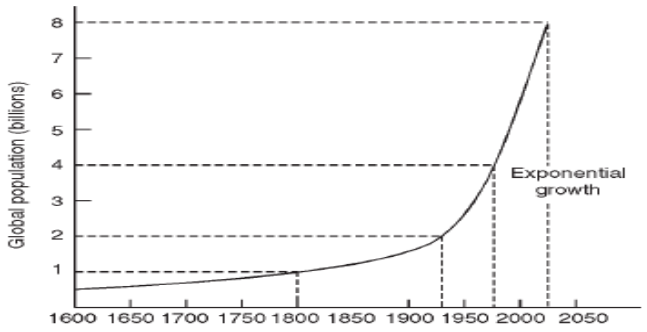
UNIT–5 : HUMAN POPULATION AND THE ENVIRONMENT

❖ POPULATION GROWTH

Population:

Group of individuals belonging to same species which live in a given area at given time.

- In 1800, the earth was home to about 1 billion people.
- It took about 39,000 years of human history to reach 1 billion, 130 years to reach the second billion, 45 years to reach 4 billion and the next doubling is likely within a span of a few decades.
- We have already crossed 6 billion and may reach 11 billion by 2045 as per the World Bank estimates growth. The dramatic way in which global human population grew thereafter is shown in Figure



Global population growth trends in the last four centuries.

Reasons of this trend of human population growth:

During the Stone Age, population was quite stable. Environmental conditions were hostile and humans had not yet developed adequate artificial means for adaptations to these stresses.

Droughts and outbreak of diseases used to be quite common leading to mass deaths. 14th century A.D. experienced large scale mortality due to bubonic plague when about 50% of people in Asia and Europe died due to the disease.

With scientific and technological advancement, life expectancy of humans improved. People started living in definite settlements leading a more stable life with better sanitation, food and medical facilities. Victory over famine-related deaths and infant mortality became instrumental for a rapid increase in population size.

Effects:

The rapid increase of human population is putting an incredible strain on our environment. While developed countries continue to pollute the environment and deplete its resources, developing countries are under increasing pressure to compete economically and their industrial advancements are damaging as well.

The demands that this growth places on our global environment are threatening the future of sustainable life on earth. As the world's population grows, improving living standards without destroying the environment is a global challenge.

Many basic resources that are strained by our current population are given below:

1. **Water Scarcity:**

It is the lack of sufficient available water resources to meet the demands of water usage (water for consumption, agriculture and sanitation) within a region.

Aquifers are being depleted faster than they can be replenished. Melting glaciers threaten the water supply for billions. More than 1.2 billion people lack access to clean drinking water.

The supply of freshwater is finite, but demand is soaring as population grows and uses per capita rises. Depending on future rates of population growth, between 2.6 billion and 3.1 billion people may be living in either water-scarce or water-stressed conditions by 2025.

2. **Food supply:**

In 64 of 105 developing countries studied by the UN Food and Agriculture Organization, the population has been growing faster than food supplies.

Population pressures have degraded some 2 billion hectares of arable land, one billion people, one out of every seven people alive, go to bed hungry. Every day 25,000 people die of malnutrition and hunger related diseases.

Almost 18,000 of them are children under 5 years old. The number of people living in countries where cultivated land is critically scarce is projected to increase to between 600 million and 986 million in 2025.

Food production and distribution could catch up if our population stopped growing and dropped to a sustainable level.

3. Coastlines and oceans:

Half of all coastal ecosystems are pressured by high population densities and urban development. A tide of pollution is rising in the world's seas. Ocean fisheries are being overexploited, and fishery is down.

Most of the world's ocean fisheries are already being fished to their maximum capacities and are in decline**.**

4. **Forests**:

Over 1.8 billion people live in 36 countries with less than 0.1 hectare of forested land per capita, an indicator of critically low levels of forest cover.

Based on the medium population projection and current deforestation trends, by 2025 the number of people living in forest-scarce countries could nearly double to 3 billion.

Nearly half of the world's original forest cover has been lost, and each year another 16 million hectares are cut, bulldozed, or burned.

Forests provide over US$400 billion to the world economy annually and are vital to maintaining healthy ecosystems. Yet, current demand for forest products may exceed the limit of sustainable consumption by 25%.

5. Global Warming:

The earth's surface is warming due to greenhouse gas emissions, largely from burning fossil fuels. If the global temperature rises as projected, sea levels would rise by several meters, causing widespread flooding. Global warming also could cause droughts and disrupt agriculture.

In 1998, global data are available for both population and heat-trapping carbon dioxide emissions, per capita emissions of CO_2 continued the upward trend that dominated the middle 1990s. When combined with growing world population, these increased per capita emissions accelerated the accumulation of greenhouse gases in the global atmosphere and, thus, future global warming.

6. **Species Extinction:**

More than 1.1 billion people live in areas that conservationists consider the richest in non-human species and the most threatened by human activities. While these areas comprise about 12 percent of the planet's land surface, they hold nearly 20 percent of its human population.

The population in these biodiversity hotspots is growing at a collective rate of 1.8 percent annually, compared to the world's population's annual growth rate of 1.3 percent.

Human population growth is the number one threat to the world's environment. Each person requires energy, space and resources to survive, which results in environmental losses. If the human population were maintained at sustainable levels, it would be possible to balance these environmental losses with renewable resources and regeneration. But our population is rapidly rising beyond the earth's ability to regenerate and sustain us with a reasonable quality of life. We are exceeding the carrying capacity of our planet. We need to limit our growth voluntarily, and promote contraceptive use, before Nature controls our population for us with famines, drought and plagues.

Population characteristics:

1. Exponential growth:

When a quantity increases by a constant amount per unit time e.g. 1, 3, 5, 7 etc. it is called **linear growth.** And when it increases by a fixed percentage it is known as exponential growth e.g. 10, 102, 103, 104, or 2, 4, 8, 16, 32 etc.

2. Doubling time:

The time needed for a population to double its size at a constant annual rate is known as doubling time. It is calculated as follow-

$$Td = 70/r$$

Td = Doubling time in years
r = annual growth rate

3. Total Fertility rates (TFR) :

The average number of children that would be born to a woman in her lifetime if the age specific birth rates remain constant. The value of TFR varies from 1.9 in developed nations to 4.7 in developing nations.

4. Infant mortality rate (IMR) :

It is the percentage of infants died out of those born in a year. Although this rate has declined in the last 50 years, but the pattern differs widely in developed and developing countries.

5. Replacement level:

This is an important concept in population dynamics or demography. Two parents bearing two children will be replaced by their offspring. But, due to infant mortality this replacement level is usually changed.

For developing nations, where infant mortality is high and life expectancy is low, the replacement level is approx 2.7, whereas in developed nations it is 2.1.

6. Age Structure:

Based upon people belonging to different age classes like pre-reproductive (0-14 years), reproductive (15-44 years) and post reproductive (45 years and above) Age structure of population of a nation can be represented by age pyramids,

a. Pyramid shaped:

The very young population is more, making a broad base and old people are less. This indicates growing population such as India, Bangladesh, Ethiopia, and Nigeria.

The large number of individuals in very young age will soon enter into reproductive age, thus causing an increase in population, whereas less number of people in old age indicates less loss of population due to death.

b. Bell shaped:

In Countries like France, USA and Canada where birth rates have in the past one or two decades declined resulting in people of almost equal number in age group 0-35 years.

So in the next 10 years, the people entering into reproductive age group is not going to change much and such age-pyramids indicate stable populations.

c. Urn shaped:

In Countries like Germany, Italy, Hungary, Sweden and Japan number of individuals in very young class is smaller than the middle reproductive age class.

In the next 10 years the number in reproductive age class will thus become less than before resulting in a decline of population growth.

The TFR, age structure, infant mortality and replacement level are all important parameters determining population growth. But population will not stop growing even when all couples have only 2 children.

7. Zero population growth (ZPG):

When birth plus immigration in a population are just equal to deaths plus emigration, it is said to be zero population growth.

8. Male-Female ratio:

The ratio of boys and girls should be fairly balanced in a society to flourish. However, due to female infanticides and gender-based abortions, the ratio has been upset in many countries including India.

In China, the ratio of boys to girls became 140:100 in many regions which led to scarcity of brides.

9. Life expectancy:

It is the average age that a newborn infant is expected to attain in a given country. The average life expectancy, over the globe, has risen from 40 to 65.5 years over the past century.

In India, life expectancy of males and females was only 22.6 years and 23.3 years, respectively in 1900. In the last 100 years improved medical facilities and technological advancement has increased the life expectancy to 60.3 years and 60.5 years, respectively for the Indian males and females.

10. Demographic transition:

Population growth is usually related to economic development. There occurs a typical fall in death rates and birth rates due to improved living conditions leading to low population growth, a phenomenon called demographic transition. It is associated with urbanization and growth and occurs in four phases:

i. **Pre industrial phase** - high growth and death rates and net population growth is low.

ii. **Transitional phase** - advent of industrialization providing better hygiene and medical facilities and adequate food, thereby reducing deaths.

Birth rates, however, remain high and the population shows 2.5-3% growth rate.

iii. **Industrial phase** - fall in birth rates thereby lowering growth rate.
iv. **Post industrial phase** - zero population growth is achieved.

Demographic transition is already observed in most developing nations. As a result of demographic transition the developed nations are now growing at a rate of about 0.5% with a doubling time of 118 years.

However more than 90% of the global population is concentrated in developing nations which have a growth rate a little more than 2%, and a doubling time of less than 35 years.

❖ POPULATION EXPLOSION

Between 1950-1990, i.e., within 40 years the population crossed 5 billion. In the year 2000, the world population was 6.3 billion and it is predicted to grow four times in the next 100 years. Such unprecedented growth of human population at an alarming rate is referred to as population explosion.

The population clock:

Every second, on an average 4-5 child are born and 2 people die, thus resulting in net gain of nearly 2.5 people every second. This means that every hour we are growing by about 9000 and everyday by about 2, 14,000.

The Indian Scenario:

a. For the developing countries like India, population explosion is a curse and is damaging to the development of the country and its society. The developing countries already facing a lack in their resources, and with the rapidly increasing population, the resources available per person are reduced further, leading to increased poverty, malnutrition, and other large population-related problems.

b. India is the second most populous country of the world with 1.27 billion people. Currently, there are about 51 births in India in a minute. India represents almost 17.31% of the world's population, which means one out of six people on this planet live in India.

c. Although, China leads in population for decades, India is all set to take the number one position by 2030. With the population growth rate at 1.58%, India is predicted to have more than 1.53 billion people by the end of 2030.

Causes:

1. Decline in the Death Rate:

Until recently, birth rates and death rates were about the same, keeping the population stable. The success in reducing death rates was attributable to several factors like

1. increase in food production and distribution
2. improvement in public health (water and sanitation)
3. medical technology (vaccines and antibiotics)
4. awareness education and standards of living

The fall in death rates that is decline in mortality rate is one fundamental causes of overpopulation. This has resulted in an increase in the life expectancy of individuals. Mortality rate has declined leading to an increase in population. Thus the overall death rate has gone down same time as brought with it, the curse of overpopulation.

2. Rise in the Birth Rate:

With the new discoveries in nutritional science, we are able to bring in increase in the fertility rates of human beings.

Medicines of today can boost the reproductive rate in human beings.

There are medicines and treatments, which can help in conception. Thus, science has led to an increase in birth rate.

3. Migration:

The inhabitants of various countries migrate to a particular part of the world and settle over there, the area is bound to suffer from the ill effects of overpopulation.

If the rates of emigration from a certain nation do not match the rates of immigration to that country, overpopulation makes its way.

Crowding of immigrants in certain parts of the world, results in an imbalance in the density of population.

4. Lack of Education:

Illiteracy is another important cause of overpopulation. Those lacking education fail to understand the need to prevent excessive growth of population. They are unable to understand the harmful effects that overpopulation has.

They are unaware of the ways to control population. Lack of family planning is commonly seen in the illiterate lot of the world. This is one of the major factors leading to overpopulation.

Consequences:

Population grows fastest in the world's poorest countries. Overpopulation and poverty have long been associated with increased death and disease.

The world's current and projected population growth calls for an increase in efforts to meet the needs for food, water, health care, technology and education.

In the poorest countries, massive efforts are needed to keep social and economic conditions from deteriorating further; any real advances in well-being and the quality of life are negated by further population growth.

Many countries lack adequate supplies of basic materials needed to support their current population. Not every nation is capable of providing its people with the adequate amount of resources.

The ever-increasing population will eventually leave no nation capable of providing its people with the resources they need to thrive. When the environment fails to accommodate the living beings that inhabit it, overpopulation becomes a disaster.

Measures:

Alarmed by its swelling population, India started taking measures to stem the growth rate quite early. India launched the National Family Planning program in 1952 and became the first country in the world to have a population policy.

The family planning program yielded some noticeable results, bringing down significantly the country's fertility rate. In 1965-2009 the contraceptive usage more than tripled and the fertility rate more than halved.

The efforts did produce positive results, however, failed to achieve the ultimate goal and the population of India since getting independence from Britain in 1947 increased almost three times.

Whereas India has missed almost all its targets to bring the rate of population growth under control, China's 'One Child Policy' in 1978, has brought tremendous results for the latter. The policy claims to have prevented between 250 and 300 million births from 1978 to 2000 and 400 million births from 1979 to 2010.

Problem with implementing measures:

Population explosion is causing severe resource depletion and environmental degradation. Our resources like land, water, fossil fuels, minerals etc. are limited and due to over exploitation these resources are getting exhausted.

Even many of the renewable resources like forests, grasslands etc. are under tremendous pressure. Industrial and economic growth are raising our quality of life but adding toxic pollutants into the air, water and soil. As a result, the ecological life-support systems are getting jeopardized.

The two very important views on population growth are-

1. Malthusian Theory:

According to Malthus, human populations tend to grow at an exponential or compound rate whereas food production increases very slowly or remains stable. Therefore, starvation, poverty, disease, crime and misery are invariably associated with population explosion.

He believes positive checks. like famines, disease outbreak and violence as well as preventive checks like birth control need to stabilize population growth.

2. Marxian Theory:

According to Karl Marx, population growth is a symptom rather than the cause of poverty, resource depletion, pollution and other social ills.

He believed that social exploitation and oppression of the less privileged people leads to poverty, overcrowding, unemployment, environmental degradation that in turn, causes over population.

❖ FAMILY WELFARE PROGRAMS

It was implemented by the government of india as a voluntary programme. It is an integral part of overall national policy of growth covering human health, family welfare child care and womens rights.

Family planning:

Family planning allows couples to decide their family size and also the time spacing of their offspring. Almost every culture in the past used to practice some traditional fertility control methods through some traditions, taboos and folk medicine.

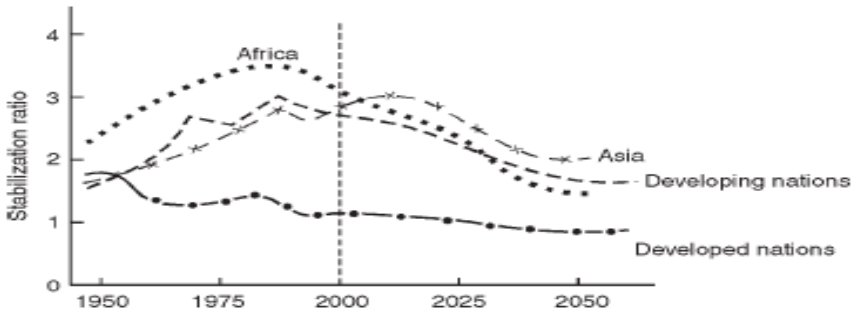
Modern science has provided several birth control techniques including mechanical barriers, surgical methods, chemical pills and physical barriers to implantation. More than a hundred contraceptive methods are on trial.

The United Nations Family Planning Agency provides funds to 135 countries. Many of these countries include abortion as a part of the population control programme which very often encourages female infanticide thereby disturbing the optimal male and female ratio in a society.

The birth control programmes have often faced strong opposition from religious groups. Nonetheless, World Health Organization (WHO) estimates that today about 50 percent of the worlds married couples adopt some family planning measures as compared to just 10% about 30 years back. Still some 300 million couples do not have access to family planning.

India started the family planning programme in 1951 with the objective of "reducing the birthrate to the extent necessary to stabilize the population at a level consistent with the requirements of national economy."

Evolution:



Stabilization ratio of developing & developed nations, Africa and Asia. A ratio of 1 achieved in developed nations around 2000 indicates zero population growth in developed nations while Africa is presently having the highest ratio.

The United Nations projections about population stabilization of developed and developing nations and that of Asia are shown in above Figure.

The ratio is derived by dividing crude birth rate by crude death rate. As evident, developed nations have already achieved a stabilization ratio of 1 around the year 2000, which is more or less stabilized indicating zero population growth.

Developing nations including Asia, on the other hand, is yet having a high stabilization ratio nearing 3, which is however, on a decline and is expected to lower down substantially by 025.

Stabilization in developing nations is possible only through various family welfare programmes.

❖ ENVIRONMENT AND HUMAN HEALTH

A physically fit person not suffering from any disease is called a healthy person. According to World Health Organization (WHO) health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Human health is influenced by many factors like nutritional, biological, chemical or psychological. These factors may cause harmful changes in the body's conditions called disease.

Infectious organisms:

Disease causing organisms pose greater environmental threats to health, more severely in the developing countries especially the tropical ones.

High temperature and moisture along with malnutrition help many diseases to spread in these countries. Microbes especially bacteria can cause food poisoning by producing toxins in the contaminated food.

Some moulds grow on food and produce poisonous toxins. Infectious organisms can also cause respiratory diseases (pneumonia, tuberculosis, influenza etc.) and gastrointestinal diseases (diarrhoea, dysentery, cholera etc.) There are various types of parasites that cause diseases like malaria, schistosomiasis, filariasis etc. Most of these infections take place when the environmental conditions are unclean and unhygienic.

Chemicals:

A large number of chemicals are introduced in the environment by anthropogenic activities. Industrial effluents containing various chemicals are of major concern. Chemicals can be divided into two categories i.e. hazardous and toxic chemicals. Hazardous are the dangerous chemicals like explosives, inflammable chemicals etc and toxic chemicals (toxins) are poisonous chemicals which kill cells and can cause death.

Many other chemicals can cause cancer (carcinogenic), affect genetic material (DNA) in cells (mutagenic) or cause abnormalities during embryonic growth and development (teratogenic), while there are others that affect nervous system (neurotoxins) and the reproductive system.

Some of the pesticides and other industrial pollutants may act as hormone analogs in humans and other species. These environmental hormones affect reproduction, development and cause various types of ailments including tumors.

Many chemicals like DDT and other chlorinated pesticides bio-accumulate in food-chain and show deleterious effects at the top of the food chain. Many chemical substances present in wastewaters like heavy metals (mercury, cadmium, lead etc.) fluoride and nitrate can affect human health.

Metals can contaminate food while cooking in various types of utensils including alloys like steel. Containers for canned food, especially which are acidic in nature, contaminate the food with lead. Lead also comes in water from the water-pipes where it is added for plumbing purposes.

Various alcoholic beverages contain lead while tobacco contains cadmium that goes in the body and affects human health. Various chemicals, gases and particulates laden with chemicals, spewed into the environment from various industries cause air pollution and affect human health.

Noise:

Although human ear is capable of tolerating a range of sound levels, yet if sound levels beyond the permissible level exist for certain duration, it becomes painful and sometimes irreparable damage occurs.

Radiations:

Radiations are known to cause short-term and long term changes in various organs. Cosmic rays and ultra-violet rays cause harmful effects on human health which may include cancer.

Diet:

Diet has a very important role in maintaining health. Malnutrition makes humans prone to other diseases. There is a strong correlation between cardiovascular diseases and the amount of salt and fat in one's diet. Food contamination can cause various ill effects. There had been cases of Dropsy in India, a disease which occurred due to contamination of mustard oil with the poisonous seeds of Argemone mexicana.

Settlement:

Proper environment, availability of basic necessities of life like, water, sanitation etc. are essential for healthy living. Improper settlement and poor physical environment may cause various psychological problems which affect various vital physiological processes in the body.

❖ HUMAN RIGHTS:

Human beings are born equal in dignity and rights. These are moral claims which are inalienable and inherent in all individuals by virtue of their humanity alone, irrespective of caste, colour, creed, and place of birth, sex, cultural difference or any other consideration.

These claims are articulated and formulated in what is today known as human rights. Human rights are sometimes referred to as fundamental rights, basic rights, inherent rights, natural rights and birth rights.

Definition:

The Universal Declaration of Human Rights (UDHR) 1948 defines human rights as "Rights derived from the inherent dignity of the human person." Human rights when they are guaranteed by a written constitution are known as "Fundamental Rights" because a written constitution is the fundamental law of the state.

Human rights are essential for the overall development of individuals. The Constitution of India makes provisions for basic rights also known as Fundamental Rights for its citizens as well as for aliens. A distinction is made between Specific Fundamental Rights and Unspecified Fundamental Rights.

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Draft Declaration of Human Rights and Environment:

The draft declaration describes the rights as well as duties that apply to individuals, governments, international organizations and transnational corporations.

The preamble envisages a deep concern regarding the consequences of environmental harm caused by poverty, debt programmes and international trade. Environmental damages are often irreversible.

Human rights violations may lead to further environmental degradation on a long-term basis and the environmental degradation, in turn would lead to further human rights violation.

The principles of the draft declaration are divided into five parts.

- **Part I:** It deals with human rights for an ecologically sound environment, sustainable development and peace for all. It also emphasizes the present generation's rights to fulfill its needs to lead a dignified and good quality life. But, at the same time it lays stress on the fact that it should be without impairing the rights of the future generations to meet their needs.
- **Part II:** It mainly deals with human rights related to an environment free from pollution and degradation. It also emphasizes the rights to enjoyment of natural ecosystems with their rich biodiversity. It defines right to own native land or home. No one can be evicted from one.s native place except in emergency or due to a compelling purpose benefitting the society as a whole which is not attainable by other means. All persons have the right to timely assistance in the event of any natural or technological disaster.
- **Part III:** It deals with right of every person to environmental information, education, awareness and also public participation in environmental decision making.
- **Part IV**: It deals with the duties to protect and preserve the environment and prevent environmental harm. It includes all remedies for environmental degradation and measures to be taken for sustainable resource use. It emphasizes that states shall avoid using environment as a means of war and shall respect international law for protection of environment.
- **Part V:** This lays stress on social justice and equity with respect to use of natural resources and sustainable development. Till now, however, it has not been defined in practical terms the threshold, below which level of environmental quality must fall before a breach of individual human right will said to have occurred or above which the level of environmental quality must rise. Right to development has to be linked to .right to safe and clean environment Which has to be considered not only at the level of individual but at community, national and global level.

❖ VALUE EDUCATION:

Education:

It is one of the most important tools in bringing about socioeconomic and cultural progress of a country. However, the objective should not merely be imparting coaching to the students that they get through the examinations with good results and get some good job.

Education does not simply mean acquiring a lot of information but also its righteousness and use within the framework of a spectrum of ethical values.

Current scenario:

The rapid strides of scientific and technological advancements have no doubt, brought revolutionary changes in our everyday life and information technology has shrunk the whole world into a global village with access to very information sitting in one corner over the internet.

But, in this frenzy for development and mad race for progress perhaps man has become too materialistic, self-centered and over ambitious and the desired ideals of a real good life have been pushed to the background.

Objective of value education:

1. It has a very significant role in providing proper direction to inculcate a positive attitude and to teach the distinction between right and wrong.
2. It teaches one to be compassionate, helpful, peace loving, generous and tolerant so that they can move towards a more harmonious, peaceful, enjoyable and sustainable future.
3. It helps in arriving at value-based judgments in life based on practical understanding of various natural principles rather than acquiring certain prejudices.
4. It encompasses human values, social values, professional values, religious values, national values, aesthetic values and environmental values.
5. It increases awareness about our national history, our cultural heritage, national pride, constitutional rights and duties, national integration, community development and environment.

Different phases:

Phases include value awareness, value orientation, value appraisal, value selection, value commitment and value action. The basic aim is to create and develop awareness about the values, their significance and role.

After knowing them mindset of students would get oriented towards those values and they will try to critically analyze the same and then select the values which really appeal to him.

Value-based Environmental Education:

Following the Supreme Court directives (in M.C. Mehta's Union of India, 1988) environmental education has been included in the curriculum right from the school stage to college/university level. The prime objective of it is to make everyone environment literate.

Environmental education can be made value based by,

1. Preparing text-books and resource materials about environmental education that play an important role in building positive attitudes about environment. The basic human value is man in nature rather than nature for man needs to be infused through the same.
2. Including Social values like love, compassion, tolerance and justice which are the basic teachings of most of our religions into environmental education. These are the values to be nurtured so that all forms of life and the biodiversity on this earth are protected.
3. Cultural and religious values enshrined in Vedas emphasize that man should not exploit nature without nurturing her. Our cultural customs and rituals in many ways teach us to perform such functions as would protect and nurture nature and respect every aspect of nature, treating them as sacred, are it rivers, earth, mountains or forests.
4. Encompassing the Environmental education with the ethical values of earth-centric rather than human-centric world-view. The educational system should promote the earth-citizenship thinking. Instead of considering human being as supreme we have to think of the welfare of the earth.
5. Global values stress upon the concept that the human civilization is a part of the planet as a whole and similarly nature and various natural phenomena over the earth are interconnected and inter-linked with special bonds of harmony. Disturbing this harmony anywhere will be an ecological imbalance leading to catastrophic results.
6. Spiritual values highlight the principles of self-restraint, self discipline, contentment, reduction of wants, freedom from greed and austerity. All these values promote conservationism and transform our consumerist approach.

Value-based environmental education can bring in a total transformation of our mindset, our attitudes and our lifestyles. The above mentioned human values will go a long way in attaining the goals of sustainable development and environmental conservation. The value elements in environmental education alone can succeed in achieving the real goals of environmental literacy.

❖ HIV/AIDS

Dr.Robert Gallo at National Institute of Health, USA and Luc Montagnier at Pasteur Institute, Paris isolated the virus, HIV which causes AIDS.

HIV stands for **H**-Human: This particular virus can only infect human beings. **I**-Immunodeficiency: HIV weakens your immune system by destroying important cells that fight disease and infection. **V**-Virus: A virus can only reproduce itself by taking over a cell in the body of its host.

AIDS stands for **A**-Acquired: AIDS is not something you inherit from your parents. You acquire AIDS after birth. **I**-Immuno: our body's immune system includes all the organs and cells that work to fight off infection or disease. **D**-Deficiency: one get AIDS when your immune system is deficient. **S**-Syndrome: A syndrome is a collection of symptoms and signs of disease.

The terms "HIV" refers to the virus itself and "AIDS" refers to the late stage of HIV infection.

Function of HIV inside human body:

HIV is like other viruses that cause the flu or the common cold. But an important difference over time is that our immune system can clear most viruses out of our body. That is not the same in case of HIV, the human immune system can't seem to get rid of it i.e., once you have HIV, you have it for life.

HIV can hide for long periods of time in the cells of your body and that it attacks a key part of immune system. White Blood Cells are responsible in the formation of antibodies are called T-helper cells.

Our body has to have these cells to fight infections and disease, but HIV invades them, uses them to make more copies of it, and then destroys them. Over time, HIV can destroy so many of your CD4 cells that your body can't fight infections and diseases anymore.

When that happens, HIV infection can lead to AIDS, the final infection. No safe and effective cure currently exists, but scientists are working hard to find one. But with proper medical care, HIV can be controlled.

Treatment for HIV is often called antiretroviral therapy or ART. This can dramatically prolong the lives of many people infected with HIV and lower their chance of infecting others.

Origin:

Though sufficient knowledge about the disease has been gained, yet a definite source of this virus could not be identified. But it is believed that it is transferred to humans from African monkey, through contaminated polio vaccine prepared from monkey's kidney, Through Hepatitis-B viral vaccine, Through small pox vaccine programme of Africa.

Transmission:

1. It is transmitted through certain body fluids from an HIV-infected person-Blood, Semen, Rectal fluids, Vaginal fluids, Breast milk. These body fluids when come into contact with a mucous membrane or damaged tissue or when directly injected into bloodstream (by a needle or syringe) the transmission is possible.
2. Having unprotected sex with someone who has HIV.
3. Sharing needles, syringes, rinse water, or other equipment used to prepare injection drugs with someone who is infected with HIV.
4. Being born to an infected mother. (HIV can be passed from mother to child during pregnancy, birth, or breastfeeding).
5. Receiving blood transfusions, blood products, or organ/tissue transplants that are contaminated with HIV.
6. Contact between broken skin, wounds, or mucous membranes and HIV-infected blood or blood-contaminated body fluids.

HIV is NOT spread by:

- Air or water
- Insects, including mosquitoes or ticks
- Saliva, tears, or sweat
- Casual contact, like shaking hands, hugging or sharing dishes/drinking glasses

Symptoms:

1. Early Stage of HIV

Within 2-4 weeks after HIV infection, many people experience flu-like symptoms often described as the 'worst flu ever'.

This is called "acute retroviral syndrome" (ARS) or "primary HIV infection," and it is the body's natural response to the HIV infection.

Symptoms include Fever, Swollen glands, Sore throat, Rash, Fatigue, Headache, Muscle and joint aches.

2. The Clinical Latency Stage

Latency means a period where a virus is living or developing in a person without producing symptoms. During the clinical latency stage, people who are infected with HIV experience no HIV-related symptoms, or only mild ones. This stage is sometimes called "asymptomatic HIV infection" or "chronic HIV infection."

During the clinical latency stage, the HIV virus reproduces at very low levels, although it is still active. If one take antiretroviral therapy (ART), they may live with clinical latency for several decades because treatment helps keep the virus in check.

It is important to remember that people in this symptom-free period are still able to transmit HIV to others even if they are on ART, although ART greatly reduces the risk of transmission.

3. Progression to AIDS

If one have HIV and you are not taking HIV medication (antiretroviral therapy), eventually the HIV virus will weaken your body's immune system. The onset of symptoms signals the transition from the clinical latency stage to AIDS.

During this late stage of HIV infection, people infected with HIV may have the following symptoms:

- Rapid weight loss
- Recurring fever or profuse night sweats
- Extreme and unexplained tiredness
- Prolonged swelling of the lymph glands in the armpits, groin, or neck
- Diarrhea that lasts for more than a week
- Sores of the mouth, anus, or genitals
- Pneumonia
- Red, brown, pink, or purplish blotches on or under the skin or inside the mouth, nose, or eyelids
- Memory loss, depression, and other neurologic disorders.

Many of the severe symptoms and illnesses of HIV disease come from the opportunistic infections that occur because your body's immune system has been damaged.

Diagnosis:

1. ELISA test (Enzyme Linked Immuno Sorbent Assay) is a sensitive preliminary blood test used to detect HIV antibodies.
2. Western Blot is the confirmatory test, which is highly specific and based on specific antibodies to viral core proteins

Control and Management:

- Education to people about protected sexual behavior and practices, the do's and don'ts in AIDS contraction and bringing more awareness among the public.
- Protected sexual behavior.
- Screening of blood and blood products before blood transfusion.
- Usage of disposable syringes in the hospitals.
- Not sharing the razors / blades in the saloon.
- Avoid tattooing using common needle.
- Making the antiretroviral drugs such as AZTs (Azidothymidine/Zidovudin) and saquinovir available to patients.

❖ WOMEN WELFARE

Women and children are usually the soft targets, who suffer in a number of ways mainly because they are weaker, helpless and economically dependent. The main aim is to improve the status of women by providing oppurtunities in education, employment and economic independence.

Need:

Women usually suffer gender discrimination and devaluation at home, at workplace, in matrimony, in inheritance, in public life and power, particularly in developing countries. The gender violence, victimization and harassment take many forms across culture, race or nation.

The exceptionally high number of cases of abduction, dowry deaths, rape, domestic violence, criminal offences and mental torture to women is something that needs immediate attention and reforms in the interest of the women.

Women are often the worst victims of communal enmities. The human rights of women are violated too often in a male dominated patriarchal society. Thus, there is an urgent need for policy reforms and more stringent legislation as well as educational and legal awareness amongst women for checking the atrocities and injustice towards her.

There is a full-fledged Ministry for Women and Child development whose sole aim is to work for the welfare and upliftment of women encompassing family planning, health care, education and awareness.

Environmental degradation:

Women are also the victims of capitalism, development and environment. The exploitative nature of capitalist development not only affects the natural environment but the traditional, social, cultural and family life of women.

After losing the forests and getting rehabilitated from their native places, men folk usually migrate to towns in search of some job while the women are left behind to look after the family and household with little resources.

Development projects like mining very often play havoc with the life of women. Men can still work in the mines or migrate to towns after getting compensation from the government. The National Network for Women and Mining (NNWM) with about 20 groups in different mining states of India is rightly fighting for a .gender audit of India's mining companies.

The displaced women are the worst affected as they do not get any compensation and are totally dependent upon the males for wages. The displaced women driven out from their land-based work are forced to take up marginalized work which is highly un-organised and often socially humiliating. Issues related to their dignity and honour has not yet received any attention.

The NNWM is now working for rights of women over natural resources, resettlement and compensation issues. Besides the government initiatives there are now a number of nongovernment organizations mostly as Mahila Mandals.

To create awareness amongst women of remote villages even to empower them, train them, educate them and help them to become economically self-dependent On an international level, the United Nations Decade for Women (1975-85) witnessed inclusion of several women welfare related issues on international agenda.

The CEDAW (International Convention on the Elimination of all forms of Discrimination Against Women, 1979) has been a landmark outcome of the decade to be accepted as an international standard for the protection and promotion of women's human rights and socio-economic upliftment. It is, however, most important for all women in the mainstream, tribal's, refugees and the down-trodden to be educated about these issues.

National commission for women:

It has been created by government of India and its objectives are

- To examine constitutional and legal rights for women
- To review existing legislations
- To sensitize the enforcement and administrative machinery to women's causes.

❖ CHILD WELFARE

Children are considered to be the assets of a society. They nearly occupy 40% of total population. But the statistical figures tell us that about a million babies, out of 21 million born every year in India are abandoned soon after their birth due to different socio-economic reasons.

Around 20 million children in our country are estimated to be working as child labours, some of them in various hazardous industries like the match industry, firework industry, brassware industry and pottery industry.

Child labours:

Poverty is the main reason to drive these children into long hours of work in miserable, unhealthy conditions and yet they do not get the minimum nutritive food, what to talk of educational and recreational facilities, which are their childhood rights.

Various organizations towards child welfare:

The UN General Assembly in 1959 adopted the Declaration of the Rights of a child. After the UN convention on Rights of Child, it became International Law in the year 1990, consisting of 54 articles and a set of international standards and measures to promote and protect the well being of children in a society.

The law defines right of the child to survival, protection, development and participation.

-The right to survival emphasizes on adequately good standards of living, good nutrition and health.

-The right to protection means freedom from exploitation, abuse, inhuman treatment and neglect. -

-The right to development ensures access to education, early childhood care and support, social security and right to leisure and recreation.

-The right to participation means freedom of thought, conscience and religion and appropriate information to the child.

The World Summit on Children, held on September 30, 1990 had a focused agenda for the well being of the children targeted to be achieved in the beginning of the new millennium.

India is also a signatory to the World Declaration on Survival, protection and development of children.

A national plan of action for children has been formulated by the Ministry of Human Resource Development (MHRD), Government of India in which a strategic plan has been formulated for children's welfare in the priority areas of health, education, nutrition, clean and safe drinking water, sanitation and environment.

Universalisation of effective access to at least primary level schooling, special emphasis on girl child's education including health and nutrition, up gradation of home-based skills, mid-day meals scheme, expansion of early childhood development activities including low-cost family based involvements are some of the important actions envisaged.

Children are also the most affected due to environmental pollution. .They consume more water, food and air than adults, hence more susceptible to any environmental contamination.- says one of the scientific reports of Center for Science and Environment (CSE), New Delhi. It is high time to work together for a secure and cleaner environment so as to give our children a cleaner and safer world to live in.

❖ EIA

EIA is an evaluation procedure that helps planners and decision-makers to understand the environmental impacts of a proposed project or activity.

EIA is used according to two principal functions-

• As a planning tool to minimise adverse impacts caused by a development activity emphasis is on the methodologies and techniques for identifying, predicting and evaluating the environmental impacts of a proposed project or programme. Increasingly, EIA is also being viewed as a key mechanism for involving the public in the planning
process through stakeholder analysis.

• As a decision-making instrument to decide upon the acceptability of a project based on its environmental costs. It is designed to:

1. anticipate and prevent environmental problems
2. identify ways to increase environmental benefits
3. support informed decisions on project options and trade-offs
4. integrate environmental considerations into the planning, design and construction of projects at all scales

If used properly, EIA can help to achieve the following benefits:

• Avoiding mistakes that can be expensive and damaging in ecological, social and economic terms
• Avoiding conflicts and increasing project acceptance
• Integrating short-term needs with long-term goals
• Addressing transboundary issues
• Improving project design and reducing capital and operating costs
• Improving institutional co-ordination
• Considering alternative projects and designs
• Improving accountability and transparency in planning and decision-making.

It is a tool used for decision making regarding developmental projects and programmes and it may be defines as a formal process used to predict the environmental consequences of any developmental project. Thus it ensures that the potential problems are foreseen and addressed at an early stage in the project planning and design.

This is often carried out in order to produce an environmental statement/report. This statement must include-

- Description of the project
- Description of significant effects
- Mitigating measures
- A non technical summary

❖ ROLE OF IT IN HUMAN HEALTH AND ENVIRONMENT

Information technology has tremendous potential in the field of environmental education and health as in any other field like business, economics, politics or culture. Development of internet facilities, worldwide web, geographical information system (GIS) and information through satellites has generated a wealth of up-to-date information on various aspects of environment and health.

A number of soft-wares have been developed for environment and health studies which are user friendly and can help an early learner in knowing and understanding the subject.

a. **Database:**

Database is the collection of inter-related data on various subjects. It is usually in computerized form and can be retrieved whenever required. In the computer the information of database is arranged in a systematic manner that is easily manageable and can be very quickly retrieved.

Application includes

- **The Ministry of Environment and Forests**, Government of India has taken up the task of compiling a database on various biotic communities. The comprehensive database includes wildlife database, conservation database, forest cover database etc. Database is also available for diseases like HIV/AIDS, Malaria, Fluorosis, etc.
- **National Management Information System (NMIS)** of the Department of Science and Technology has compiled a database on Research and Development Projects along with information about research scientists and personnel involved.
- **Environmental Information System (ENVIS)** The Ministry of Environment and Forests, Government of India has created an Information System called Environmental Information System (ENVIS).

  Headquarters: Delhi, it functions in 25 different centers all over the country.

  The ENVIS centers work for generating a network of database in areas like pollution control, clean technologies, remote sensing, coastal ecology, biodiversity, western Ghats and eastern Ghats, environmental management, media related to environment, renewable energy, desertification, mangroves, wildlife, Himalayan ecology, mining, etc.
- **The National Institute of Occupational Health** provides computerized information on occupational health i.e. the health aspects of people working in various hazardous and nonhazardous industries, safety measures etc.

b. Remote sensing:

Remote sensing is the acquisition of information about an object or phenomenon without making physical contact with the object and thus in contrast to in situ observation.

In modern usage, the term generally refers to the use of aerial sensor technologies to detect and classify objects on Earth (surface, in the atmosphere and oceans) by means of propagated signals (electromagnetic radiation).

It may be split into active remote sensing or passive.

It is applied in following fields-

In agriculture: provide valuable information about land and water management.

In forestry: provide valuable information for sustainable forest management.

In land cover: spatial information on land use is required at different scale depending on usage.

In water resources: for surface water mapping, ground water targeting, wetland, flood monitoring runoff modeling…etc

Satellite imageries provide us actual information about various physical and biological resources and also to some extent about their state of degradation in a digital form through remote sensing. We are able to gather digital information on environmental aspects like water logging, desertification, deforestation, urban sprawl, river and canal network, mineral and energy reserves and so on.

c. Geographical Information System (GIS):

It has proved to be a very effective tool in environmental management.

GIS is a technique of superimposing various thematic maps using digital data on a large number of inter related or interdependent aspects.

Its applications include

1. Different thematic maps containing digital information on a number of aspects like water resources, industrial growth, human settlements, road network, soil type, forest land, crop land or grassland etc. are superimposed in a layered form in computer using softwares. Such information is very useful for future land-use planning.
2. Even interpretations of polluted zones, degraded lands or diseased cropland etc. can be made based on GIS. Planning for locating suitable areas for industrial growth is now being done using GIS by preparing Zoning Atlas.

3. GIS serves to check unplanned growth and related environmental problems.

d. Satellite data:

It helps in providing correct, reliable and verifiable information about forest cover, success of conservation efforts etc.

They also provide information of atmospheric phenomena like approach of monsoon, ozone layer depletion, inversion phenomena, smog etc. We are able to discover many new reserves of oil, minerals etc. with the help of information generated by remote sensing satellites.

e. World Wide Web:

A vast quantum of current data is available on World Wide Web.

Important on-line learning center:

1. www.mhhe.com/environmental science
2. Multimedia Digital Content Manager (DCM) in the form of CD-ROM

Provides the most current and relevant information on principles of environmental science, various problems, queries, applications and solutions.

The World Wide Web with resource material on every aspect, class-room activities, digital files of photos, power-point lecture presentations, animations, web-exercises and quiz has proved to be extremely useful both for the students and the teachers of environmental studies.

Features:

1. Student friendly features:

These include practice quiz, how-to study tips and hyperlinks on every chapter topics with detailed information, web exercises, case studies, environment maps, key-terms, career information, current articles, interactive encyclopedia and how to contact your elected officials.

2. Teacher-friendly features:

In addition to above it include supplement resource charts, additional case studies, answers to web exercises, solutions to critical thinking questions, editing facility to add or delete questions and create multiple versions of same test etc.

Thus remote sensing and GIS play a key role in resource mapping, environmental conservation, management, planning and environmental impact assessment. It also helps in identifying several disease infested areas which are prone to some vector-borne diseases like malaria, schistosomiasis etc. based upon mapping of such areas. There are several Distribution Information Centres (DICs) in our country that are linked with each other and with the central information network having access to international database.

Information technology is expanding rapidly with increasing applications and new avenues are being opened with effective role in education, management and planning in the field of environment and health.