UNIT-V
HUMAN POPULATION AND THE ENVIRONMENT

In this unit we can study the growth of human population and how they affect with the environment.

Population Growth:

In 1800, the human population is 1billion i.e., up to 39,000 years. By 1930 it is 2 billion and by 1975 it is 4 billion. Now it reached 6 billion and by 2045 it may reach 11 billion. If we observe, the growth within few decades the population is being doubled.

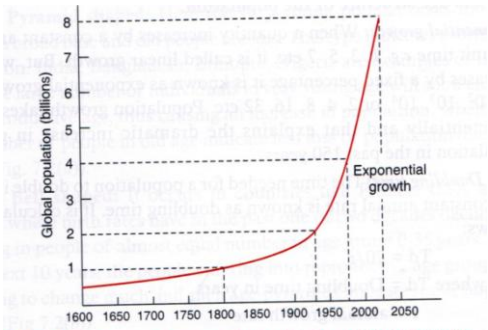


Fig. 7.1 Global population growth trends in the last four centuries.

Reasons for population growth:

During stone-age population was stable and environment conditions are also stable till artificial condition had entered. There are more no. of deaths due to diseases and drought conditions. In AD 14th century 50% of people died in Asia and Europe due to bubonic plague. But with improvement in technology human expectation's also increased i.e., they lead life with better sanitation, food and medical facilities. So due to this there is rapid increase in the population growth. In developing countries children are consider as economic assets and so it lead to rapid growth in population. 90-95% of population growth is seen in last 50 years with increase in 3-4% per year.

Population characteristics and variations among nations:

Exponential Growth:

When a quantity increases by constant amount then it is called linear growth. e.g: 1,3,5,7, etc. But when it increases with percentage i.e., 10, 10^2, 10^3, 10^4.....then it is known as exponential growth. Population growth takes place exponentially and drastic change occurred in last 150 years.

Doubling time:

The time need for the population to double at constant rate is known as doubling time. It is calculated as follows:

$T_d=70/r$

Where T_d = Doubling in time.

r = annual growth rate.

If a nation has 2% increase annually, then the population will be doubled in 35 years.

Total fertility rate (TFR):

It is defined as average number of children that would be born to a woman in her life time if the age specific birth rate remains constant. TFR varies from 1.9 to 4.7 in developing countries, but in 1950's it is 6.1 and however due to cultural changes and government policies it has come down.

Infant mortality rate:

It is a parameter which affects future population growth. It is percentage of infants died out of those born in a year. Any how this rate has declined in last 50 years.

Replacement level:

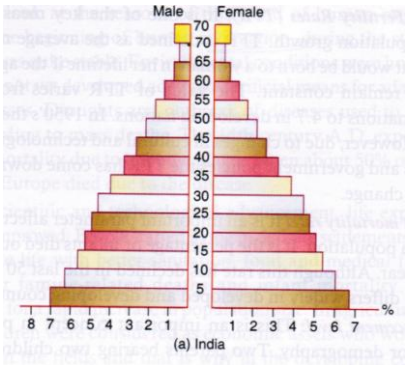
This is also an important concept in which two parents are replaced by two children. But this replacement may affect due to infant mortality rate. The replacement level in developing countries is 2.72 that of developed countries is 2.1.

Age structure:

Age factor can be represented in the form of pyramids based on different categories

Pre reproductive	- 0-14
Reproductive	- 15-44
Post reproductive	- 45 & above

Based on age groups three structures obtained.



a)Pyramid shaped:

This type of pyramid shaped is seen in India, Bangladesh, Ethiopia & Nigeria. Here very young age groups are high and old age groups are less due to death.

b) Bell shaped:

This shape is seen in countries like France, USA, Canada, where birth rates are declined due to which 0-35 age people are almost equal and such age pyramids are quite stable in population growth.

c) Urn-shaped:

This shape age pyramids are seen in countries like Germany, Italy, Hungary in which very young class is smaller than middle reproductive groups.

However population growth is affected by TFR, age structure, infant mortality, replacement level. Growth of the population occurs even when two parents have two children.

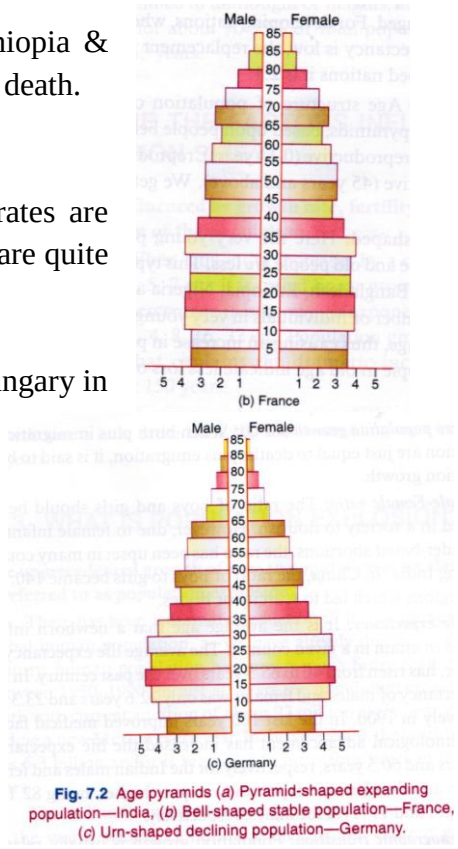


Fig. 7.2 Age pyramids (*a*) Pyramid-shaped expanding population—India, (*b*) Bell-shaped stable population—France, (*c*) Urn-shaped declining population—Germany.

1. Developing countries like Ethiopia show pyramid shaped age structure in which TFR is 6.9. Presently it has 57 million populations which may reach to 225 million by 2050 when TFR becomes 2.1.
2. In countries like Africa, Mali, Rwanda, Uganda, Zambia, Zimbabwe the growth is affected due to AIDS. In Zimbabwe ¼, Botswana 2/3rd are died due to AIDS before reaching 50.

Zero population growth:

When birth & death rate are equal, then it is said to be zero population growth.

Male-female ratio:

The ratio of boys & girls should be balanced in the society for health environment but due to abortions the female gender has drastically decreased in many countries. In china ratio of boys to girls is 140:100.

Life expectancy:

It an average age that a new born is expected to live in a given country. Earlier the life expectancy is 40 and now it has risen to 65.5. In 1900 the life expectancy of Indians are 22.6 Y & 23.3 Y for male & female respectively, but now it had increased to 60.3 & 60.5 Y respectively. These difference in the life expectancy is due to improved medical facilities and technological advancement but in countries like Japan and Sweden the life expectancy is quite higher i.e., 82.1-84.2 & 77-77.4 Y for male and female respectively.

Demographic transition:

Population growth and economic development are interrelated to each other. Due to improved living condition death rates are decreased and birth rates are controlled due to which population growth is lowered and this phenomenon is called demographic transition. It is associated with urbanisation and occurs in four stages:

a) Pre industrial phase:

It is characterised by high death rates and the net population growth is low.

b) Transitional phase:

Due to better hygienic & medical facilities, death rate is decreased and so the population growth shows 2-3% increase.

c) Industrial phase:

Due to fall in birth rates population growth is lowered.

d) Post industrial phase:

This is characterised by zero population growth.

Population explosion:

In the past 100 years, the population growth has drastic change from 1950 to 1990 (40 years) the population has crossed 5 billion and every year 92 million increase takes place. So every year New Mexico is

added (Mexico population-92 million) In the year 2000 the population is 6.3 billion and in the next hundred years they may increase by 4 times. This unpredicted growth of human population at an alarming rate is called population explosion.

The Indian scenario:

India is the second most populated country in the world with 1 billion and if it continues may reach upto 1.63 billion by 2050 & will become most populous country in the world surpassing china. So we are facing serious population explosion problem. We should realise ourselves that do we have resource, provision for housing, education, employment for drastic population growth. If we see the population statistics of our country, it had added another India after 35 years of independence. India has 1 billion of 6 billion world population which means every 6^{th} person is an Indian.

Every second 4.5 children are born & 2 people die due to which net gain of 2.5 person, resulting in growing 9000/hour & 2,14,000/day.

Due to population explosion there is severe depletion in the natural resources and also environment is subjected to degradation. The non-renewable sources like land, water, fossil fuels gets exhausted & even renewable sources will also be depleted. Qualities of life can be raised by industrialisation & economic growth but toxic pollutants are introduced into atmosphere. There discussion going on throughout the world that we should stabilize or even shrinks the population by decreasing the fertility rates (or) we should find the alternate for the resource.

On the population growth two important views (or) ideas are discussed.

i) Malthusian theory:

According to Malthus, human population growth is exponential but the food production rate is low and so it leads to starvation, poverty, diseases, crime, etc. He believes in positive checks & preventive checks to stabilise population growth. Positive checks - famines, diseases, outbreak and violence. Preventive checks - birth control.

ii) Marxian theory:

According to Karl Marx, population growth is a symptom rather than cause of poverty, resource depletion, pollution, etc. He believed that social exploitation & oppression of less privileged people leads to poverty, overcrowding, unemployment, environmental degradation, etc.

We have to compromise with two views as of all factors are interdependent & inter related to each other.

Family welfare programmes:

Population explosion is like a time bomb that could be exploded at any time, so in order to avoid that we must keep the population level below the carrying capacity. We cannot know how long we continue our exponential growth but the warning. Signals are given to control the population in terms of depletion of resources. A catastrophic doomsay model warns that earth cannot sustain more than two doublings i.e. 25 billion.

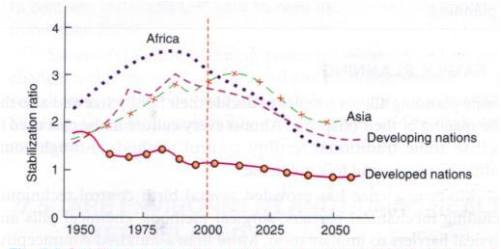


Fig. 7.3 Stabilization ratio of developing & developed nations, Africa and Asia. A ratio of 1 achieved in developed nations around 2000 indicates zero population growth in developed nations while Africa is presently having the highest ratio.

Stabilisation ratio:

This is the ratio of birth rate to death rate. In developed countries this 1 in the year 2000 & in developing nations it is around '3'. Stabilisation in developing countries is only possible through various family welfare programmes.

- Kerala is the only state in India with lowest birth rate. The factors that decides the model are age of marriage for woman at 21 (Indian average 18), female literacy is 53% (Indian average 13%), budges, provision for primary education 60% (Indian average 50%), better public distribution of food among 97% of population, better medical facilities in rural areas, great success of family planning programmes, etc.

Family planning:

Family planning includes restriction in number of children and the time gap between them. In earlier days also they used some tradition, taboos, folk medicine as a family planning activity.

Now modern science has provided with several birth control techniques like mechanical barrier, surgical methods, chemical pills & physical barrier to implantation. Still more hundred contraceptive methods are in trails.

In regarding family planning, the United Nations family planning agency provides funds to 135 countries. In so many countries abortion is a part of family planning in which female infant killing also takes place due to which male female ratio is affected. World health organisation (WHO) estimated that 50% of present married couples adopt some planning to restrict the family, which is far better by 10% about 30 years back.

The Indian scenario:

India had started family planning programme in 1952 when the population was nearly 40 crores. In 1970's government forced to do family planning. In 1978 government passed legally for minimum age for marriage for men & woman is 21 &18 (earlier 18 & 15 respectively) In 1981 census also there is no decrease in the population growth & since then funds for family planning programmes has been increased.

In 2000 state government has also adopted their own approach. In regarding this Kerala had been stabilised population growth and now comparable with USA & also proving that wealth is not related to zero population growth. In 2001 A.P. also achieved zero population growth with a different approaches (passing cash, better land, housing, subsidized loan, etc are provided in regarding family planning programmes) In contrast to this U.P. & Bihar showed 2.5% growth in population.

Successful family planning programme includes:

Education & economic status of women, social security, political stability, proper awareness, confidence building along with accessibility, effectiveness in birth control etc.

Environment and human health:

A physically fit person and who is free from diseases is called a healthy person. According to 'WHO' health is a "state of complete physical, mental & social well being & not complete absence of disease (or) infirmity". However human health is influenced by many factors like nutritional, biological, chemical (or) psychological, etc. The factors are:

Infectious organisms:

Micro-organisms which cause diseases, threatens human health especially in developing countries of tropical region due to moisture & high temperature in addition to malnutrition. Microbes contaminate the food & causes food poisoning.

Some micro organisms causes respiratory diseases like pneumonia, tuberculosis, influenza, etc & gastro intestinal diseases like diarrhoea, dysentery, cholera etc. Some parasites causes malaria, schistosomiasis, filariasis, etc. These are all due to unclean & unhygienic.

Chemicals:

As a result of human activities, many chemicals are introduced into the environment mostly in the form of effluents in industries. Chemicals can be divided into two categories. 1) Hazardous

2) Toxic

Explosives, inflammables, are hazardous & a chemical that kills cells & causes death is called toxic. Some chemicals are

1) Carcinogenic - causes cancer.
2) Mutagenic - causes mutations.
3) Teratogenic - affects embryo.
4) Neurotoxins - affects nervous system.

The pesticides & some industrial pollutants affect reproduction, development & may cause various tumours. Many chemicals like DDT, chlorinated pesticides accumulate in the food chain & affect the organism by biomagnifications. Sometimes heavy metals like Hg, Cd, Pb, etc. affect the human health. Food will be contaminated while cooking and also container of the food (eg :-steel, etc) various alcoholic beverages contain Pb, while tobacco contains Cd.

Noise:

Ear is capable of hearing (or) have tolerance up to certain levels of sound only if they go beyond permissible level then it affects & damages the ear. Sound is related to various physiological & psychological changes.

Radiations:

Radiations may cause short term (or) long term changes in various organs. Cosmic rays & UV rays affect human health which may cause cancer.

Diet:

In maintenance of human health diet plays an important role. Deficient in nutrition (mal nutrition) causes many diseases (attack will be easy). Salt & fat levels are important factors in cardiovascular diseases. Due to contamination of poisonous seeds of Argemore mexicana cases seen in India. Some chemicals are added to polish & process some food materials like pulses, oils etc.

Settlement:

People living environment without basic needs of life like water, sanitation, etc may cause various psychological and also physiological (process) problems.

Human rights:

The right that is given to human to enjoy this earth & its surroundings is called human rights. The foundation of human right was laid in 13^{th} century. Due to the liberal thoughts of philosophers, scientific dogmas, socio-economic restrains are resulted. For the state of all people happy, universal declaration of human rights (UNDHR) by UNO started on December 10, 1948. This declaration protects any individuals from injustice & human rights violation. UNDHR includes specific rights, civil, political & economical, social & cultural. It also gives right to live, liberty, security, fair trial by law, freedom of thought, expression, conscience, association, freedom of movement & also stresses on equal pay for equal work, trade union, health care, education, etc.

To say, the human rights are universal. But there is a wide gap between the developing & developed countries. The reason for the violation of human rights in developing countries is population & poverty, i.e, human right are valid until a life settles for the particular individuals.

Statistical data by WHO	*NO. OF PEOPLE*
Malnourished, no clean drinking water, health facilities, proper hygienic conditions	1 of 5
No fuel to cork	1 of 3
Struggle for existence	1 of 5
Death due to drinking contaminated water	40 million

Unemployment of poor thinks that financial assistance will given by the child for sustainability against child labour & universal education. For the developed countries social & economic rights are less important than the civil & political. But in developing countries this is reverse due to poverty, ignorance, illiteracy, malnutrition & diseases.

In June 1993, at Vienna world conference on human rights, social & economical rights are equalised to civil & political. If any country follows the human rights, developing assistance will be given so due to that human rights is considered to be an important factor. Due to poor human rights in India & other developing countries affected in this regards. (nearly 24 million dollars are slashed by USA in BURTAN BILL)

In India, human rights issues have centred around slavery, bonded labour, women subordination, custodial deaths, violation against women & minorities, child abuse, dowry deaths, man killings of daliths, torture, arbitrary detentions etc. In Indian constitution we have list of social, economic, civil, political rights but those are violated often. (Due to money factor). For over all development & peace, we have to respect the human rights of all people.

After the human rights were confined, another issue is emerged after the earth summit 1992, i.e., sustainable development regarding environment. Declaration of human rights & environment confines an healthy secure & ecological good environment for every human being. In relation to that equity, security, basic needs should be in justified way to all.

But there are in-equities between the developed & developing countries in the depletion of natural resources. The developed countries are enjoying only the fruits of natural resources and throwing the wastes to the developing countries by export. Due to the wastes, worker class & the poor are the victims to unsafe & unclean environment (air, water, etc.) On the way of unsustainable development the tribal people lose their habitat for projects & dams.

Draft declaration of human rights & environment:-

The draft declaration concern about rights & duties of individuals, governments, international organisations & national corporations.

The environment degradation is caused by poverty, debt programmes & international trade, once it is degraded it cannot be reversed. In addition to these violation to human rights further degraded.

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

Part-1:

It deals with human rights with sustainable development & peace for all. It also deals with needs to lead a dignified and good quality life. It concerns about the future generation needs also.

Part -2:

It deals with human rights related with free from degrading environment & pollution. It stresses on the enjoyment of eco system with rich biodiversity. It gives rights to own native land /home & need not to be vacated unless emergency (any beneficial programme of the society). Anyone in the earth can help the other in natural/technological disaster.

Part-3:

It deals with human rights related environmental information, education, awareness & public participation.

Part-4:

It deals with human rights related duties to protect & preserve environment. It includes remedies & measures for environmental degradation & sustainable development. It also stresses that states should not quarrel regarding the resources and should respect the international law for protection of environment.

Part-5:

It deals with human rights with social justice and equity in related to natural resources & sustainable development.

Right to development has to be linked to right to safe & clean environment not only in personal but at global level. Threshold level of human rights is not defined till now.

Valve education:

Education is the one of the most important tool for progress of a country in economical & cultural way. Anyhow objective of education is not only giving information to meet exams & get good job but also to use at the right place within the frame work of a spectrum of ethical values.

The scientific & technological achievements brought drastic & revolutionary changes and no doubt about it. The informational technology also imparts their role i.e., anyone can sit in the internet and get information worldwide. But due to this man had become materialistic, self centred, over ambitious and ideals of real life have been pushed to background. So value based education has a very significant role in providing proper direction for youth & to get positive attitude due to which we can move towards enjoyable & sustainable future.

Value education helps in value based judgements related to natural principle. It constitutes human values, religious values, national values, aesthetic values & environment values. Value education increases awareness about our national history, heritage, national pride, constitutional rights and duties, national integration, community & environment development.

Value education is divided into different phases i.e., value awareness, value orientation, value appraisal, value selection, value commitment & value action. But the basic aim is to create awareness about the values & as a result of this student mindset orient towards values & analyse them. So he will take the commitment towards the values.

Value based environmental education:

Every person should have idea about environmental education. The fundamentals of environment and principles of ecology helps to manage the resources in a sustainable way and it creates that it is a duty of every citizen, such that a clean & safe environment could be hand-hovered to future generation.

From supreme court (filled M C Mehta, 1988), environmental education has been included in the curriculum right from the school/college/ university level. The main objective is to educate all environmentally, in which environment belongs to all & if we affects the environment it re affects us.

Values of environmental education:

The values help in attaining sustainable development & also change our mindset attitude & our life styles. They are:

1) Human values:

The basic human values "man in nature"(rather than nature for man) etc are mediated through text books because it plays an important role in building positive attitudes in the environment.

2) Social values:

In environmental education love, compassion, tolerance, justice, etc to be included such that all forms of life & the biodiversity will be protected.

3) Cultural & religious values:

These are the values in Vedas like "Delhi me dadami te" i.e., you give me & I give you (yajurveda) The cultural & religious values teach us to perform functions such as protect & nurture nature in every aspects like rivers, earth, mountains, forests, etc.

4) Ethical values:

Ethical values of environmental education should care about earth rather than human i.e., should promote earth citizen ship (welfare of earth) instead of human being supreme power.

5) Global values:

The human civilization is a part of earth planet & similarly nature & various factors over the earth are interlinked with each other by harmony. If we disturb, it causes ecological imbalance.

6) Spiritual values:

Principles of self restraint, self discipline, contentment, reduction of desires, freedom from greed & austerity are some of the elements added into traditional & religious part of country. All these values promote conservation.

"what is use of building beautiful house, if you don't have a decent planet to place it on". This can answer 'what is real development & progress". i.e., shouldn't develop with environmental disasters, health hazards, destroying nature's beauty. Loss of mental peace, etc. The value elements can succeed the goals of environmental education.

HIV/AIDS:

Acquired Immuno Deficiency Syndrome is only caused due to Human Immuno deficiency Virus (HIV)

Mode of transmission:

Blood transfusion, unprotected sex with infected person, sharing needles (or) syringes used for the infected person, mother to baby through pregnancy, breast feeding after delivery.

Note:

It is not transmitted by tears, sweat, urine, faeces, saliva (during kissing) & also by sharing towel, utensils, clothing, toilet seats, insect bite, etc.

About 40 million are affected with HIV/AIDS world aide and 70% of them in sub-Saharan Africa. AIDS is fourth killing disease. In 2003 3 million people died due to HIV/AIDS. It is rapidly spreading in Europe & Asia & there will sharp increase in Russia, China & India.

Discovery:

It is discovered in 1983. Definite source of the virus could not be identified.

AIDS is a man- made epidemic produced by genetically engineered laboratory produced virus. This AIDS virus cannot kill human directly but weakens the immune power & subject-able to diseases. i.e., infectious organisms invade into human body easily when immune system is affected. Alcoholic consumption increases the invasion of AIDS. Most of the evidence states that AIDS has spread from Africa & that too transferred from African monkey (white sooty mangabeys) or chimpanzees to human.

HIV-India Context: In India about 6 million people are affected with HIV & it is serious in A.P, Karnataka, T.N, M.H, Nagaland, and Manipuri where it has crossed 1% mark among pregnant women. In Manipur & Chennai HIV are found to be transmitted through injecting drug & more in sex-workers.

Some of the people believe that HIV has spread through vaccine programmes & it is as follows:

- HIV has spread in Africa through HIV contaminated polio vaccine prepared by using monkey's kidney.
- It has spread through Hepatitis-B viral vaccine in New York, Los angles, San Francisco.
- It has spread through small pox vaccine programme of Africa.

Effects of HIV / AIDS in Environment:

Due to AIDS, large no. of deaths occurs by which local environment & natural resources are affected, they are loss of labour, etc. With decrease in the no. of population and lack of experience results in difficult to look after the perennial crops & due to which production is affected. If the deaths are of forest workers then forestation, soil conservation, etc are affected & demands for fuel wood will be increased. Excess of water is required for maintaining the sanitation in AIDS affected region. HIV affected person cannot perform work efficiently.

AIDS Vaccine: Monkey trails.

The AIDS affected monkey lives long & so got idea to make vaccine. As a part of research, it is discovered how HIV destroys the immune system. Norman Letvin of Harvard Medical school, Boston believed that the vaccine helps to live longer without ill & doesn't prevent.

Prevention & highlights was released by US centre for disease control and prevention. In 1980's researchers believed that there is a chance to make vaccine but in 1981, 25 million was died due to this.

Norman Letvin team vaccinated Simian Immune deficiency Virus (SIV) against monkey which similar to that of HIV.

Most of the vaccines stimulate to produce antibodies which develop immune response against a particular virus/ bacteria but not for HIV. Second type of immune response called cell mediated immune response which fights against AIDS virus by T-cells.

NOTE:

Monkeys who get the SIV vaccine live much longer when they are later infected with HIV living up to 900 days while the unvaccinated one die on average of 300 days.

Women & Child welfare:

Women & child are ultimately sufferers as they are weak and economically dependent.

Women welfare:

A woman usually suffers from different issues like gender discrimination & devaluation at home, workplace, marriages, power, public life particularly in developing countries. Women are subjected to gender violence, victimization & harassment, etc. From the data of ministry of women & child development, states that immediate attention should be drawn towards abduction, dowry deaths, rape, domestic violence, criminal offenses, mental torture of women in the interest of them. The human rights of women are violated often. So, stringent legislation should be formed. Now there are many women groups also know as women cells, who cares for different welfare & legal issues. The ministry for women & child development works for welfare & upliftment of women such as family planning, health care, education, awareness etc.

The exploitation of nature not only affects the environment but also family life of women, such as rehabitation from native place of forests for project, mining, etc, activities. men will be given compensation or work but the women will be confined to household purposes only as they did not get any compensation & will be dependent on men. If at all they had given work, it is highly unorganized & often humiliating socially, so the National Network for Women & Mining (NWWM) with about 20 groups fighting for a gender audit of India's mining companies, resettlement & compensation issues.

Apart from government bodies, the non government organization (NGO'S) mostly mahila mandal's creates awareness amongst women of remote villages to empower, train, educate them & to live self–dependent.

At intentional level the United Nations decade for women (1975-85) included several women welfare related issues. The land mark outcome of the decade is elimination of a form of discrimination against women has been accepted as international standard for the protection & promotion of women's human rights. The most important thing is women to be educated about these issues.

Child welfare:

Children are the assets of a society. From a statistical data –1 million in 21 million infants are abandoned & in India due to different socio-economic reasons. Around 20 million children are working a child labour, some in hazardous industries like matches, fireworks, brassware's, potteries, etc & reasons to work is poverty. They work hours together in unhealthy condition without nutritive food, etc.

The UN general assembly in 1959 adopted the declaration of the rights of a child & after that in 1990 it become international law with 54 articles to promote & protect the well being of children in a society.

The law defines right of the child
i) to survival
ii) Protection
iii) Development
iv) Participation

1. Right to survival includes good standard of living, good nutrition & good health.
2. The right to protection means freedom from exploitation, abuse human treatment & neglect
3. Right to development includes education, social security, early childhood care & support, etc
4. Right to participation means freedom of thought, conscience & religion and appropriate information to the child.

The world summit on children held on September 30, 1990, in which well being of the children targets are discussed, India also agrees with world declaration on survival, protection & 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 a strategic plan has formulated for children's welfare regarding health, education, nutrition, clean & safe drinking water, sanitation & environment. Some more important activities also involved, they are up gradation of home-base skill, mid –day meals scheme, etc.

Children are also victims of environment pollution as they consume more amount of water, food, air than adults. Reports of Centre for Science and Environment (CSE), New Delhi says that biggest threat to children is water borne diseases & 6 million children are affected by this way. Children are also affected by cancer in which 6% is increasing per year. Even foetus is also affected due to environmental toxins. So we have gather and work to handle safe, secure environment to our children.

Role of information technology in environment and human health:

It has tremendous potential use in the field of environment education when compared to business, economics, politics etc.

Development of internet facilities, WWW (World Wide Web), GIS (Geographical Information System), etc, created a platform of update information on various aspects of environment & health, in addition to many software has been developed.

Database on environment & health:

Collection of inter- related data on various subject is known as database. It is stored in the computer & can be taken whenever required as it is arranged in a systematic way which is easy to manageable. These are several distribution information centre's (DICs) in our country which are linked with each other and also with central information network having access to international database.

The ministry of forest & environment, government of India are maintaining a database of biotic communication in which wild life conservation, forest cover, etc, are maintained, in addition to this disease like HIV/AIDS, malaria, fluorosis, etc, are also maintained.

Some of the information system are:

a) Environment information system (ENVIS)

: The ministry of environment and forests came to know the importance of environmental information & in 1982 December ENVIS has established and agenda of this is to provide information to decision makers, policy makers, scientists, engineers, research workers all over the world.

ENVIS has number of centres which is collaborated with ministry of environment & forests. Due to wide network of ENVIS, it is considered as National Focal Point (NFP) for INFOTERRA, global information network of United Nations Environment Programme (UNEP). To strengthen ENVIS in-terms of sustainable

development in India, 85 centres are in process in which 81 are established which includes government department, NGO's, etc.

The centres (ENVIS) create websites on specific environment related subjects & also establish linkages with all information sources. They create data bank selected parameters in the subject, identity information gaps, publish newsletters and bulletins.

The ENVIS centre also maintains the data bases of (pollution control, clean technologies, remote sensing, costal 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 maintains the database of health aspects of people in hazardous and non-hazardous industries, safety measures, etc.

The Major objectives of ENVIS are

:1) To build a repository and dissemination centre in Environmental Science and Engineering.

2) To change to modern technologies of acquiring, processing, storage etc.

3) To support and develop R & D with innovation in environmental information technology.

4) To provide national environmental services in-order to meet the future needs.

b) National Management Information System (NMIS)

: Department of Science and Technology (DST) maintains the database of R&D projects with concerned scientists also.

c) Geographical Information System (GIS)

:- The Photographs of satellites provides us actual information about various physical and biological resources and to some extent about degradation of environment. We can also get the information like water logging, desertification, deforestation, mineral and energy reserves, etc. So it is proved to very effective tool in environmental management.

A large number of inter-related (or) inter dependent aspects of thematic maps are superimposed by GIS technique, in relation to this several software's are developed. The thematic map containing digital information of water resources, industrial growth, human settlements, road network, soil type, forest land, cropland etc.

Applications of GIS

: 1) It is useful in future land use planning.

2) Polluted zones, degraded (or) diseased croplands, etc can be interpreted by GIS.

3) Suited areas for industrialization can be planned.

4) It can check unplanned growth and related environmental problems.

5) Forest cover and its conservation can be known by satellite data.

6) GIS also gives information regarding monsoon, ozone layer depletion, inversion. etc.

7) New resources f oil, minerals, etc, can be determined using remote sensing satellites.

8) It also helps in identifying disease infected areas especially malaria, schistosomiasis, etc.

Thus remote sensing and GIS play a key role in resources mapping, environmental conservation, management, planning and environmental impact assessment.