place in most countries over a period of time. There is a transition from dominance of the primary sector, to the secondary sector, and in the later stages, to the tertiary and quaternary sectors. In some countries, there is a tendency to delay the decline of their manufacturing. Japan and Germany, for example, are still able to manufacture successfully for world markets from a home base.

Even in such countries, the importance of manufacturing, in employment and also as a proportion of GNP, declines eventually. It is balanced by concomitant rise of the service sector. This deindustrialisation shift can be seen at the regional level too. In the USA, this decline was first observed in New England in 1950s and 1960s. Later in 1970s, the Middle Atlantic States of Virginia, Maryland and Delaware were affected by this decline. The industrial Mid-West faced it in 1980s. It is supposed to be a predictable process, which leaves behind a well of human skills, organisations and offices. The growing importance of services has now given it an independent status as a productive sector in the economy. Instead of being an accessory to manufacturing or to the people at large, it is an exporter. The competitive advantage of some countries such as Switzerland and the UK, and of some regions or cities is in service provision.

Under the old thinking, there was a special geographical pattern of industrial locations, while services were distributed evenly matching population distribution. As such there was a precise geography of iron

and steel making, but banking might be found in every market town even with a small population. These services also organised in a hierarchy, placing higher order services in the large city, and lower order services in small areas. There was little need for these services to agglomerate for interaction among themselves. Now, however, there are major concentrations of services. Some of them are catering to new industrial structures and needs such as advertising and marketing.

They have distinctive spatial patterns. One of the most distinctive patterns is that of global cities, located in relation to the international economy. We will learn more about them later in this chapter. The major components of services may broadly be grouped as the following:

(i) Business services include advertising, legal services, public relations, and consulting.

(ii) Finance, insurance and real estate include savings and investment banking, insurance and real estate (commercial as well as residential).

(iii) Wholesale and retail trading links the producers with consumers. Personal services such as maintenance services, beautician and repair work are also included in this.

(iv) Transport and communications include railways, roadways, shipping and airline services and post and telegraph services.

(v) Entertainment such as television, radio, film, and literature.

(vi) Government at different levels — local, state and national includes bureaucracies, police and army, and other public services.

(vii) Non-governmental agencies include those organisations which have been setup by individuals or groups for charity on non-profit social activities concerning education, healthcare, environment, rural development etc.

Employment in the service sector has increased steadily in the developed countries during the last century despite low population and significant job losses in manufacturing Compared to manufacturing sector; it employs large number of women. In general, the increase in the services employment throughout the world is attached to various reasons. Rising per capita income in the developed countries has generated proportionately larger increases in the demand for many kinds of services especially healthcare, entertainment and transport. The increasing value of time has led to more household functions being accomplished outside the home. Similarly medical services as a proportion of gross national product (GNP) have increased steadily in Europe, North America and Japan. It is mainly due to the changing demographic composition of the population in highly industrialised countries.

The demand for medical care is more from the elderly population. There is also a rise in demand for educational services at all levels with the increasing demand for literacy, mathematical and computer skills at workplaces. The growth of services reflects the increasing proportion of non-direct production workers. Most manufacturing companies also need administrative set-up to collect and process information and make strategic decisions. As such clerical staff, sales people, researchers, advertisers, public relations experts, accountants, financial experts, and lawyers provide assistance in a complicated decision-making process.

Despite globalisation, liberalisation and privatisation, the size and role of the public sector has been increasing. The government is usually the largest employer because it provides innumerable services to the people such as defence, education, health, sanitation and law and order. In developed countries, rising levels of service exports within and among nation have also led to the growth of services. Many nations derive a substantial amount of their aggregate revenues from the sale of services to clients located elsewhere. Services are extensively traded on a global basis, contributing about 20 per cent of international trade.

Advanced Services, Information Flows and the Global City

The information based global economy especially in highly industrialised societies, has given rise to specialised activities, which are fairly advanced. They include finance, insurance, consulting, information gathering, management of information services, as well as research and development, and scientific innovations, which are at the core of all economic activities. All of them can be reduced to knowledge generation and information flows. Due to advanced telecommunication systems, it is possible for these activities to have a scattered location around the globe. Yet, they reveal dispersal and concentration simultaneously. While a number of activities are dispersing widely, those belonging to the upper tier still reflect concentration in few countries.

In fact, there is a hierarchy between tiers of urban centres, with the higher level of functions in terms of both power and skill being concentrated in a few major metropolitan areas. For example, New York, London and Tokyo together cover the world for the purposes of financial trading and work largely as a unit in the same system of endless transactions. They jointly dominate in international finance, and in most consulting and business services of international scope. Some of the services are managed from within the firm. Thus, some of the legal works, advertising or accounting are conducted within the firm, often at the head office or offices attached to it. This is indexed by the number of major firms that have head offices in specific cities.

As the global economy expands, new units join the system and new linkages get established. New regional centres of processing of service activities have emerged in the USA (e.g. Phoenix, Wichita), in Europe (Barcelona, Nice, Stuttgart), and in Asia (Mumbai, Bangkok, Shanghai). However, decentralisation of such activities are concerned mainly with 'back offices'. It means mass processing of transactions that only execute the strategies decided and designed in the corporate centres and headquarters located in a few global cities. These activities employ the bulk of semi-skilled office workers, many of them replaceable as technology evolves. The significance of this spatial system of advanced service activities lies in the versatility of its network based on the information flow. The growing megalopolis of Hongkong – Shenzhen – Guangzhou – Zhuhai – Maccau is expected to be a major financial and business hub in the twenty-first century in Asia.

QUATERNARY ACTIVITIES

In recent years, economic activities have become much more specialised and complex. As a result, a new category called quaternary has come into use now. Activities concerning knowledge such as education, information, research and development (R&D) are recognised as a different class of services even among intangible outputs and hence, placed under this category. The term quaternary basically refers to the 'more intellectual occupations, whose task is to think, research and develop ideas'. As such, this sector is especially concerned with research and development. In the most economically advanced nations, the quaternary activities involve a small but growing proportion of the population, characterised by the highest incomes and a higher degree of mobility in the process of career advancement. In recent years, revolution in information technology has given rise to knowledge-based industries. There has been a remarkable growth in the science and technology based industrial complexes called Science and Technology Parks in places such as Boston, Massachusetts, and California in the USA. Development of softwares is an example of such activities.

What do we mean by Information Technology and how has it helped in the development of quaternary activities? It refers to a converging set of technologies in microelectronics, computing (machines and software), telecommunications, broadcasting and optoelectronics. Around the nucleus of information technologies, a number of major technological breakthrough e.g. genetic engineering has taken place. These have application in various fields such as energy, medicine, health care, transportation and manufacturing. In other words, the core of the transformation refers to technologies of information processing and communication i.e. they are process-oriented.

An important characteristic of the current technological revolution is the application of knowledge and information to knowledge-generation and information-processing devices. The Information Age has revolutionized the technical elements of industrial society. As a result, economic activities of today are overwhelmingly dominated by the production of such intangibles in which knowledge information and communications are critically important. You have read about them in earlier pages. The vast majority of employment in industrialised nations of the world — particularly well — paying, white collar employment — consists of information collection, processing, and transmission in one form or another.

These functions have increased in importance with declining cost of computers and their increasing power. At the same time, accelerated technological changes, shortened production — time, and growing competition and uncertainty in the investment and job markets due to liberalisation and globalisation, have made the production and marketing of goods and services more information-intensive. Therefore, the geography of world economy rests heavily upon invisible flow of data and capital, binding places unevenly to the world system. Economic activities have stretched over ever-larger distances, at times, across different continents and hence, closely tied to the deployment and use of telecommunication systems. With the digitisation of information in the late twentieth century, telecommunication steadily merged with computers to form integrated networks, most spectacularly through the internet. It has helped professionals to move away from the congested city centres or offices, and work at home, where they can conduct most of their business on line without face-to-face contact.

Banks, insurance companies and securities firms, which are highly information-intensive economic activities, have been at the forefront of developing extensive worldwide network of leased and private communication networks. Electronic funds transfer systems form the nerve centre of the international financial economy, allowing banks to move capital around at a moment's notice. One of the most significant repercussions of the internationalisation of financial markets has been the growth of global cities, notably London, New York and Tokyo. Though a number of other cities such as Paris, Toronto, Los Angeles, Osaka, Hongkong and Singapore, are also important in a global economy, the role of the trio — New York, London and Tokyo in the production and transformation of international economic relations in the last century has been the most significant. They act as the command and control centres of the world system by providing home to massive complexes of financial firms, business services and corporate headquarters of Transnational Corporations (TNCs). They create opportunities for interaction through face-to-face contact, political connections and cultural activities.

In short, the telecommunications today tend to reinforce the agglomeration of high wage and high-value-added, white collar functions. At the same time, they promote decentralisation of low-wage and low-value added, blue or pink-collar jobs. They have a variety of impacts upon cities and regions, both positive and negative. Electronic systems are of great use in everyday life, including credit cards, visa, passports, tax records, medical report, telephone and crime statistics. But they also re inscribe the social categories of wealth and power and geographical categories of core and periphery.

UNIT –IV

[TRANSPORT & TRADE GEOGRAPHY]

TRANSPORT AND COMMUNICATION

Natural resources, manufacturing enterprises and markets for products are rarely located at the same place. Transport, communication and trade link areas of production of goods and services with areas of consumption. Distance in modern times is being progressively reduced with each improvement in transport and communication facilities. The world economy today will rather grind to a halt but for an efficient transport and communication system. In earlier days, the means of transport and communication were the same. But with the advancement in science and technology, both have acquired specialised and distinct forms.

Transport refers to the carriage of goods and passengers from one place to another using humans, animals and different kinds of vehicles. Such movements take place through land, water and air. Roads and railways form part of the land transport. Waterways and airways are the other two modes. Pipelines are used to carry liquids like water and petroleum, and natural gas. Transport thus includes transport arteries, vehicles to carry people and goods, and the organisation to maintain arteries and to handle loading, unloading and safe delivery.

Communication means conveyance of information from the place of origin to the place of destination through a channel. Postal services, telephone, telegraph and fax services, internet and satellites are some of the major means of communication.

Trade means exchange of goods and services through market channels among places in response to differences in prices or demand and supply. It thus, refers to the flow of goods and services being exchanged between places. It is now apparent that transport, communication and trade facilitate the movement and exchange of people, goods and services. Transport and communication provide the network of routes, channels and carriers, through which trade takes place.

Land Transport

Most of the movement of goods and services takes place over land. In early days, humans themselves were carriers. In some parts of the world human portage is still important, e.g. in thickly — forested regions or rugged mountains where roads are difficult to be constructed. Later, horses, mules and other animals were used as beasts of burden. With the invention of wheel, the use of animal driven carts and wagons came into prominence. Horse has been the most popularly used animal for riding, carrying load or drawing carts and carriages. The use of animals improved the speed and efficiency of transport, but it was still slow and arduous when compared with the modern standards. The revolution in land transport was witnessed only after the invention of steam engines in the eighteenth century. Although, the pathways and unmetalled roads have been used for transportation since the earliest times, development of internal combustion engine brought significant changes in the quality of roads and vehicles plying on them. The first railway line was built in 1830, which increased accessibility and connectivity. It opened continental interiors for commercial mining, manufacturing and agriculture. Among the latest developments in land transportation are ropeways, cableways and pipelines.

Ropeways and cableways have been developed in rough and difficult terrain especially the mountainous regions. Liquids like mineral oil, water, sludge and sewers are transported through pipelines. Roads and Highways Roads are the most economical means for relatively short distances. Freight transport by road is

becoming increasingly important in comparison to rail transport particularly because it offers door to door service. In developed countries, good quality roads are universal and they provide long-distance link in the form of motorways, autobahn, and interstate highways systems facilitating rapid movement. Lorries of increasing size and power carrying very heavy loads are very common now. In developing countries, despite, the lack of good quality roads, the growth of road transport in recent years has been phenomenal.

Highways are metalled roads connecting distant places. Such roads are constructed in a manner that vehicles could ply in an unobstructed manner. As such, these roads are wide as much as 60 metres, smooth and often duel-carriageways with several traffic lanes, bridges, flyovers and embankments are en route to allow uninterrupted traffic flow. In developed countries, number of vehicles is large and road network is dense. Every city and port town in Europe is linked through highways. In Russia, Moscow is linked by road to eastern city of Vladivostok.

In North America, highways link cities located on the eastern and western coasts as well as towns of Canada in the north and those of Mexico in the south. Trans-Canadian-Highway links Vancouver in British Columbia (west coast) and St. John city in Newfoundland (east coast). Likewise Alaskan Highway links Edmonton in Canada and Anchorage in Alaska. A large part of Pan-American Highway has been constructed, which would connect the countries of South America, Central America, and the United States of America. Australia's one of the major road links is Trans-Continental Stuart Highway. It connects Darwin in the Northern Territory and Melbourne in Victoria via Tennant Creek and Alice Spring. In China, cities in the north and the south, as well as those in the east and the west have been linked through highways. For example, Tsungtso city located near the Vietnamese boundary in the south is linked with Beijing. Similarly, Shanghai has been linked with Guangzhou in the south and Beijing in the north through highways. A highway has been constructed recently to join Lhasa and Chengdu. In India, there are a number of highways connecting important towns and cities. National Highway No 7, linking Varanasi with Kanyakumari, is the longest in the country. A golden quadrangle is being developed to connect our metropolitan cities of Delhi, Mumbai, Chennai and Kolkata. In Africa, a highway joins Algiers across Atlas Mountains and Sahara desert, with Conakry in Guinea. Similarly Cairo has also been connected with Cape Town. The construction of good, long distance roads has assisted tourism in many countries. Some of the major roads of this kind have been built in South America. Attempts have also been made to connect the ports with their hinterlands. The quality of the roads varies greatly between developed and developing countries because construction and maintenance of good roads require heavy expenditure.

Railways

Railways are comparatively cheaper and more convenient mode of transport than roadways in moving goods in bulk over a long distance. With the opening of the first public railway between Stockton and Darlington in northern England in 1825, railways became most popular and fastest form of transport for both passengers and goods during the nineteenth century. The growth of the railways was brought about by two interrelated factors. Firstly, the steam engine was developed and applied not only to industry but also to transport. Secondly, the rapid rise of industry made it necessary to improve existing transport systems. Railways were the cheapest and fastest carriers of bulky goods a large number of passengers, over a long distances. Commuter trains have become very popular in Britain, the USA, Japan and India. They carry thousands of people every day from one part of the city to the other within no time.

Trans-Siberian Railway

World Railway Patterns:

The competitiveness of railways as a form of transport varies greatly from one country to another, because of the high cost of maintenance. Usually they are managed by the government as they come under essential services. Steam engines have been replaced by diesel and electric engines. Speed of trains has increased tremendously. Special services for passengers such as air-conditioning, night births, reclining seats and restaurant services are provided for comfortable journey. Freight services have also been improved by introducing wagons with cooling facilities for perishable goods and tankers and containers. Containers can be unloaded directly from ships on to special rail wagons cutting out several loading and packing operations. However, railways all over the world are experiencing severe financial difficulties. In Asia, railway network is good in India, Japan and China. India with about 93,000 km of railways cover 63,000 route km and more than 7,000 stations. It has the densest network in Asia. In Japan, the total length of railway is 28,000 km. China has more then 35,000 km route length. Other countries of Asia have relatively few rail routes. West Asia is least developed in rail transport because of vast deserts and sparsely populated regions. In South America, the rail network is particularly dense in the Argentina's Pampas and the coffee-growing region of Brazil. Nearly forty per cent of the total route length of South America is concentrated in this region. There is only one trans-continental railway in South America linking Buenos Aires (Argentina) with Valparaiso (Chile) through the Uspallata Pass across the Andes located at a height of 3,960 metres above mean sea-level. Of the remaining countries only Chile has a considerable length of railway lines, running from Iquique to Puerto Montt, with branch lines that link coastal ports with mining sites in the interior. The railway routes of the other Andean states, e.g. Peru, Bolivia, Ecuador, Colombia and Venezuela, are short and consist mainly of single lines from ports to the interior with no inter-connecting links.

Australia has about 40,000 km of railways, of which a quarter is found in New South Wales. There is one trans-continental line running from Perth to Sydney; passing through such towns as Kalgoorlie, Adelaide, Canberra and Melbourne. A major North-South line links Adelaide and Alice Spring but as yet this has not

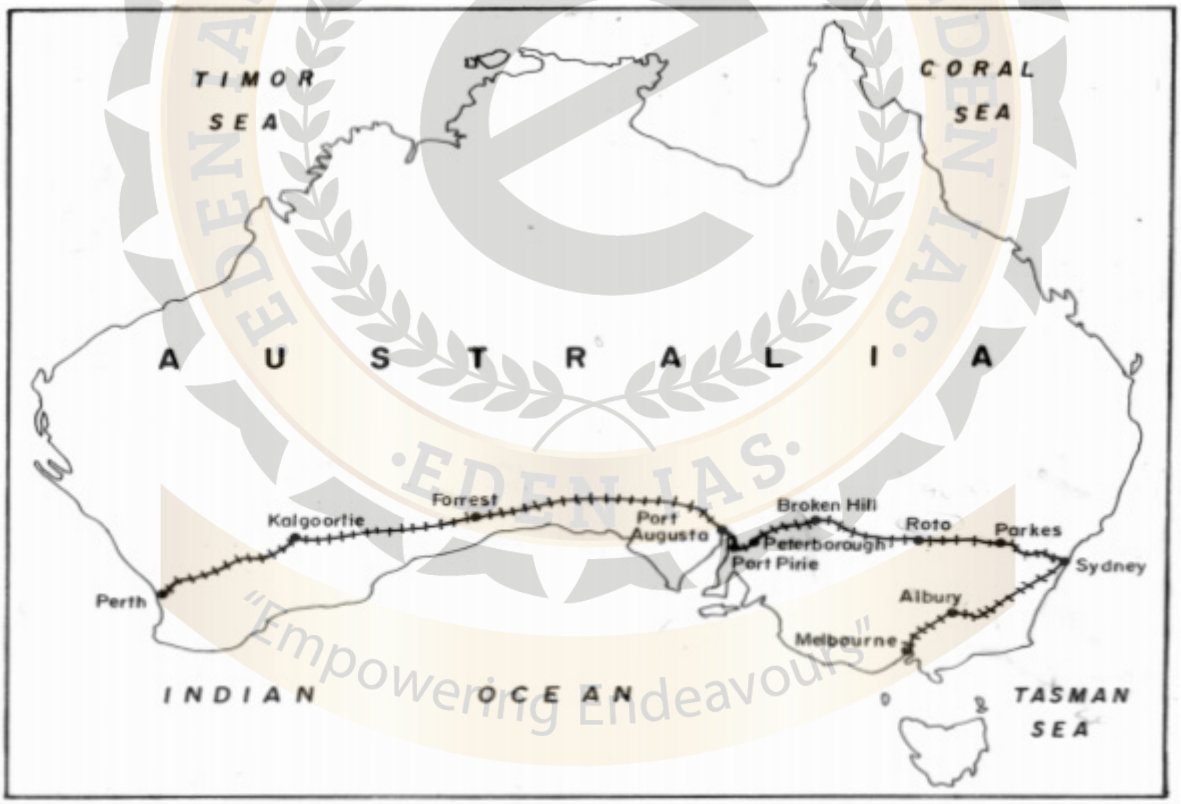
been joined to the line from Darwin to Birdum. New Zealand's railways are mainly in the North Island linking the main towns of farming areas. Africa, despite being the second largest continent, has only 40,000 km of railways. Some of the more important routes include the Benguela Railway through Angola to Katanga-Zambia copper belt; the Tanzania Railway from the Zambian copper belt to the sea at Dar-es-salaam, and the railway through Botswana and Zimbabwe linking the landlocked central African states to the South African system. Elsewhere, as in Algeria, Senegal, Nigeria, Kenya, Ethiopia, railway lines run from coastal ports to island centres but do not form a good network or link with lines in other countries. South Africa, with 18,000 km of railways has the densest rail network because of the gold, copper and diamond mining activities.

One of the densest rail networks in the world is found in Europe. There are approximately

4, 40,000 km of railways, most of which are double or multiple tracked. Important railheads are: Paris, Berlin, London, Brussels, Milan, Warsaw and Moscow. Industrial regions of Western Europe exhibit greatest railway densities. Belgium has the greatest density with one km of railway for every 6.5 sq. km of the country. Passenger transport by rail is more important than freight in many European countries. Underground railways are important in London, Paris and Moscow. Trans-continental railway lines of Europe have now lost their importance with ever growing quicker air transport and more flexible roadways. North America has at present the most extensive network of railways making up nearly 40 per cent of the world' total. The railway network today is used extensively for the transport of bulky freight like minerals, grains, timber and manufactured product over long distance. It, however plays an unimportant role in passenger transport because more passengers prefer to travel by automobiles or aeroplanes than by railways. The densest railway network is found in the east-central USA and southern Canada, south of the Great Lakes, and on the Atlantic coast. The high levels of economic development coupled with high urbanisation are the main reasons for the concentration of rail network in the eastern United States of America.

Canadian Pacific Railway

Trans-Continental Railways: Railways running across the continent and linking its two ends are called trans-continental railways. They were constructed for economic and political reasons. The most important trans-continental railway in Asia is the Trans-Siberian Railway (Fig. 8.1). It runs in Russia from St. Petersburg in the west to Vladivostok in the east. It is a double-track route and runs for a distance of about 9,332 km. Some of the main stations en route are Moscow, Ufa, Novosibirsk, Irkutsk, Chita and Khabarovsk. It has connecting links to the south to Odesa in the Ukraine, Baku the Caspian Sea, Tashkent in Uzbekistan, Ulan Bator in Mongolia, Shenyang (Mukden) in Manchuria and Beijing in China. Canadian Pacific Railway connects Vancouver on the west coast and Halifax on the east coast of North America. It was constructed in 1886. Its total length is 7,050 km. Initially this railway line was built as a part of an agreement to make British Columbia join the Federation of States. It, however, assumed economic importance later on because it connected Quebec-Montreal industrial region with softwood forest region in the north and wheat region of the prairies. Thus, each region became complementary to the other. A loop line from Winnipeg to Thunder Bay, located on the northern shores of the Lake Superior, connects this railway line with one of the important waterways of the world. Wheat from the prairies could be brought through the waterways. This railway line thus became the economic artery of Canada. Australian Trans-Continental Railway connects Sydney on the east coast with Perth on the west coast. It runs through the southern part of the continent. Main stations on this route are Broken Hill, Port Augusta, and Kalgoorlie. There is a proposal to build a trans-Asiatic railway linking Constantinople in Turkey with Bangkok in Thailand via Saudi Arabia, Iran, Pakistan, India, Bangladesh and Myanmar.



Australian Trans-Continental Railway

Water Transport

One of the great advantages of water transportation is that it does not require route construction. The oceans are linked with each other and they are negotiable by ships of various sizes. All that needs to be done is to provide port facilities at the two ends. It proves to be cheap because the friction of water is far less than the friction of land or air. And hence, the energy cost of transportation is lower. The waterways are divided into two groups: inland waterways and oceanic routes.

Inland Waterways

Rivers, canals, lakes and coastal areas have been important inland waterways from time immemorial. Boats and steamers are used as means of transport. They carry cargo as well as passengers. Rivers are the only means of transport in dense forests. Very heavy cargo like coal, cement, timber, metallic ores can be transported by waterways. In India, riverways were the main highways of transportation in ancient times. But they lost importance because of several reasons such as construction of railways, lack of water in rivers as they were diverted into canals for irrigation, making them unsuitable for navigation; and poor maintenance of inland waterways. The development of inland waterway is dependent on several factors such as width and depth of the channel, continuity in the flow of water and transport technology in use. Despite inherent limitations, inland water transport has developed in many parts of the world. In these regions, many rivers have been greatly modified to enhance their navigability. Building of dams and barrages for regulating the flow of water and dredging i.e. removal of silt from channel beds for maintaining a constant depth of water does help overcome many problems mentioned earlier. The river banks are stabilised in areas where shifting of channels is a problem. Some of the major inland waterways are discussed below: There are two major inland waterways systems in North America: (i) the Great Lakes – St. Lawrence waterway, and (ii) the Mississippi waterway.

The Great Lakes–St. Lawrence Waterway: It is a unique waterway in the northern part of North America. The ports located on this route have developed just like ocean ports — with all facilities. As such large ocean freighters are able to navigate deep inside the continent, upto 3,760 km, through the estuary of St. Lawrence below Qubec. This waterway has helped in the industrial and economic growth of the region

The Mississippi Waterway: The Mississippi-Ohio waterway connects the interior part of the USA with the Gulf of Mexico in the south. Large steamer can go through this route upto Minneapolis. There are a large number of navigable rivers and canals in western and central Europe and western Russia.

The world's densest network of inland waterways is found in France and Germany. Rivers Seine, Rhine and Elb together with their tributaries flow into the North Sea. Most of the rivers are interconnected through canals. One may travel in this part almost through rivers and canals from the Mediterranean Sea to the North Sea.

Rhine Waterway: The Rhine is the most important channel of navigation in this region. It is the world's most heavily trafficked waterway. Rotterdam is located at its mouth in the Netherlands. Its hinterland stretches up the Rhine and includes Belgium, France, Germany and Switzerland

Volga Waterway: Russia has a large number of developed waterways. The Volga is one of the most important waterways. The Volga river system discharges its water in the Caspian Sea. It provides a navigable route of 11,200 km. The Volga — Moscow canal connects it with the Moscow region. It is linked with the Black Sea through the Volga — Don Canal.

In many countries of Southeast Asia, rivers play an important role in carrying people and goods. But inland waterways of eastern China and India are comparatively more important in terms of volume. China has many large rivers but some of them, especially in the eastern part, are more developed for water transport. The Huang, the Chang Jiang and the xi rivers are navigable. The densely populated Sichuan region is linked with the Chang Jiang delta, where a dense network of canals has developed. Ocean vessels can reach upto Hankow through this route. River Ganga in India is navigable upto Patna. There is a regular steamer service between India and Bangladesh through Sunderbans. Kerala is another state where inland water transport through the backwater is prospering. India has a long coast line. There are coastal services to carry passengers and goods. Although the Amazon in South America is the longest river in the world and is also naviga-

ble upto Iquitos in Peru, which is 3,680 km from the Atlantic coast in the east, it has not yet developed due to sparse population and low economic development of the region.

Parana-Paraguay Waterway: It is the most important riverway in South America. This river system discharges its water in the Atlantic Ocean through the estuary of Rio de la Plata. As such large ships can enter the waterway. Parana is navigable for ocean vessels upto Santa Fe, located at a distance of 240 km. Paraguay provides accessibility to river steamers upto Asuncion. This waterway has a well developed hinterland and connects the productive interior to the Atlantic coast.

Ocean Transport

Ocean transport is the cheaper means of haulage (carrying of loads) than land and air. The oceans offer a free highway traversable in all directions with no maintenance cost. Ocean-going ships are capable of carrying far larger loads than any other carrier. The introduction of refrigerated chambers for transporting perishable goods such as meat, fruits, vegetables and dairy products, and the development of tankers and other specialised ships has greatly improved the efficiency of ocean transport. The use of containers has not only made cargo handling easier but has eased the transfer of goods to land transport by rail or road at the world's major ports. Modern passenger liners and cargo-ships are equipped with radar, wireless and other navigation aids. As such they are little hindered by storms and bad weather and can cross the ocean at moderate speed reaching their destinations on schedule. Some of the major oceanic routes are

North Atlantic Route: It connects two most developed regions of the world, eastern part of Canada and the USA with the Western Europe. It is, therefore, the most important and busiest route. Both the coasts have good port and harbour facilities. Rich agricultural, commercial, and industrial regions of Europe export large quantities of manufactured items — textiles, chemicals, machinery, fertilisers, steel and wine to the United States and Canada. Bulky and large quantities of food grains and raw materials, like wheat, woodpulp, copper as well as iron and steel, transport equipment etc. are sent to the Western Europe through this route. The foreign trade of the North Atlantic Region is greater than that of the rest of the world combined.

The Mediterranean and the Indian Ocean Route: Industrially developed countries of Europe are connected with East Africa, South Asia and Southeast Asia through the Mediterranean Sea, the Red Sea and the Indian Ocean route. In fact, all ocean bound traffic from Europe to Africa, Asia and Australia passes through this route. The east bound cargo mainly consists of machinery and industrial products. The west bound cargo includes mineral oil and agricultural products such as cotton, rubber, tea, coffee and sugar. Port Said, Aden, Mumbai, Kochi, Colombo and Singapore are some of the important ports on this route.

The Suez Canal: It is a man-made waterway in Egypt which was constructed to link the Mediterranean Sea with the Red Sea. It is a sea-level canal without locks. The opening of the Suez Canal in 1869 reduced direct sea-route distances between Western Europe and South East Asian countries by about one half. A number of ports have emerged enroute such as Port Said and Port Faud in the north and Port Suez in the south.

The Cape of Good Hope Route: This route was once the subsidiary alternative to the Suez. This route is 6,400 km longer between Liverpool and Colombo. It provides link between Western Europe and West African countries, South Africa, Southeast Asia, Australia and New Zealand. The ships coming from Europe directly head towards the Cape of Good Hope. With the increase in the tempo of economic development in the recently independent African nations and the exploitation of their rich natural resources such as gold, copper, diamond, tin, chromium, manganese, cotton, oil palm, groundnuts, coffee and fruits, the volume of traffic round the Cape of Good Hope and from ports in both East and West Africa is on the increase.

The South Atlantic Route: This sea route connects West European and West African countries with ports of Brazil, Argentina and Uruguay in South America. The ocean traffic in the South Atlantic is far less than that in the North Atlantic because South America is comparatively less densely populated and has limited economic development. Only southeastern Brazil, the Plata estuary and parts of South Africa have large-scale industrial development. There is also very little trade on the east-west route between Rio de Janeiro and Cape Town, because both Africa and South America have similar products and resources. Coffee and cocoa from Brazil, and wheat, meat, wool and flax from Argentina are sent to the industrial countries of North America and Western Europe in return for manufactured and semi-finished commodities.

The North Pacific Route: It links the ports on the western coast of North America such as Vancouver, Seattle, Portland, San Francisco and Los Angles with the ports in Asia – Yokohama, Kobe, Shanghai, Hongkong, Manila and Singapore. Trade across the vast North Pacific Ocean goes by several routes which converge at Honolulu. The direct route farther north on the great circle links Vancouver and Yokohama, reduces the traveling distance (about 2,480 km) by half. Wheat, timber, paper and pulp, fish, dairy products and manufactured goods are the main exports from North America. The trade from Asia mainly consists of manufactured goods such as textiles, electrical equipment from Japan, Hongkong, South Korea and Taiwan, and tropical raw materials from Southeast Asia, e.g., rubber, copra, palm oil, tea and tin.

The South Pacific Route: It connects Western Europe and North America with Australia, New Zealand and the scattered Pacific islands via the Panama canal. This route is also used for reaching Hongkong, Philippines and Indonesia. Goods transported are mostly wheat, meat, wool, fruits, dairy products and manufactured articles. The distance covered between Panama and Sydney is about 12,000 km. Honolulu is an important port on this route.

The Panama Canal: It connects the Atlantic Ocean in the east and the Pacific Ocean in the west. It has been constructed across the Panama isthmus, and therefore, separates the landmass of North America from that of South America. With the construction of Panama Canal, the distance between the eastern and western coasts of North and South Americas has come down substantially. It also provides a shorter route between countries of Far East and Southeast Asia on the one hand and those of the Western Europe on the Panama Canal have a lock system. Ships cross different levels of the canal through three locks before entering into the Gulf of Panama. The economic importance of Panama Canal is comparatively less than that of the Suez.

Air Transport

It is the fastest mode of transport, as well as the costliest. The manufacturing of aircrafts and their operation require elaborate arrangements — hangar, landing, fueling and maintaining facilities. As such air transport is used only for high value goods and passengers. Air traffic is adversely affected in bad weather. It has certain advantages too. Valuable cargo can be moved rapidly on a worldwide scale. Being fast, it is preferred for long-distance travel by passengers. Air transport is often the only way to reach difficult areas.

Recent developments may change the future course of air transport. Supersonic aircraft such as Concorde, had been developed, which could cover the distance between New York and London within three and a half hours. A very dense network of air routes exists in Western Europe, Eastern United States of America and Southeast Asia. There are some nodal points where the air routes merge or radiate in all directions e.g. — London, Paris, Rome, Moscow, Karachi, New Delhi, Mumbai, Bangkok, Singapore, Tokyo, San Francisco, Los Angeles, Chicago, New York and Rio de Janeiro etc. Soviet Asia and Africa lack air services. There is a distinct belt of air routes from east to west in the Northern Hemisphere. Airports require wide ranging facilities for the passengers, goods and the aircrafts. The construction of airports is very expensive. Hence, they develop in areas where there is sufficiently large volume of traffic London, Paris, Rome, New York, Chicago, Tokyo and Singapore are some of the busiest airports of the world.

INTERNATIONAL TRADE

Trade refers to the movement of goods and services from areas of surplus to areas of deficit. When exchange of goods and services takes place between two countries, it is called international trade. Throughout history, trade routes have played significant roles in cultural diffusion. You must have heard or read about the old 'silk route' between China and Southwest Asia. The caravans travelling on this south-land route used to trade in silk, iron wares, and condiments. Trading between different parts of the world, especially between Asia and Europe has a very long history. The chance discovery of America by Columbus was prompted by trade. The Indians, the Chinese, the Arabs, the Romans, the Dutch and the British — all have contributed in promoting trade relations. Trade in modern time is no less important. In fact it is now the base of all world economies. Why do we trade and how does it contribute to the national economy? You will get answers to these questions in the following pages.

BASE OF INTERNATIONAL TRADE

The need for trade arises mainly from regional difference in production and productivity. There are great variations in the location and distribution of different kinds of natural resources on the earth's surface. All countries do not possess all resources in the same amount. Besides, the degree of utilisation of these resources also varies from country to country. A number of factors such as availability of resources, required capital, technology and skills, domestic and international demand and government policies influence and determine the production of various commodities and services. As a result, there are regions which have surplus in certain commodities while deficit in others. Hence, countries export goods and services that are in surplus and import those that are in deficit. Specialisation in the production of certain goods and services, by some countries is another factor that gives rise to international trade. Some countries are known for specialised skills in the production of certain goods in great demand globally. For example, Chinese silk, Iranian carpets and Indian spices have formed part of international trade since ancient times. Today, Swiss watches and chocolates, Japanese camera and electronic goods, American Boeing aircrafts and West Asian petroleum are in demand internationally. Production of any commodity in large volumes does not ensure that it will be a part of international trade. If the production exceeds local consumption level and is in short supply elsewhere, then alone it enters international trade channels. Certain food crops do not enter the world trade even if they are surplus, in order to regulate prices internally. For example, trading in rice is limited as most of its production is needed within the region, where it is grown at a price within the reach of the people. There are cases where surplus production is destroyed or thrown in the ocean, to keep prices high enough to maintain production level. For example, maize production is quite high in the USA, so is the coffee production in Columbia and Brazil in South America. In order, to maintain world prices, the surplus production of these crops in certain years is thrown away instead of selling it at a lower price. Among the food crops wheat is the most important trading item. Several countries in Africa are heavily dependent on a limited range of primary products — agricultural and mineral commodities, such as coffee, cocoa, cotton and copper for foreign exchange to buy other goods. For example Mauritania, Zambia and Rwanda earn more than 95 per cent of their foreign exchange from a few primary products. In a few countries, a single product dominates export earnings e.g. copper in Zambia and coffee in Uganda provide more than 90 per cent of their foreign exchange. The smooth flow of goods and services between different parts of the world is dependent on a number of factors. Peace and political stability in the producing region is a primary condition for it. One of the reasons for fluctuating petroleum prices is periodic disturbance in West Asia — Iranian Revolution, Palestinian-Israeli conflict and Iraq-Kuwait war. Conflicts and wars disrupt production and transportation of goods and services.

COMPONENTS OF INTERNATIONAL TRADE

There are three important components of international trade that set the world pattern. They are: volume of trade; composition of trade; and direction of trade.

Volume of Trade

The volume of trade may be measured in terms of the actual tonnage of goods traded, but tonnage is rarely an indicator of value and hence, the trade of a country is usually measured by the total volume and the value of goods exchanged. Sometimes, however, it is measured on a per capita basis, that is how much trade (by value) is carried on per head of the population. World trade has been changing constantly. Except for a few sudden dips during economic recession, the growth rate has been accelerating during the post World War II period. The volume of trade between countries differs markedly depending upon the nature of goods and services produced, bilateral agreements and trade restrictions.

Composition of Trade

The types of goods and services entering the world trade are also changing. The importance of manufactured goods has increased over the years. It is the largest and fastest growing component of trade. It has been possible due to fast growth of manufacturing industry in the latter half of the twentieth century and reduction in tariff barriers especially under General Agreement on Trade and Tariffs (GATT) and now under the World Trade Organisation (WTO). A number of primary products such as coal, cotton, rubber and wool have lost importance in recent years. Petroleum occupies one of the most important places in the world trade now.

Direction of Trade

Until the eighteenth century, manufactured and high value sophisticated goods were exported from present day developing countries to Europe. The direction of trade changed in the nineteenth century. Manufactured goods from Europe were exchanged for the food stuffs and raw materials from three southern continents. In the first half of the twentieth century, much of the trade in manufactured goods was mainly between the USA and Western Europe. Japan, in that period, became another important trading country. In the second half of the twentieth century, the old pattern has started changing. The developing countries are now able to compete with developed countries in manufactured goods too. Emphasis is now laid on trade in technology.

SEA PORTS

Sea ports play an important role in international trade and hence, known as 'Gateways of International Trade'. Ocean routes are most economical for carrying bulk and heavy commodities in large quantity. Port is that place on the coast where cargo is received from other countries as import and sent out to other countries as export. It thus, acts as a point of entry and exit. The quantity of cargo handled by a port is an indicator of the level of development of its hinterland. The importance of a port is judged by the size of cargo and the number of ships handled. The ports have arrangements for loading and unloading of cargo. Thus, the ports provide facilities of docking, loading, unloading and the storage facilities for cargo. In order to provide these facilities, the port authorities make arrangements for maintaining the navigable channel, arranging tugs and barges, and providing labour and managerial services.

Types of ports

Ports are classified in two ways: on the basis of their location such as inland ports and outports; and on the basis of the specialised tasks performed such as passenger ports and commercial ports. Most ports are, however, multipurpose.

Passenger Ports

These are the ports of passenger liners. They are concerned with passenger traffic. Mumbai, London and New York are the examples of such ports.

Commercial Ports

These are the ports which basically handle the goods for imports and exports.

Oil Ports

These ports deal in the processing and shipping of oil. Some of these are tanker ports and some are refinery ports. Maracaibo in Venezuela, Esskhira in Tunisia, Tripoli in Libya are tanker ports. Abadan on the Gulf of Persia is a refinery port.

Ports of Call

These are the ports which originally developed as calling points on main sea routes where ships used to anchor for refuelling, watering and taking food items. Later on they developed into commercial ports. Aden, Honolulu and Singapore are its good examples.

Packet Stations

These are also known as ferry ports. These packet stations are exclusively concerned with the transportation of passengers and mail across water bodies covering short distances. These stations occur in pairs located in such a way that they face each other across the water body e.g. Dover in England and Calais in France across English Channel.

Out Ports

These are deep water ports built away from the actual ports. These serve the parent ports by receiving those ships which are unable to approach them due to their large size. Classic combination, for example, is Athens and its outport Piraeus in Greece.

Entrepot Ports

These are collection centres where the goods are brought from different countries for export. Singapore is an entrepot for Asia, Rotterdam for Europe, and Copenhagen for the Baltic region.

Naval Ports

These are the ports which have only strategic importance. These ports serve the warships and have repair workshops for them. Kochi and Karwar are the examples of such ports in India.

Inland Ports

These ports are located away from the sea coast. They are linked with the sea through a river or a canal. Such ports are accessible to flat bottom ships or barges. For example, Manchester is linked with a canal; Memphis is located on river Mississippi; Rhine has several ports like Mannheim and Duisbvrg; and Kolkata is located on River Hoogly, a branch of river Ganga.

MAJOR SEA PORTS OF INDIA

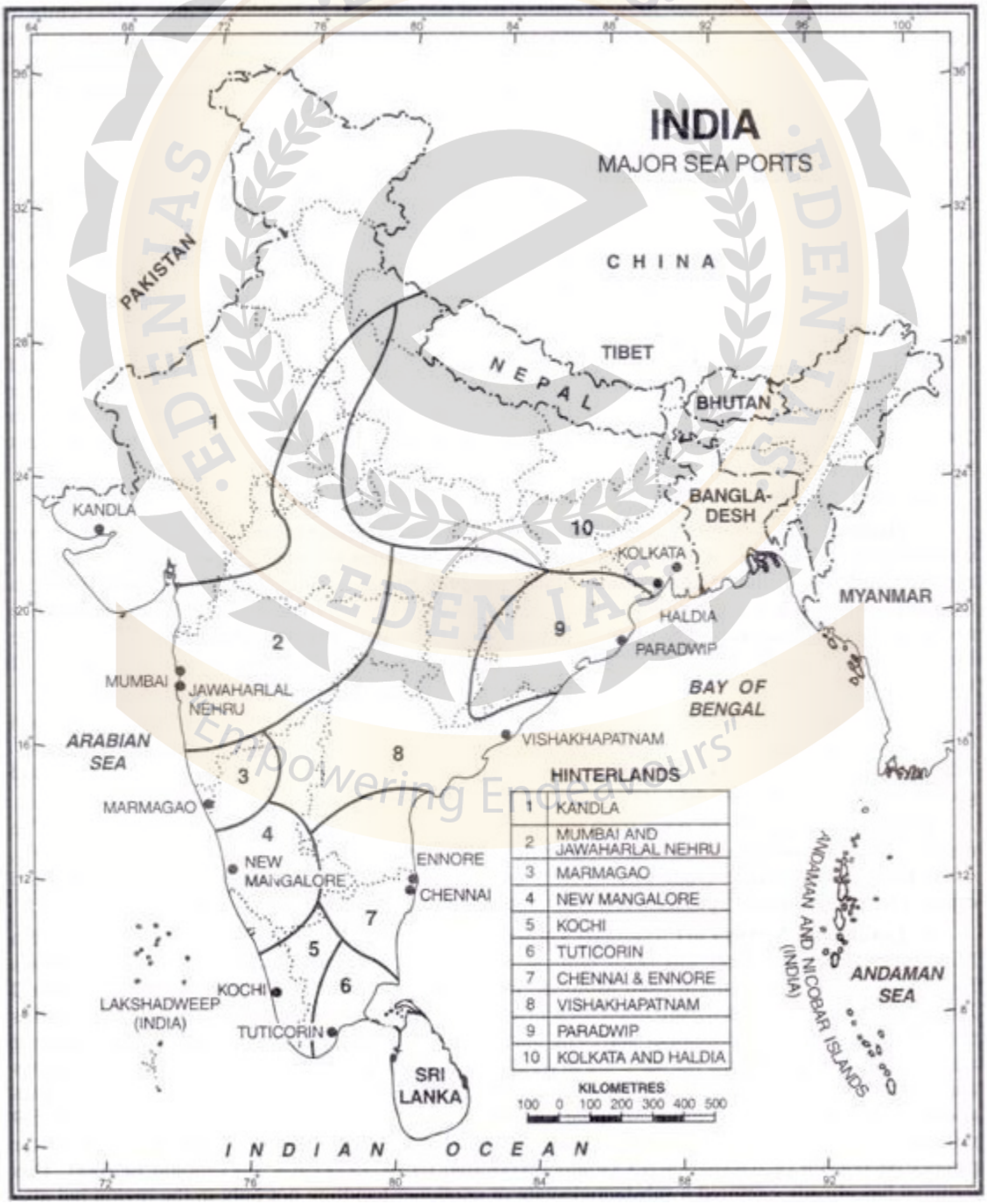
Mumbai:

It is a magnificent natural harbour on the West Coast of India. The deep 10-12 metre sea adjoining the harbour with no sand banks enables big ships to enter the port easily. It handles approximately one-fifth of India's foreign trade with predominance in dry cargo and mineral oil from the Gulf countries. It is the biggest port of India. It handles foreign trade with the Western countries and East African countries. The opening of the Suez Canal in 1869 brought it much closer to the European countries. Mumbai has a vast hinterland covering the whole of Maharashtra and large arts of Madhya Pradesh, Gujarat, Rajasthan, Delhi. This hinterland is very rich in agricultural and industrial resources. The entire hinterland has undergone large scale economic improvement which has helped in the rapid growth of this port. A dense network

of roads and railways connects the port with its hinterland. Mumbai is a gateway to India from the west and handles large scale trade of great variety. The major items of export are cotton textiles, leather, tobacco, manganese, machinery, chemical goods etc. while the imports include crude oil, superior quality raw cotton, latest machines, instruments and drugs. This port is likely to progress further with the economic development of its hinterland.

Jawaharlal Nehru Port:

Formerly known as Nhava Sheva port, this port was opened on 26th May, 1989. This new port has been built at an island named Nhava Sheva, about 10 km from Mumbai. The main purpose of this port is to release pressure on the Mumbai port. The port is equipped with the most modem facilities having mechanised container berths for handling dry bulk cargo and service berth etc. Most of the operations are conducted with the help of computers. The port is linked by road and rail to other railway routes and National Highways avoiding Mumbai city altogether. It is a twin port of Mumbai so far its hinterland is concerned.



Kandla:

This port is located at the eastern end of Gulf of Kachchh about 48 km away from Bhuj. It is a natural sheltered harbour in Kandla creek with average depth of 10 m. The port is equipped with all the modem facilities and state-of-the-art technology. The traffic handled at Kandla consists of crude oil, petroleum products, fertilizers, food grains, salt, cotton, cement, sugar, edible oils and scrap. This port has a vast hinterland covering large parts of Gujarat, Rajasthan, Haryana, Punjab, Delhi, Himachal Pradesh, Jammu and Kashmir and Uttaranchal. The port is well connected by roads and railways and has a bright future.

Marmagao:

It is an important port of Goa located at the entrance of Zuvari estuary and occupies fifth position in handling the traffic. Its harbour is protected and holds about 50 streamers in fair season and 15 steamers in rainy season. It has the capacity to handle 16.1 million tonnes of cargo traffic. With the opening of the Konkan railway, the importance of this port has increased significantly and it is fast emerging as a multi-commodity port. Four new harbours are being constructed in the Vasco Bay for handling container traffic and general cargo.

New Mangalore:

This is an important port located at the southern tip of the Karnataka coast north of the Gurpur River. Initially it was designed for small ships. However, it was upgraded in the Fourth Five Year Plan to accommodate larger ships. A harbour was constructed so that business could be carried on throughout the year. Its hinterland lies in Karnataka and northern part of Kerala. Tea, coffee, rice, cashew nuts, fish, rubber etc. are exported through this port. The major items of import through this port are crude oil, fertilizers, edible oils etc. Its main importance lies in export of iron ore from the Kundremukh mines. The port is well linked through broad gauge rail line and NH-17 with Mumbai and Kanniyakumari.

Kochi:

It is another natural harbour on the west coast of India and is located on the coast of Kerala. Kochi has sheltered backwater bay. The port is located close to Suez-Colombo route and enjoys the proximity of a trunk maritime route. It handles the export of tea, coffee and spices and imports of mineral oil and chemical fertilizers. The Kochi Oil Refinery receives crude oil through this port. It is also a ship-building centre. Imports through this port far excel the exports. In other words, imports are about five times more than the exports. Its hinterland lies mainly in Kerala and Tamil Nadu. It is served by a well developed network of transport routes.

Kolkata-Haldia:

It is a riverine port located on the left bank of river Hugli about 128 kms inland from the Bay of Bengal. Kolkata port handles goods coming from South-East Asian countries, Australia and New Zealand. Kolkata port is called the 'Gateway to Eastern India. It is the world's most important centre of jute industries. Kolkata is the main port for exporting jute products, tea, coal, steel, iron ore, copper, leather and leather products, textiles, manganese and many more items. The imports consist mainly of machinery, crude oil, paper, fertilizers and chemical products. The Kolkata port suffers from a number of problems. It is located on the bank of the River Hugli, which suffers from the problem of silting as tidal bores enter this port frequently. Sandy bars and islands have been formed at several places. The river is in its old stage and bends at several places creating lot of problems for the ships because they do not find a straight passage from the coast to the port. To sum up Kolkata port has a serious problem of 'bends', 'bars' and 'bores'.

The depth of water is gradually declining. This has necessitated constant dredging so that larger vessels are able to enter the port. Expert pilots are required to conduct the ships and the cost of maintaining the port has become prohibitive. To rid the Kolkata port of some of the problems mentioned above, a barrage has been constructed across the Ganga at Farakka. This barrage is designed to divert water along the Bhagirathi-Hugli. However, with the signing of water treaty between India and Bangladesh, adequate water is not available in the Hugli River. Only a change in the treaty can improve the situation.

Kolkata port has a vast hinterland. Almost whole of the eastern and north-eastern parts of the country are included in the hinterland of this port. The main areas comprising the hinterland of Kolkata are West Bengal, Bihar, Jharkhand, Uttar Pradesh, Uttaranchal, Sikkim, Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Meghalaya, Tripura and northern parts of Chhattisgarh and Madhya Pradesh.

Haldia port has been developed on the confluence of rivers Hugli and Haldi about 105 km downstream from Kolkata. Its main purpose is to release congestion at Kolkata. It receives larger vessels which otherwise would have to go to Kolkata. Some of the large vessels which cannot enter the Kolkata port can easily come upto Haldia. Haldia has an oil refinery and a fertilizer factory. A large integrated petro-chemical plant has also been set up here. An important rail link connects Haldia with Kharagpur. The main items of trade are mineral oil and petroleum products. Haldia-Dock complex is considering plans to develop a berth on BOT basis. The hinterland of Haldia covers the same territories as that of Kolkata although to a much lesser extent.

The Bhagirathi River has changed its course recently as a result of which Haldia's future has become uncertain. With the large-scale deposition of silt near the port the entry of large ships has become difficult.

Paradwip:

It is a deep water (depth 12 metres) and all weather port located on the Orissa coast about 100 km east of Cuttack. Because of its great depth, this port is capable of handling bulk carriers of over 60,000 DWT. Constructed in the Second Five Year Plan period, this handles iron-ore and coal along with some other dry cargo. Large quantity of iron ore is exported to Japan through this port. The imports through port are only half of its exports. The hinterland of Paradwip port is comparatively small and covers Odisha only.

Vishakhapatnam:

It is the deepest land-locked and protected port built at the coast of Andhra Pradesh. An outer harbour has been developed to handle the export of iron-ore. Elaborate arrangements have been made to handle crude oil and other petroleum products. It also handles fertilizers. It also has the ship-building and ship-repair industry. The primary export items are iron ore (especially from Bailadila mines to Japan), manganese ore, spices and wood. The imports comprise mainly of mineral oil, coal, luxury items and other industrial products. The hinterland of Vishakhapatnam port commands an approximate area of 3.4 lakh sq km which is constituted by Telangana/Andhra Pradesh and the contiguous parts of Chhattisgarh, Madhya Pradesh, Maharashtra and Karnataka. This part of the country is very rich in mineral resources and agricultural produce.

Chennai:

Chennai is the oldest artificial harbour on the East Coast of India. It does not possess a natural harbour and an artificial harbour has been created in an area of 80 hectares near the coast. It mainly handles petroleum products, fertilizers, iron-ore and general cargo. The major items of exports are rice, textiles, leather and leather goods, tobacco, coffee, manganese ore, fish and fish products, coconut, copra etc. The imports consist of coal, crude oil, paper, cotton, vehicles, fertilizers, machinery, chemical products etc. The hinterland of the Chennai port encompasses the large part of Tamil Nadu, southern part of Andhra Pradesh and some parts of Karnataka. The port is gaining importance due to increased significance of its hinterland.

Ennore:

This port has been developed to reduce pressure of traffic on Chennai port. Located slightly in the north of Chennai on the Tamil Nadu coast, this is the country's first corporate port. The major items of traffic on the port are coal, iron ore, petroleum and its products, chemicals, etc. Its hinterland is a part of the hinterland of Chennai port.

Tuticorin:

This port has also been recently developed at the Tamil Nadu coast about 8 km south-west of the old Tuticorin port. It has an artificial deep sea harbour which can accommodate vessels upto 8 metre draft in any season of the year. The port handles the traffic of coal, salt, food grains, edible oils, sugar and petroleum products. Its main purpose is to carry on trade with Sri Lanka as it is very near to that country. Its hinterland is formed mainly by southern Tamil Nadu comprising districts of Madurai, Kanniyakumari, Ramnathpuram, Turunelveli and southern part of Tiruchchirappalli. It is well connected by railways and roads.

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