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# UNIT 5 SOCIAL ENVIRONMENT AND POPULATION OF MAN

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## 5.1 INTRODUCTION

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The purpose of this unit is to show the close relationship between human beings and their environment, of which culture is a very important aspect. There is a growing concern today over the increasing ecological imbalance created by mankind itself. Man lives in a physical environment, to which he learns to adapt in many ways. But we often forget that human beings also live in a cultural environment which influences and often determines their actions to a great extent. For instance, the kind of environmental resources that would be utilised by people, the way in which these would be used and who would use them, is determined by the cultural environment such as cultural norms, and values of the people. Political, economic, and religious institutions, which are a part of culture, put constraints on the use of natural resources and also the way in which they are exploited. After studying this unit you will appreciate how social and cultural environment is important for the understanding of any human activity.

Among all living organisms human beings alone have the capacity to change their environment. In this unit, you will learn how the human species has survived and flourished, their population increasing slowly, and recently in an explosive manner. You will learn that the size, composition by age and sex, and growth rate of the human population are constantly changing factors, not only in the world as a whole, but also in the various regions and countries. You will see how the age and sex composition of a population can be shown in an advantageous way in population histograms, from which we can tell not only how the population has changed over a number of years, but also derive implications for the

future. According to latest figures, the world population today is doubling once every thirty five years. No real progress can be made toward solving the earth's environmental, social and economic problems until ways are found to reduce population growth rate. It is, therefore, essential to understand the structure and growth of the human population and the possible scenarios for the future.

## Objectives

After studying this unit, you should be able to:

- define culture and outline the relationship between culture and physical environment,
- describe various social institutions giving their salient features, and explain how language and communication are important for human social interaction,
- describe how mankind's relationship with the physical environment resulted in the evolution of different societies,
- give reasons for the observed growth pattern of human populations,
- define demographic transition and explain population histograms with reference to changes in population size, and
- outline the various projected scenarios for the future of human populations.

## 5.2 SOCIAL ENVIRONMENT OF MAN

You already know what constitutes the physical environment. In unit 1, you have read briefly about the social environment too. Let us now study about the social environment in some detail. All over the world, human beings have grouped themselves together to carry out their activities collectively. These groups of people have a definite organisation. Their activities are centered around a set of common goals and they share common beliefs, attitudes and modes of action. Such groups are called societies. Every society has its own cultural environment and individuals in a society are guided by the culture they live in. Thus, the society and its culture form our social environment (Fig. 5.1).

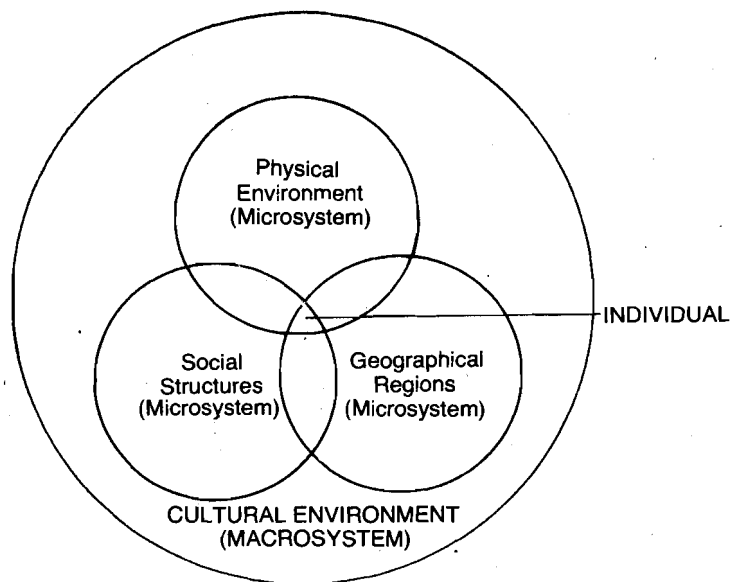


Fig. 5.1: A Holistic model of individual's environment.

### 5.2.1 What is Culture?

Culture is a very important factor which determines social environment and social action. Behaviour of an individual is guided by the culture he lives in. Culture guides him to select a particular way of behaviour from a very broad range of alternative behaviours that are permitted to him by his biological heritage. Culture is that complex whole which includes knowledge, beliefs, arts, morals, laws, customs and any other capabilities and habits, acquired by man as a member of the society.

Though, all over the world, mankind exhibits an amazing diversity of cultures, each culture always encompasses certain areas of human activity which are referred to as various aspects of culture. These aspects are ways of adaptation to the surrounding physical environment. Anthropologists, provide the following exhaustive list of these aspects:

- Material culture and its sanctions
  - a) technology
  - b) economics
- Social institutions
  - a) social organisation
  - b) education
  - c) political structures
- Man and the universe
  - a) belief systems
  - b) control of power
- Aesthetics
  - a) graphic and plastic arts
  - b) folklore
  - c) music, drama and dance.
- Language.

We would be discussing some of these aspects in later sections of the unit.

### 5.2.2 Interrelationship between Culture and Environment

The particular set of cultural arrangements adopted by a society is largely determined by its physical environment, including climate, topography, natural resources and so on. Thus, we find that all the major agricultural settlements are located near river banks, areas of fertile land and adequate water supply. The Indus Valley Civilization in India or the civilization that developed by the river Nile in Egypt, illustrates this point. However, it is important to note that in similar kinds of climates, different cultures may develop. Physical environment is not the conclusive factor in cultural development.

After a certain stage of cultural development and level of knowledge is reached, man's subordination to nature is partially reduced and at times even changed into his domination over it. Over exploitation of natural resources may occur, resulting in an ecological imbalance. In modern industrial societies, deforestation, replacement of natural forests by concrete jungles, destruction of wildlife etc., are instances of culture, severely affecting physical environment. It is also seen that exploitation of natural resources is not possible unless a certain level of cultural development is reached.

#### SAQ 1

State whether the following statements are true or false. Write (T) for True (F) for False in the boxes provided:

- i) Cultural environment of the society is not largely determined by its physical environment. ☐
- ii) The Indus Valley and the Egyptian Civilisation developed near river banks due to struggle against odds such as flood etc. ☐
- iii) World is a basket of several cultures showing amazing diversity. ☐
- iv) Exploitation of natural resources is only possible when there is certain degree of cultural development. ☐

## 5.3 MAJOR SOCIAL INSTITUTIONS

Social institutions play a major role in determining the relationships people have with each other, the way they live and interact, in other words, their social environment. We will now briefly discuss the major social institutions.

### 5.3.1 Marriage, Family and Kinship

Institution of marriage, in some form or the other, is found universally in almost all human societies. One of the most basic human biological needs of perpetuation of species through reproduction is regulated by marriage. Though universal to all human societies, marriage differs widely in its forms and types. Scholars commonly distinguish between two forms of marriage. These are monogamy and polygamy.

Monogamy is marriage of one man with one woman. Polygamy has two subtypes: polyandry, where one woman marries more than one man and polygyny, where one man marries more than one woman. The most universal form of marriage, however, happens to be monogamy. This is because of the approximately equal proportion of males-females among human species, and also economic difficulties in maintaining a large family.

The primary effect of marriage is formation of families and cooperating groups of households. Family is defined by the Bureau of Census as **'a group of two or more persons related by blood, marriage or adoption and residing together.'** Family serves to take care of the young which is necessary for a human infant whose dependency period is long. Three major types of families are recognised:

- joint family,
- extended family, and
- nuclear family.

Joint family is one where the new couple comes and stays with the parents of either spouse, mostly bridegroom's. This type is fairly common and is predominantly found in rural India. The extended family is one where besides the parents and their children, other relatives and their families reside together. Nuclear family which is becoming more and more a norm now, rather than the first two types, consists of the husband, wife and their children.

Kins are people, who are related to each other through some combination of principles of descent, parentage and marriage. Kinship terminologies primarily apply to people who are biologically related. Thus, kinship evolves out of the institution of marriage, but once established it serves to regulate marriage and often restricts choice of marriage partners.

### 5.3.2 Religion

Another important aspect of our social environment is religion. Religion may be defined as **'a more or less coherent system of beliefs and practices concerning a supernatural order of beings, forces, places or other entities.'** The supernatural order includes only those entities which are thought to be non-empirical by a particular group. Thus, some people might think of flying saucers as actual entities while some others may treat them as supernatural, sacred entities.

#### Religion and Environment

Religious beliefs, rituals and superstitions of the people are directly affected by their environment and economic activity. The objects that are rendered sacred are the objects which are of particular importance in that environment. Cow, for example, is considered sacred by the Hindus, as cattle are an extremely important resource in agrarian societies. The religious sacredness attached to cows functions to safeguard this important resource in the community. Similarly many natural phenomena like rain, for example, are deified in agricultural societies as they are vital for their survival and so it is necessary to somehow control them. However, the same religious beliefs and practices when they outlive their particular economic and environmental context, can seriously restrain exploitation of certain valuable resources for the new mode of production.

### 5.3.3 Political Institutions

What holds people together? How do people with conflicting ideologies and interests cooperate with each other? How are they brought together to do things they do not really want to do? The answer is, through political institutions. Political process is basically concerned with regulating attainment of public goals. This is important because in any society the ownership of available resources needs to be controlled in some manner. Moreover, political processes, according to sociologists have to do with establishment and enforcement of behavioural standards and with circulation of individuals from status to status. Not all members of a society can participate equally in the decision making processes of that society, only a few control the decisions taken. These also include issues like who generally takes decisions, whose decisions are accepted by other members of the group. The backbone of political institutions are the economic institutions.

### 5.3.4 Economic Institutions

Economic activity is traditionally defined as an activity concerned with production, distribution and consumption. More generally, it is, a provision of goods and securities for the satisfaction of human wants. The goods produced are 'means' for the satisfaction of wants. The action which directly satisfies wants is therefore non-economic. For example, the act of preparing a meal is economic, but eating it is not an economic activity. An economic activity utilises scarce resources for production of adequate goods. This process involves four factors of production, namely, land, labour, capital and entrepreneurship. Each economic act may not involve all these four factors at the same time, but they are essential for the overall economic activity of any society. Further, the economic activity of a society is governed by certain normative patterns of that society. Let us call these the 'economic institutions'. The commonly found economic institutions are property, occupation, contract, market and money. Though they vary widely in form, their essence remains the same. The institution of property delimits the rights of individuals over scarce and valuable resources. These resources may be tangible like land and movable assets. All societies have division of labour to some extent; in any case there is atleast a division according to the age and sex of its members.

Different societies of the world have very different economies. In the course of their evolution, the human societies have moved from hunting-gathering stage, through pastoralists—farmers to industrialised economy. The economic activity of man—the mode of production, division of labour and so on—is directly dependent on the physical environment of man, as well as his level of knowledge. The physical environment provides specific resources which have to be utilised by people for their survival. The level of knowledge, technological advance in particular, determines the mode of production by that people.

Since economic activity is most directly related to one's survival, the economic environment affects individuals the most. However, it must be realised that economic activity itself is greatly affected by the total cultural environment.

In addition to the above social institutions, education is one more important institution in a society. It helps in socialising members of the society and transmitting to them knowledge, skills, attitudes and the values through formal and informal arrangements with which most of us are familiar. Recently there is an awareness to use education as a means of developing an understanding of the environment.

#### SAQ 2

Strike out the incorrect portion from the sentences given below.

- i) Social institutions are **most important/not important** aspects of cultural environment.
- ii) Nuclear families are **becoming/not becoming** a norm now-a-days.
- iii) Religious beliefs **do not affect/direct affect** environment.
- iv) The available resources **can/can not** be controlled by political power.
- v) All the members in a society **can/can not** take part equally in decision-making process.
- vi) The institution of property **delimits/does not limit** the right of the individual over scarce and valuable resources.
- vii) Economic activity is greatly **affected/not affected** by total cultural environment.

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## 5.4 LANGUAGE AND COMMUNICATION

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The capacity to construct language and to communicate through this tool with other community members is uniquely human. Language may be defined as patterns of sounds which are assigned definite meanings. This implies that language is symbolic in nature. In spoken language symbols are sounds while in written language they are of graphic nature. Languages show an extraordinary diversity among different people.

### 5.4.1 Language and Culture

As you may have already noted, the very emergence of culture depends on man's capacity to communicate. However, the relationship between language and culture is not restricted to this instrumental level, but is of a dual, reciprocal nature. Not only does language reflect culture, it also in a very fundamental way moulds it.

Language reflects the major themes, interests and concerns of people. All linguistic forms have meaning and they represent categories of experiences which are the end result of a long historical tradition and are tied to a particular cultural milieu, e.g., the category 'house' in English represents the physical architecture whereas the category 'home' is associated with one's family. The several functions of language can be summed up as:

- 1) Primarily language makes communication and therefore culture possible.
- 2) It is through language that norms and rules are enforced and social order maintained.
- 3) Language makes it possible to extend the range of information by exchanging it with others.
- 4) Language enables human beings to report and convey experiences which are removed from the present time and space.

### 5.4.2 Communication

Language itself evolved from the need to communicate. As you know to begin with, human beings communicated only through the word of mouth then print came in and now we have the electronic media. In the evolution of human society, social interaction and communication have played a great part. For instance the aboriginal community—Onges of Andaman who were cut off from all communication from the people of the mainland are still at a very primitive stage of development.

Communication can make effective contribution in creating knowledge of each others beliefs and culture. It can enable the vast humanity of this globe to move towards an ideal of a global family—a unity in diversity. It can build the consciousness that we have to share the resources on this earth and so we have a common destiny and a common goal.

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## 5.5 SOCIETY, CULTURE AND BEHAVIOUR

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The positions and roles that an individual occupies in a society as well as his place in the social stratification system determines his social environment. It largely determines the people he is likely to interact with and at times even severely restricts social intercourse.

To a very large extent, every individual is a product of the culture he lives in. The peculiar ways of his culture, norms, values and customs are called 'socialisation process'. Socialisation aims at preparing the members of society in effectively adapting to their cultural and physical environment. Socialisation begins very early in life, even before the child acquires the capacity to speak. However, as the child grows, his social environment begins to widen beyond his family. Also, with age, his social roles keep changing rapidly.

At practically by 20-25 years of age, an individual has learnt most of the important things needed to survive in the given cultural and physical environment.

### 5.5.1 Culture and Human Impact

Thus we see that all these aspects — culture, religion, political institutions, economic institutions—of the social environment determine mankind's relationship with the physical environment. As different societies evolved over thousands of years, these relationships also got modified.

Let us now consider the ways in which we interact with other organisms and the non-living components of our environment. To study these interactions properly, we will look at hunting - gathering, agricultural and industrial societies. A study of these three social systems show basic shifts that have occurred during our cultural development.

### 5.5.2 Hunting-Gathering Societies

Much of what we know about the hunting-gathering societies comes from archaeological findings and the study of remnant cultures in Australia, South America and Africa. From such studies we find that people of these hunting - gathering societies lived in a world closely linked to the environment. They knew a great deal about their surroundings. This profound ecological knowledge is evident today in the existing hunting-gathering societies. Hunter gatherers were nomads, wanderers who foraged for plants and captured a variety of animals using only primitive weapons. Because their skills did not give them a great advantage over other species, their populations never grow very large.

Hunting-gathering societies can be considered environmentally benign, they exploited the environment only to meet their need. What damage they created from trampling or cutting vegetation and the wastes they left behind could easily be repaired by the environmental regeneration.

### 5.5.3 Agricultural Societies

Over many thousands of years, human beings became increasingly dependent on cultivated crops and less and less dependent on wild varieties. The earliest agriculturists practiced subsistence level farming, which provides food only for the farmer's family. Because each farmer could provide for only a few people, the first villages and their populations were small.

#### Emergence of Cities

Subsistence-level farming gave way to a more advanced form of agriculture with the development of the plough and other metal tools and as time went by, people began to do business with neighbouring villages. The human population began to grow more interconnected with improvements in agricultural technology and trade; the villages grew into cities and became major trade centres. As the agricultural societies began to lay emphasis on trade, the link with the natural environment, so visible in hunting-gathering societies, was weakened. But the agriculturist's attitude towards nature was much like those of hunter-gatherers. Population's need was fulfilled without disturbing the natural environment.

### 5.5.4 Industrial Societies

As a result of the Industrial Revolution, the agricultural society transformed into an industrial society. The Industrial Revolution brought about a dramatic change in the social and economic organisation of society. As industries grew, the influx of materials — fuel, food, minerals and timber — into the city rose sharply. New medicines and better control of infectious diseases through insecticides and improved sanitation also grew out of the Industrial Revolution. These important new developments enhanced human survival; people began to live longer and population began a rapid ascent resulting in a population explosion. This was also the time when population had a marked effect on environment. Let us study certain characteristics of human population and see how it affects environment.

### SAQ 3

- Give suitable column heading in box 3.
- Arrange the words given below under appropriate box.

### Social Environment and Population of Man

#### Human Beings

2

Physical Environment

Man-made Environment

3

Work place, atmosphere, culture, soils, space craft, plants, animals, language, crop field, major institution of society, gravitational force, culture, natural resources, society.

## 5.6 POPULATION EXPLOSION

In the last unit you have studied that essentially, increase or **growth** of population is the difference between the number of births and the number of deaths in a particular year. The **growth rate** is calculated as a percentage of the population. A growth rate of 2% would mean that 2 persons for every 100 are being added every year, or 20 persons for every 1000 of the population. Thus, the growth rate will depend on the birth rate as well as the death rate.

The term '**population explosion**' refers to the sudden and dramatic increase in the number of human beings which has been observed in recent years. How justified is the use of this term? Consider the following facts:

Man appeared in his present form (*Homo sapiens*) not more than 50,000 years ago, somewhere in Africa. For most of human history, the total human population remained small. It was less than 300 million at the time of Christ, about 2000 years ago. By 1850 it had reached 1 billion (1000 million), and since then it has grown very rapidly, and has already exceeded 5 billion, in just about 135 years. In Table 5.1 you can see how the population has increased. Whereas it took tens of thousands of years to reach the first billion, human population today is set to increase by 4 billion (from 4 to 8 billion) in just 42 years.

Table 5.1: Growth of world population

It Took From	For World Population to Reach	Time Taken
Beginning of Man		
to Birth of Christ	300 million	All of human history
0 - 1500 A.D.	300 million	1500 years
1500 - 1850	1 billion	350 years
1850 - 1925	2 billion	75 years
1925 - 1960	3 billion	35 years
1960 - 1975	4 billion	15 years
1975 - 1985	5 billion	10 years

Now look at Figure 5.2 below. It shows clearly two things, first, the slow growth of human population till about the 17th century, and second, its rapid 'explosion' since then. You may agree that the population situation today is very different from that in all of human history.



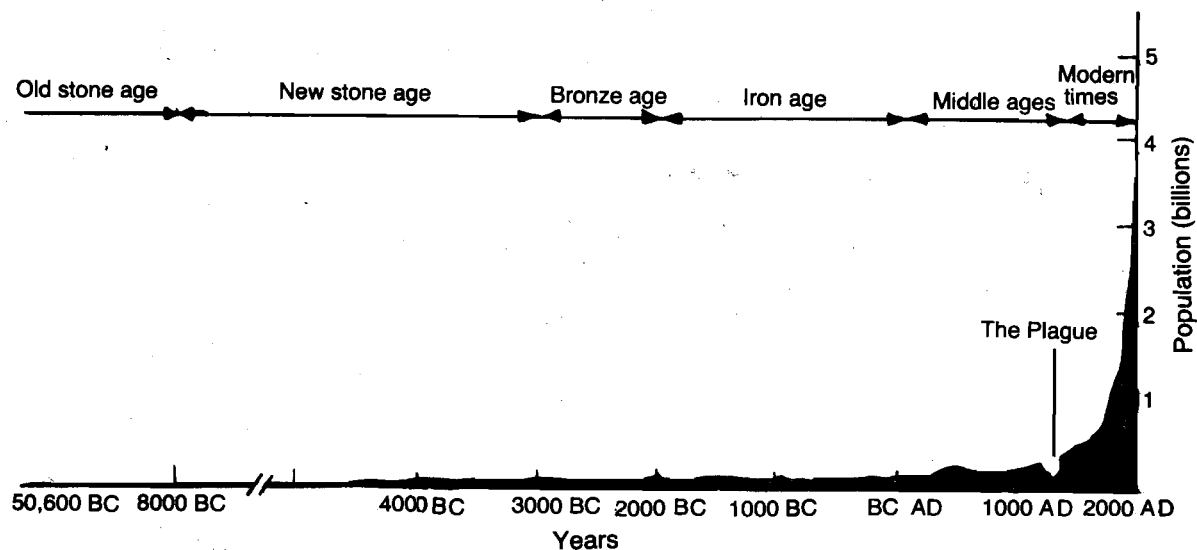


Fig. 5.2: Growth curve showing world population. Note the rapid increase in population in the last 2000 years.

### 5.6.1 Historical Overview

Let us see what are the factors leading to: (a) the slow growth of human population for tens of thousands of years, and (b) its sudden increase in recent times.

Throughout most of human history, the population remained small, so that births and deaths were roughly equal. Many died due to disease, famine and war. It is estimated that man in the Stone Age had an average life expectancy of only 17 years, while ancient Romans and Egyptians attained 30 years on the average. (In contrast, the average life expectancy in many countries of the world today is over 70 years.) Many died as a result of large-scale epidemics which swept across continents from time to time. For example, in 14th century Europe, it is estimated that a quarter of the population died from bubonic plague. Other killer diseases were cholera, yellow fever, typhus, malaria and small-pox.

Wars are also responsible for killing large numbers of people, including civilians. For example, the Second World War is estimated to have cost nearly 100 million lives, and the recent Afghan war about a million lives. Wars create famine and cause disease.

Despite the above checks on the growth of human population, remarkable changes were being brought about by man himself, particularly in the past few centuries, which favoured the growth of human population. From the time when man began to fashion tools, to use energy other than his own muscle power, to make machines, to grow crops and protect them, his productivity has increased enormously. He has been able to increase his food and shelter resources beyond imagination, and to subdue all other living organisms of this earth. Advances in sanitation and modern medicine, particularly from the 17th century onward have practically wiped out the major killer diseases — at least in the more developed countries. One has only to think of the role of immunisations and antibiotics like penicillin in preserving life. As a result, life expectancy in most countries has risen remarkably, and death rates have dropped sharply. These advances in modern times have more than outweighed the natural checks and are to a great extent responsible for the population explosion, especially in the less developed countries.

#### SAQ 4

Give reasons for the shape of the graph of human population as shown in Figure 5.2.

### 5.6.2 Exponential Growth

\*Whenever something increases in such a way that the increase is a fixed proportion of its own size at any time, its growth is said to be 'exponential'. For example, the number of children born in a population will normally increase proportionally with the number of

people, or size of the population. Thus population is said to grow exponentially. As the size becomes bigger, the increase also becomes larger. So the actual increase will depend on two factors: 1) what is the rate of increase in proportion to its size e.g., is it growing at 1% or 20% or 50% of its size? and 2) what is its own size at the time.

Let us look at some typical exponential curves (Fig. 5.3), in which a hypothetical population of 1000 people is shown growing over many years, at the three different rates of %, 2% and 3%.

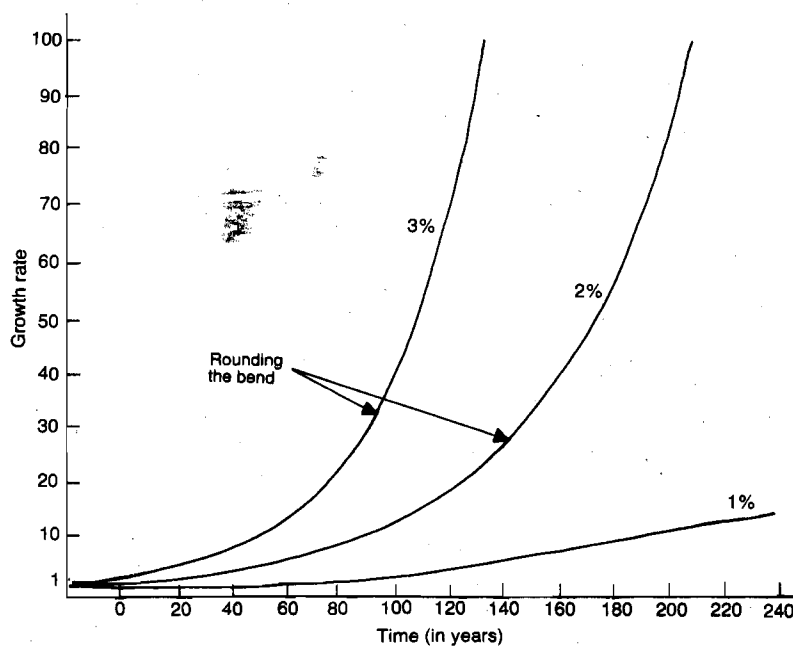


Fig. 5.3: Exponential curves.

All three curves grow slowly at first, because the initial size is small, but start to increase rapidly, shown by the upward bend. You can see that the curve growing at the largest rate (3%) has 'rounded the bend' before the others; in fact, the curve growing at 1% has still not rounded the bend in the figure. Now, if we know the growth rate in per cent per year, we can easily calculate the time in years for doubling of the amount by the formula.

$$\text{Time in years required for doubling of the amount} = \frac{70}{\text{Growth rate (in per cent)}}$$

At this stage, we will merely point out that it is not only population which grows exponentially, with it, the demands for resources such as water, food, housing, energy, fertilizers, minerals, etc., also grow exponentially. So do the wastes, organic and inorganic, released into the air, soil and water, with consequent pollution of the biosphere.

#### SAQ 5

Calculate the doubling times for quantities which grow exponentially at the rates of 1, 2 and 3 per cent per year.

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### 5.6.3 Variations among Nations

So far, we have considered the overall population growth in the world. However, population growth rates vary from nation to nation. On one hand, some nations show very high growth rates, above 3 per cent (doubling time about 23 years); on the other, some are not growing at all, and a few even have declining populations. It is important to know under what conditions this occurs and how.

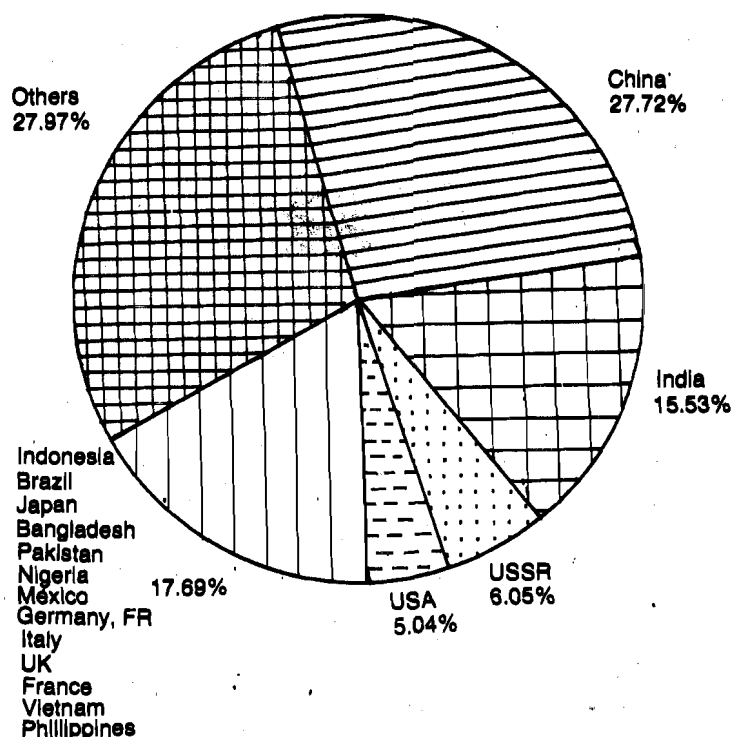


Fig. 5.4: Distribution of the world's population.

Figure 5.4 gives a diagrammatic representation of the world's population distribution. In the diagram you see that about 75 per cent of the world's population is in the developing countries of Asia, Africa and Latin America, where the growth rate is around 2.5 per cent as compared to 1 per cent in the developed countries. These differences are important in terms of the population added per year. Currently, 65 million people are being added every year to the world's population; 54 million in the developing countries as compared to 11 million in the developed countries. India's contribution alone amounts to 15 million every year. Table 5.2 shows the population of India since 1901.

Table 5.2: Population of India (1901-1981)

Census year	Total population (in millions)	Annual average exponential growth (per cent)
1901	238.4	—
1911	252.1	0.56
1921	251.3	(-) 0.03
1931	279.0	1.04
1941	318.7	1.33
1951	361.1	1.25
1961	439.2	1.96
1971	548.2	2.20
1981	685.2	2.25

Source : Govt. of India (1985). Health Statistics of India, Ministry of Health & Family Welfare, New Delhi.

If we trace the population growth of the developed nations of Europe and North America, we find that (1) together with other nations, they share the long history of very slow growth over thousands of years, during which the birth and death rates must have been roughly equal; (2) in the 17th and 18th centuries their death rate decreased due to better sanitation and health care; and (3) within a few decades, their birth rates also began to decline, resulting in a decrease in the population growth rate. Such a decrease, first in the death rates, resulting in

increased growth rates, then in the birth rates, so that birth and death rates are once again roughly equal, results in very low or zero growth rates, and is called **demographic transition**.

On the other hand, the less developed countries, which were almost all colonies till the 20th century, did not begin to benefit from better health care and sanitation until after the Second World War. Since then, their death rates have declined sharply, but their birth rates have not decreased sufficiently, with a few exceptions. Therefore, their growth rates have increased to above 2%, in some cases 3%, with doubling times of 24-35 years.

Let us look at some of the characteristics of the two groups; the developing and the developed countries. The data in Table 5.3 is for the year 1985.

**Table 5.3: Characteristics of developed and developing countries**

Characteristic	Developing Countries	Developed Countries
Growth Rate	High (2.1%)	Low (0.6%)
Doubling Time	Low (33 years)	High (116 years)
Infant Mortality (0-1 years per 1000 live births,	High (50 - 100)	Low (5 - 25)
Life Expectancy in Years at Birth	Low (40 - 50)	High (69 - 75)
Daily Food Intake in Calories per Person	Low (1500 - 2700)	High (3100 - 3500)
Literacy	Low to moderate (25 - 75%)	High (above 95%)
Income in US\$	Low to moderate	High
Per Capita	(200 - 3000)	(3000 - 14000)
Energy Use Per Capita	Low	High
Industrialisation	Low	High
Population mainly	Rural (66%)	Urban (72%)
Standard of Living	Low	High

From the above table, it is clear that **demographic transition** in the developed countries has proceeded hand in hand with other developments, such as improved nutrition, health, education, higher income and industrialisation which have raised the socio-economic standard of these countries. Therefore, it is often argued that when such developments in the developing countries are brought about, they will spontaneously bring about a decline in birth rates, as they did in the developed countries. Therefore economic uplift would have first priority, and not population control. This has been a matter of debate. Early industrialisation of the developed countries was supported by exploitation of the resources and markets of other countries by colonisation and by meeting their energy needs from the large coal and oil deposits of Europe, North America and the Middle East. Furthermore, it took place at a time when their own populations and their needs were nowhere near as large as those of the developing countries today. Most of these conditions cannot be recreated for the less developed countries. Cheap raw materials, ready markets and abundant energy are no longer available; foreign debts and poor terms of trade overburden the economies of the developing countries, and the basic needs of their populations are so great that they already exceed their ability to provide them. Most of the developed countries took more than 200 years under favourable circumstances to achieve demographic transition. The developing countries cannot afford the time, in view of their rapidly growing populations.

### SAQ 6

State whether the following statements are true or false. Write either T or F in the boxes provided.

- i) The growth rate in developing countries is 1 per cent as compared to 2.5 per cent in developed countries. ☐
- ii) Population increase affects economic growth in developing countries, while it creates social problems, such as congestion and pollution in developed countries. ☐
- iii) Currently 54 million people are being added every year to the world's population. ☐
- iv) Demographic transition is achieved when birth rate equals death rate and growth rate of the population becomes zero. ☐

## 5.7 CHARACTERISTICS OF POPULATION GROWTH INCLUDING GROWTH PROJECTIONS

Populations are characterised, not only by their size and growth rates, but also by their age structure and sex composition, by their birth, death and fertility rates, by their distribution within the country, and by migration within and across their boundaries.

A number of other characteristics such as life expectancy and infant mortality rates are often quoted to indicate the health of populations, while income and literacy, the consumption of food, energy and other resources, etc., are important indicators of the standard of living of populations. From the point of view of the human environment, the wastes released into the biosphere are also very important.

Population projections are necessary, if we want to know where we are going with the existing size and structure of population, and at the present rates of growth. We would not wish to be overtaken by disasters of our own making. Many species on earth have become extinct for one reason or another in the past, and their remains are only found in their fossil forms. As human beings, we would wish to remain in control of our destiny. Projections will be considered in detail in Section 5.8. Here we will show how inferences about the current and future implications can be made from the age and sex composition as shown in histograms.

### 5.7.1 Histograms

A population histogram (see Fig. 5.5) is a bar graph, drawn for a particular year, in which each horizontal bar represents a particular age-group of the population. The length of the bar on the left tells us the number of percentage of males (of the total population) in this age-group, and the same is shown for females on the right. A histogram can tell us a number of things such as:

- 1) the **age structure** of the population, i.e., the percentage of the population in significant age groups, such as those who are dependent on others for support, or those who can do productive work;
- 2) the **sex composition**, i.e., the number (or percentage) of males and females in each age group, from which we can also tell the number of females in the reproductive ages 15-44;
- 3) the impact of **growth and changes** in the population over several decades in the recent past; and
- 4) the **likely growth** of the population in the next few decades, at the current growth rates.

You can see that a histogram can be extremely useful for all kinds of planners who have to provide resources and facilities in the future.

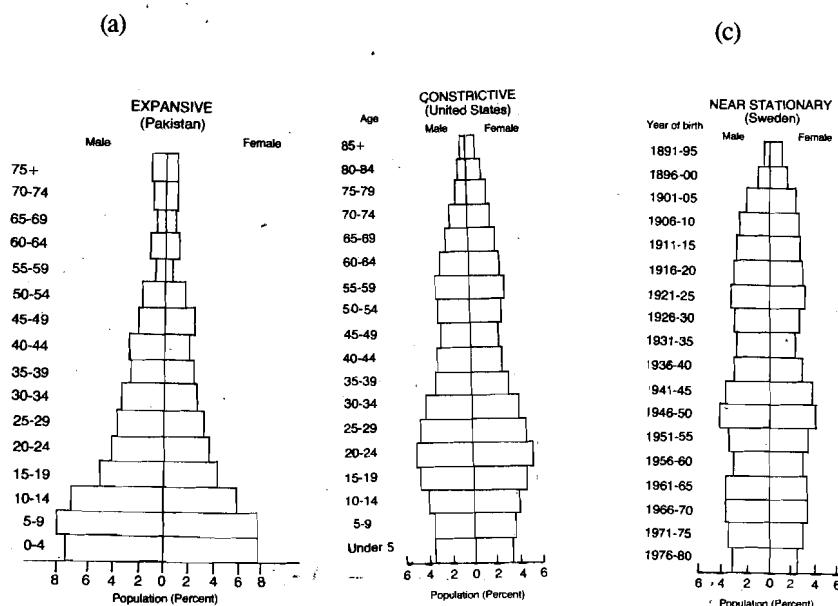


Fig. 5.5: Histograms.

Let us look at the three histograms shown in Figure 5.5. The first one, Figure 5.5(a) represents the population of Pakistan in age-groups of 5 years, as shown by the census in March 1981. This histogram is shaped like a pyramid with a very broad base. What does this mean? It means that every 5 years, more children are being added to the population than in the previous 5 years, and that this has been going on since many years. Thus the base is constantly expanding, and the increased numbers in the lower age-groups are being passed on to the upper age-groups. In this way, the population increases. Also, as the increased number of children come into their reproductive years they give birth to even more children, and so the population grows rapidly. This kind of histogram, with an expanding base, is called an **expansive histogram**. It is typical for the developing countries, whose populations are growing very rapidly.

The second type of histogram (Fig. 5.5(b)) is the **constrictive histogram**, as given for the USA in 1980. You can see that the base has become smaller (constricted) since 1956-65, i.e., there are fewer children being born in each 5-year group than before this time. However, this does not mean that the population in the United States is not growing. You will notice that on the whole the lower bars of the histogram are broader than the upper bars, because they represent more people. As these numbers are passed on to the upper age-groups, the whole population grows. In fact, it will keep on growing for at least another 50 years, almost to the top, even if the base remains somewhat constricted. Also you can see that there is a bulge (spreading) of the bars between the birth years 1950-65, during which period there was a 'baby boom', i.e., more babies were born. As this bulge passes through the reproductive years, they will produce more children than their parents, simply because they are more in number (from the baby boom). This means that an increase in the population size at any time is likely to keep the population growing for at least another 50 years even if each couple would only have enough children to replace themselves. Thus, even if China's 'One family, one child' policy starting 1979 succeeds, it would not be able to stabilise its population till after 2000 A.D.

The third type of histogram (Fig. 5.5(c)) is the **near stationary histogram**. An example is that of Sweden. You can see that the width of each bar is not very different till we come to the age groups (over 75 years) where death-rates are significant. This means that for many years the average family size has just been sufficient to replace itself. Such a population is not growing at all, hence the name 'stationary'.

### SAQ 7

Which of the histograms Fig. 5.5(a), (b), (c) represents: (a) a slow growing population, (b) a very rapidly growing population, (c) steady population. Give reasons.

### 5.7.2 Age Structure of Population

We know that at each interval of time new members are added in a population and previous members disappear by death. As a result of this, natural populations are a complex of individuals representing all age groups. It, therefore, becomes necessary for us to consider the age distribution of population while studying its composition.

The population may be divided into three age groups with reference to their reproductive potential: pre-reproductive, reproductive and post-reproductive. The first group comprises the juvenile and the third the senior members. The reproductive capacity of a population is dependent on the size of the first group. Usually a rapid growing population will contain a large proportion of young individuals, a stationary population contains a more even distribution of age groups, and a declining population contains a larger proportion of old individuals.

The proportion of the young (0-14 years) to the rest of the population is also important. In the developing countries where many children are born, this group is growing larger and larger, and may be as great as 45% of the total population of some countries. Such populations are termed **young populations**. Besides their high age-dependency ratio, these populations must cope with excessive demands for new schools and teachers, maternity and children's clinics, (health costs for children and old people are much higher than for the rest of the population) and severe competition for jobs. The developed countries, on the other hand, have **old populations** in which there is a high proportion of those above 65 years of age. They, too, face high health and care costs for the aged, whereas competition for jobs is less.

The **reproductive age-group** (15-44) for females is an important factor in population growth. One of the ways to slow down growth is to try to raise the lower limit for first marriages. For example, the current average age for the first marriage in China is 22 for females instead of 17 a few decades ago.

#### SAQ 8

Some statements indicating the age structure are given. Fill up the blank spaces in the statements using appropriate words.

- i) The age structure of a population reflects trend in ..... rate and has a bearing on the ..... of the country.
- ii) ..... of various age groups in a population determines the ..... status of the population.
- iii) A convenient way to picture age of distribution in a population is to arrange the data in the form of a ..... or age .....
- iv) A population tends to develop a ..... age distribution which may be ..... by temporary changes in the environment.

### 5.7.3 Natality, Mortality and Migration

**Natality rates** are those related to births. **Mortality rates** are those related to deaths.

**Migration rates** are those related to movements of populations into a country (immigration), out of a country (emigration), or simply inside a country from one place to another (internal migration). All these are important for the study of populations and their growth. Let us look at the meanings of some of these terms.

**Natality** is an expression of the production of new individuals in the population. In human population it is equivalent to birth rate, and is usually expressed as the number of births per year per thousand persons in the population. As such, it is quite distinct from population growth rate as it may be zero or positive but never negative. The maximum number of individuals that can be theoretically produced per individual under ideal environmental

conditions is called **potential** or **physiological natality**. It is constant for a given population. The natality may be expressed as **specific natality** that refers to population increase under specific conditions. It is not constant for a given population. The natality rate of the population is expressed by

$$B = \frac{Nn}{t}$$

Where B = birth or natality rate, Nn = number of new borns, and t = time.

The specific natality over a period of time is expressed by

$$b = \frac{Nn}{N \Delta t}$$

where b = natality rate per unit of time per individual in the population,  $\Delta t$  = change in time or number of individuals.

**Mortality** refers to death of individuals. In a population, members die due to various causes, such as malnutrition, disease and old age. Mortality is expressed as:

$$d = \frac{D}{t}$$

Where d = mortality or death rate, D = total number of deaths, and t = time.

**Migration** is the movement of people to new homes either within the boundaries of a country (internal migration) or across the boundaries to another country (international migration). It is clear that only international migration can affect the growth of population within a country. In some countries it is large enough to have a significant effect on the growth rate. For example, legal and illegal immigrants into the USA number more than 1 million a year, which is about two-thirds of the total annual growth of that country. In times of war or hardship, too, large numbers may migrate. Millions of Jews left Europe as a result of the Second World War, and large number of Arabs were displaced from Palestine. More than 3 million Afghanis have migrated into Pakistan in the 1980's as a result of the Afghan war. In order to take migration into account in calculating population growth, we must therefore, add the **net immigration** (which is negative if emigration is greater than immigration) to the population increase by births.

**Internal migration**, too, is of concern to demographers. The less developed countries are witnessing large-scale migration by the rural population into the cities due to pressure on the land. This kind of migration can cause great strain on the urban facilities such as water, housing, sanitation, etc.

#### SAQ 9

More than one answer is given for a question, point out the correct one(s) in the box provided:

- i) By the word natality we mean
  - a) net increases in the population [ ]
  - b) net decrease in the population [ ]
  - c) production of new individuals in the population [ ]
  - d) no change in the population [ ]
- ii) Migration refers to
  - a) one-way outward movement [ ]
  - b) one-way inward movement [ ]
  - c) periodic departure and return [ ]
  - d) death of individuals [ ]
- iii) Migration often takes place
  - a) under favourable conditions in the original area [ ]



- b) under unfavourable conditions in the original area [ . ]
- c) under ideal conditions in the original area [ ]
- d) under most favourable conditions in the original area [ ] [ ]

## 5.8 FUTURE OF HUMAN POPULATIONS

With world population having crossed 5 billion in 1985, and still growing at the rate of 1.7% annually, more than 65 million people are being added every year. Three quarters of the world's population lives in the less developed countries, with more than half the world's population in Asia alone. While the populations of the developed countries are growing at the relatively slower rate of 0.6%, the less developed countries are growing 3-4 times faster, with Asia and Africa taking the lead. Figure 5.6 gives a comparison between the populations of the world, the Asian region and Europe in the 20th century. Some questions arise: Can the planet Earth support the teeming billions being added? Can populations continue to grow indefinitely and what would be the consequences of that growth? If not, how would the limitations occur? What is the shape of things to come?

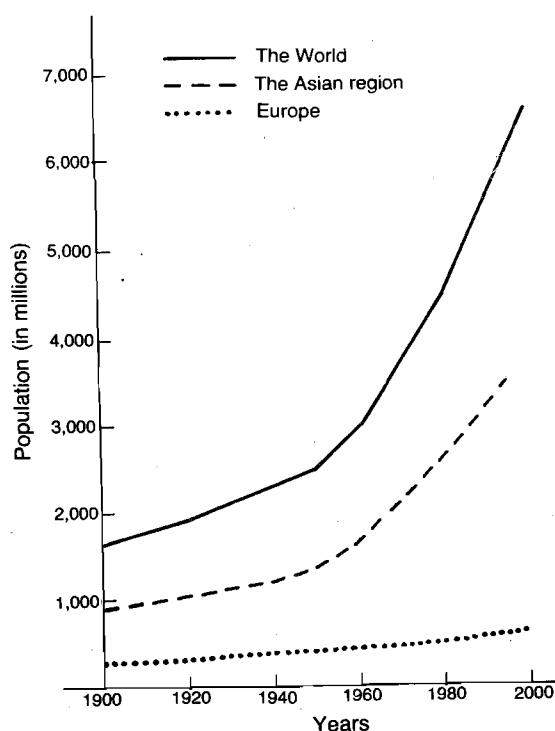


Fig. 5.6: Population of the World, the Asian region and Europe 1900-2000.

First of all, we note that increasing populations have increasing demands. To provide the people of India, Sri Lanka and Pakistan with just the same standard of living that is available today, we would have to double each and every facility in these countries within their doubling period of 33 years. Every road, house, bridge, park, school, teacher, doctor, nurse, each ton of food and kilowatt of energy, also every job opportunity must be doubled in this time, or the standard of living will fall. Even the richest country of the world would probably not be able to achieve this, what to say of the developing countries. And what about their hopes for a better tomorrow — the chance to break away from abject poverty, slums, illiteracy, malnutrition and disease? With all available resources engaged in providing the barest minimum for survival, they would hardly find the resources for industrialisation and economic growth. Also, as we have already mentioned, the essential resources for industrialisation have been largely exhausted. In the past few decades, the economic gap between the developed and the developing countries has been widening year after year. In 1960, the difference in the per capita income between them was only \$ 1240; in 1980 it was \$ 5700, and in the year 2000 it is expected to be \$ 8000. As the developing countries lag further behind, their economic dependence on the developed countries increases.

Secondly, where will all the new people go? The average density of population in India and Sri Lanka is already above 250 per square kilometer, with their urban populations growing

from about one-seventh of the total population in 1950 to about one-third in 1990. Apart from pollution, over-crowding creates mental, physical and social stress often leading to drug and alcohol abuse, increased violence and crime. An increasingly frustrated 'young population' is particularly under pressure.

Third, more people mean more pollution of the environment. The entire ecosystem is under stress. Not only are air, soil and water polluted, as you will learn in later units, but all other living beings, plants and animals, are affected. The price of unchecked population growth, with human beings covering every nook of the earth, is the near elimination of nature, with all its wealth and variety, produced and finely balanced over millions of years of evolution. In this context, it must be remarked that it is not just the number of human beings, but also the scale of their industries which is responsible for the pollution of the biosphere. The developed countries are the major polluters of the biosphere, and also the main consumers of the world's resources.

What then, is the shape of things to come?

It is clear from the foregoing that the present growth of population cannot go unchecked for long. The only question is whether the checks will be voluntarily made by nations, or whether they will wait for disasters to overtake them. Probably a mixture of both. Most developing nations of the world, with a few exceptions, have adopted policies of family planning. Some, like China and Singapore, have had signal successes. India and Sri Lanka have reduced their birth rates, but have a long way to go. Pakistan still maintains one of the highest birth rates in the region. With time running short, it seems that some countries will make a smooth demographic transition, some will not.

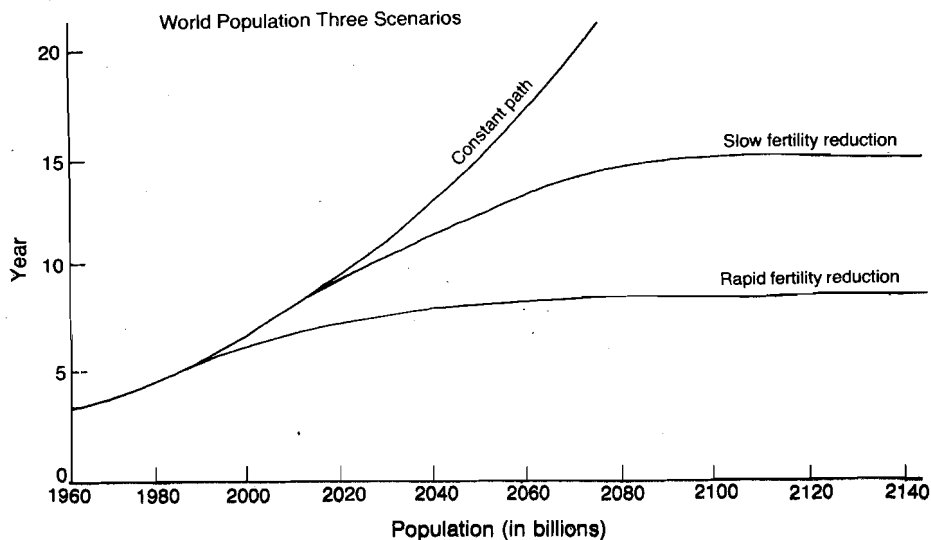


Fig. 5.7: Three scenarios for the future of world population.

Let us look at three possible scenarios for world population, as shown in Figure 5.7. The topmost curve (constant path) shows what world population will be like if the present rate of growth continues. It would result in a world population of 1 trillion (1,000,000,000,000) around the year 2300. It seems that disasters, like famine, disease and war would surely prevent this size of population. The middle curve is much more likely. It represents world population if birth rates are reduced slowly. The growth rate would decrease slowly, and world population would become stable at about 15 billion—three times of its present size. Such a population would still pose very serious problems. The third scenario is the most desirable, because it is the only one which can offer substantial economic uplift, of the populations of the Third World, but requires the greatest effort by nations, in order to achieve a rapid decrease in growth rates. Even so, world population would reach 8 billion by the time it is stabilised in 2030.

The above scenarios have been projected without taking into account any checks on population growth. Other demographers challenge them on this basis. They think that we have already damaged the biosphere to an extent that any further growth, as shown in each of these scenarios, would lead to so much damage that population size would be reduced as in Figure 5.8(a). Other demographers believe that the damage done to the environment may be so severe that the human population may be wiped out (population crash) completely or partially as shown in Figure 5.8(b).

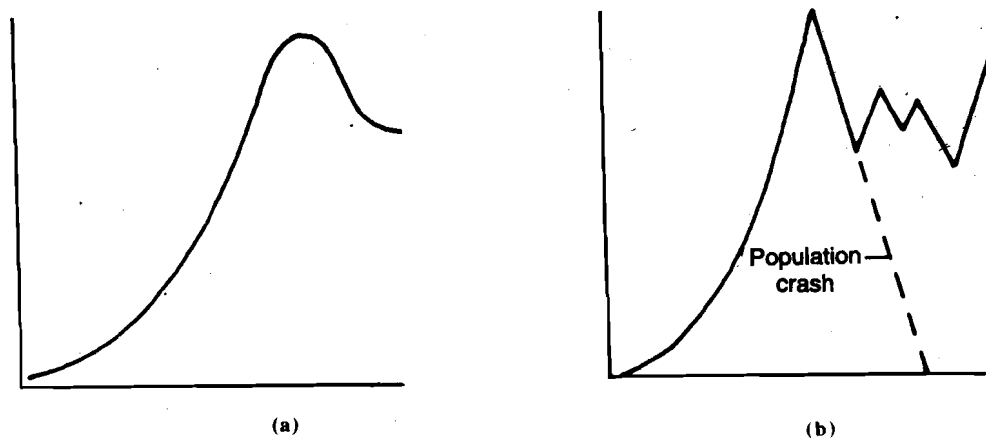


Fig. 5.8: Prediction for world population growth.

Whatever the merits of each scenario, it is certain that the future will be what we make it, by our decisions today.

#### SAQ 10

Which of the scenarios given above do you think is the most likely one for your country? Give reasons.

.....

.....

.....

.....

## 5.9 SUMMARY

In this unit you have studied that:

- There is complex interrelationship between cultural environment and physical environment of man. In spite of the wide variations found in different cultures of the world they all share some universal features, these are social institutions.
- Language reflects the cultural environment of people, and also moulds it to some extent.
- Through the processes of socialization, human beings learn and internalise the behavioural patterns and norms essential for their adaptation to their environment. An understanding of human action, therefore, requires an understanding of their physical as well as social environment.
- As the human society changed from hunting-gathering to agriculture and industrialisation, the population started growing.
- World population growth is exponential with increasing growth rates. However, nations vary greatly in their growth rates. In general, the developed nations have low growth rates of 0.6 or less. This is because after industrialisation — the lowered death rates were followed by declining birth rates, leading eventually to low growth rates, a process called demographic transition. The developing nations have growth rates above 2% and lack the resources for rapid industrialisation. Population grows showing a J-shaped growth pattern.
- Population histograms are helpful in showing the recent history of a population, as well as its short term growth trends. We distinguish three types of histogram: expansive, constrictive and stationary

- Human populations have certain specific characteristics such as density, natality, mortality, age structure, biotic potential, dispersal or migration and growth rate.
- The future of human population with the current trends is bleak, due to rapid depletion of resources, overcrowding, and destruction of the ecosystem. The future lies in slowing down growth rapidly enough to ensure a smooth demographic transition in the developing countries, failing which, large-scale disasters may occur.

## 5.10 TERMINAL QUESTIONS

- 1) State whether true or false by placing T or F in parenthesis.
  - a) Culture of a society is determined purely by its physical environment [   ]
  - b) Only modern complex societies possess laws which govern them. [   ]
  - c) Language adapts to important changes in the culture, of which it is a part. [   ]
  - d) Even without language human beings can create a culture. [   ]
- 2) List the functions of language.  
.....  
.....  
.....  
.....
- 3) Which of the following statements describe the real reason for the increase in human population? Tick the correct choices.
  - a) Increase in population is the result of certain changes in biology of man.
  - b) People have tendency to multiply.
  - c) Increase in population is the result of a steady decline in the mortality rate.
  - d) Increase in population is the result of increase in birth rate.
- 4) In the space provided below, give short answers in about three or four lines, to the following question:
  - a) What characteristics determine the size, composition and distribution of the population ?  
.....  
.....  
.....  
.....
  - b) Give two ways in which world population growth is different today from that of 500 years ago.  
.....  
.....  
.....  
.....
  - c) Define demographic transition. Discuss how demographic transition may be achieved by developing countries.  
.....  
.....  
.....

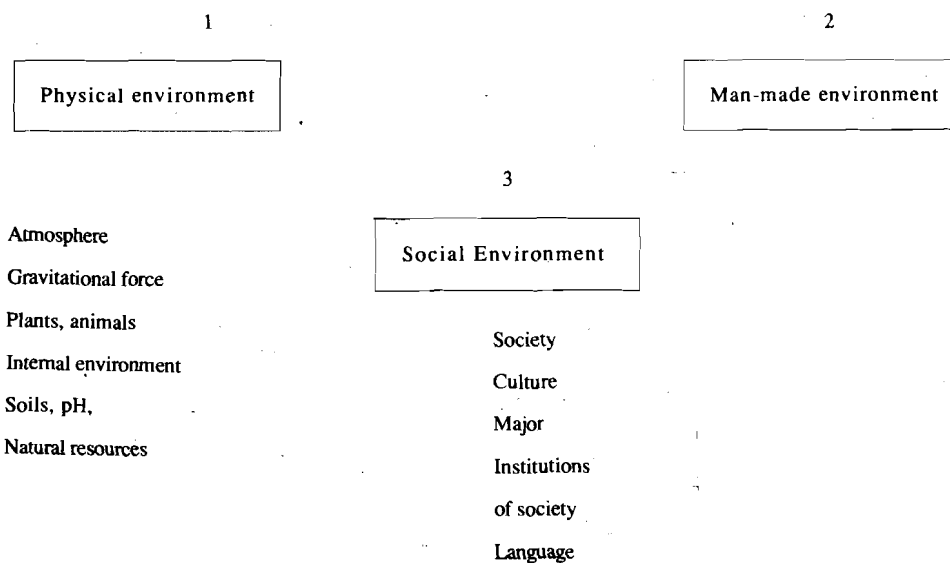
## 5.11 ANSWERS

### Self Assessment Questions

- 1) i) F ii) F iii) T iv) T
- 2) i) most important ii) becoming  
iii) directly effect iv) can  
v) cannot vi) delimits  
vii) greatly affected

3)

#### Human Beings



- 4) The long, slow growth till about 1600 was due to high death rates from famine, disease and war. Rapid growth since then is due to increased productivity, sanitation and health care, which led to declining death rates.
- 5) 70, 35 and 23.3 years
- 6) i) F ii) T iii) F iv) T.
- 7) Figure 5.6(b) for USA, because the lower half of the histogram is, on the whole, somewhat broader than the upper half, so that when the lower-age-groups move upward, and as the bulge passes through the reproductive ages, the population will grow.  
(b) Figure 5.6(a) for Pakistan, because the base is continuously expanding, which means that more and more children are being born, who in turn will have more children in the reproductive ages. (c) Fig 5(c) for Sweden because all age-groups have approximately the same spread.
- 8) i) fertility, economy, ii) proportion, reproductive,  
iii) histogram, pyramid iv) stable, disrupted
- 9) i) c, ii) c, iii) c, iv) b
- 10) Your choice.

### Terminal Questions

- 1) a) F, b) T, c) T, d) F
- 2) i) Communication is possible only through language resulting in culture.  
ii) Norms and law are made to maintain social order using language

- iii) Range of information is increased.
  - iv) The things which are removed from time and space can be conveyed through language.
- 3) c) and d)
- 4) a) Density, natality, mortality, age structure biotic potential, dispersion, and growth form are the characteristics that determine the size, composition, and distribution of the population.
- b) Firstly, world population itself is much larger now as compared to 500 years ago (over 5 billion as compared to 1/2 billion). Secondly, it is growing much faster (1 billion in 10 years as compared to 1/2 billion in 350 years)
- c) When birth and death rates are equal resulting in zero growth rate. Such a decrease in population growth rate is known as demographic transition.
- Demographic transition in the developing countries may be achieved by economic uplift and control of population growth.

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## GLOSSARY

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**anthropologist** : expert in the study of mankind esp. of its origins, development, customs and beliefs.

**atmospheric inversion** : a weather condition in which lower layers of air are cooler than those at high altitudes. This cool air remains relatively stagnant causing a concentration of air pollutants and unhealthy conditions in congested urban areas.

**bioluminescence** : emission of light by living organism.

**briquettes** : small blocks of compressed coal dust used as fuel.

**desiccation** : removal of moisture.

**detrivores** : organisms that feed on freshly dead or partially decomposed remains of plants or animals.

**ectoparasite** : external parasites.

**equinox** : time or date at which sun crosses equator and day and night are equal

autumnal : about 22nd September

vernal or spring equinox : about 20th March.

**exponential growth** : an increase by a constant percentage of the whole during a specific time period.

**non-coking coal** : coal which does not leave any solid residue after burning.

**phytoplankton** : free floating mostly microscopic aquatic plants.

**primary productivity** : the rate at which organic matter is produced during photosynthesis.

**sigmoid curve** : S-shaped curve characterised by an initially slow rate of increase, followed by a rapid growth, and then by a second stage of slow, near zero rate of increase.

**solstice** : either time summer or winter when the sun is farthest from equator.

**topography** : description of the features of a place or district, esp. the position of its rivers, mountains, roads etc.

**zooplankton** : weakly swimming, mostly microscopic aquatic animals found near the water surface.

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## FURTHER READING

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*Environment — Nursery of Life*, By Anjali Mookerjee, Publication Division, Ministry of Information and Broadcasting. Govt. of India. 1985.

*The State of India's Environment*, The first citizen's report, Centre for Science and Environment

*The State of India's Environment*, 1984-85, The second citizen's report, Centre for Science and Environment.