CHAPTER-5 HUMAN POPULATION AND ENVIRONMENT

Population growth: The rapid growth of the global population for the past 100 years from the difference between the rate of birth and death.

Cause of rapid population growth:

* The rapid population growth is due to decrease in death rate and increase in birth rate.
* Avilibility of antibiotics, immunization, increased food production, clear water and air decrease the famine related death.
* In agricultural based countries, children are required to help parents in the field that is why population increases in the devloping countries.

Characteristics of population growth:

* Exponential growth
* Doubling time
* Infant mortality rate
* Total fertility rate
* Replacement level
* Male/female ratio
* Demographic transition

Variation of population based on age structure:

Pre productive population (0-14 years)

Reproductive population (15-44 years)

Post reproductive population (above 45 years)

1. Pyramid shaped: India, Bangladesh and Ethiopia
2. Bell shaped: France, USA, UK
3. Urn shaped: Germany, Italy and Japan

Population explosion: Modern medical facilities reduces death rate and increases birth rate.

* Increase of life expectancy
* Illiteracy

Effects of population explosion (PE):

→ Poverty - infant mortality is the tragic indicator of poverty
→ PE leads to Environmental degradation.
→ PE causes over-exploitation of natural resources
→ Renewable resources like forests are under threat.
→ ↑ in population ↑ diseases, ↑ communal war
→ over crowding leads to development of slums.
→ lack of basic amenities like water, education, health etc.
→ unemployment and low living standard of people.

FAMILY WELFARE PROGRAMME:

Objectives: Slowing down the population explosion
Reducing over exploitation of natural resources

FAMILY PLANNING PROGRAMME:

Objectives: → Reduce infant mortality rate.
→ Achieve 100% of birth, death, marriage, pregnancy registration.
→ Encourage late marriage, late child bearing.
→ Improve women's health, education, employment.
→ Prevent and control of communal diseases.
→ Promote small family norms.
→ Making free and compulsory education upto 14 years.
→ Constraint spread of AIDS.

Fertility control methods:

Traditional method: taboos and folk medicine

Modern method:
1. Permanent method (Sterilization done by minor surgery)
(a) Tubectomy = female sterilization done by tying the tubes carrying ovum to uterus.
(b) Vasectomy = male sterilization done by tying the tubes carrying the sperms.

2. Temporary method
(a) Condoms = used by males to prevent sperms
(b) Copper Ts = small objects placed by doctor in the uterus.
(C) Oral contraceptive pills, drugs.

Environment And Human Health:

1. Physical hazards - Radioactive and UV radiations, = affects the body cell causes skin cancer
   global warming = causes famine and mortality
   Chlorofluro carbons = damage ozone layer
2. Chemical hazards - combustion of fossil fuels = Asthama & lung diseases
   Industrial effluence = cause cancer and death
   perticides = affects food chain
   Heavy metals = contaminate water.
3. Biological hazards - Bacteria, Viruses, Parasites = Diarrhoea, malaria, parasitic worms, cholera

Human Rights: Human rights are the fundamental rights, which are possesed by all human beings irrespective of their caste, nationality sex and language.

In 1948 Universal Declaration of Human rights UN KHR was established by UN -

→ Human right to freedom [express views, forming union, building houses choose any profession.
→ Human right to property (right to earn property)
→ Human right to freedom of religion (freedom to choose religion as his wishes)
→ Human right to culture and education (right to conserve culture, language, establishing educational institution)
→ Human right to constitutional remedies (can go to court, if fundamental rights denied)
→ Human right to equality (all citizens are equal before law without discriminate of caste, sex, religion)
→ Human right against exploitation (children should not be employed as labourers)
→ Human right to food and environment (right to get sufficient food water)
→ Human right to get good health (right to have very good physical and mental health)

Value education: It is nothing but learning about the particular thing through knowladge. We can identify our values and ourselves with the help of knowladge and experience.

TYPES : 1. Formal education - Self related learning process, all will read, write, get jobs, tackle any problem with formal education.
2. Value education - Analyze our behaviour, provide proper direction to youth, know right and wrong.
3. Value based environment education : knowladge about principles of ecology, biodiversity, care for natural resources, know to safe and clean environment

Objectives: ✓ To improve the intergal growth of human beings.
✓ To create atitudes and improvment towards sustainable lifestyles.
✓ To increase awarness about our national history our cultural heritage, constitutional rights, national integration community devlopment and environment.
✓ To create and develop awarenes about their values and their significance and their roles.
✓ To know about various livings and non-living organism and their interaction with environment.

* Concept of value education:
✓ Why and how can we use less resources and energy?
✓ Why do we need to keep our surrounding clean?
✓ Why should we use less fertilizers and pesticides?

Types of values:
Universal values - [Importance of human condition, reflect in life, joy, love, compasion, tolerance, truth etc.]
Cultural values - [Right, wrong, good and bad, behaviour of human being]
Individual values - [Individual personality and experience, parents and teachers are main key to shape individual value.]
Global values - [Human civiliation, if harmony is disturbed anywhere there will be an ecological imbalance.]
Spiritual values - [Self-restraint, discipline, reduction of wants.]

WOMANS WELFALE :-
Need of Women welfare -> * Women suffer gender discrimination.
* Devaluation at home, matrimony, work place, public and power.
* Dowry death, rape, domestic violence, mental torture to women.
* Human rights are violated, decision making are neglected.

Objectives: * To provide education * To improve employment opportunity
* To impart vocational training * To restore respect, dignity & equality.
* To generate awareness * To aware problems of population

Objective of a national commission of women:
* To examine constitutional and legal document for women.
* To review existing legislation.
* To sensitize the enforcement and administrative machinary to women's cause.

Various organization for women welfare:
The national network for women and mining (NNWM) - fighting for genders audit for of India's mining company.
United nation decade for women - inclusion of women welfare related issues on international agenda.
International convention on the elimination of all forms of discriminating against women (CEDAW) - Protection and promotion of women upliftment
Non govt organisation (NGO's) - Empower, educate village women and making self dependant.
Ministry of women & child development - work for upliftment of women by family planning, health, education & awareness.

CHILD WELFARE:
Reason for child labour: - Poverty - work in unhealthy condition
want of money - parents need money for their family

Various organisation towards child welfare:
→ UN convention on rights of child of international law - promote and protect children in our society

Rights of the child - *
* The right to survival - emphasizes on good health, nutrition, standard of living
* The right to participation - freedom of thought to the child
* The right to development - ensures education, care, support, social security and recreation.
* The right to protection - freedom for exploitation, inhuman treatment and neglect

→ World summit on children - well being of children is target
→ Ministry of human resources devlopment (MHRD) - concentrate on child's health, education and nutrition.
Environmental degradation and child welfare - children are most affected due to pollution, even child in mother's womb is affected by environmental toxics.
centre of science and environment - keeping environment clean for healthy life of children -

Role of information technology in environment : Information technology means collection, proceeing storage, dissemination of environment.

1. Remote sensing (RS) -
→ Gathering information about an object without coming in contact with is called remote sensing.
→ Any force like acoustic, gravity, magnetic, electromagnetic could be used for remote sensing.

Application :-
In agriculture - RS provide information about land, water management use of seeds, fertilisers, inputs etc.
forestry - Information on types, density, extent of forest cover, wood volume, forest fire, peat etc.
Land cover - Gives spatial information on land → RS data is converted to map.
Water resources - Surface water body maping, ground water targeting flood monitoring, water quality monitoring, run off modeling, irrigation water management -

2. DATA BASE : collection of interrelated data on various subjects.
Application : * Ministray of environment and forest - compile data on biotic communities, diseases like HIV, malaria, fluresis.
* National management information system - DB on R & D projects, research scientist etc.
* Environmental information system - DB on pollution control area, clean technology, biodiversity, remote sensing, environmental managment, desertification etc.

3. Geographical information system:
It is a technique of superimposing various thematic maps using digital data on a large number of inter related aspects.
Application: → Thematic maps are superimposed using softwares.
→ Interpretation of polluted zones, degraded lands.
→ To check unplanned growth and related environmental problems.

4. Satellite data: → Helps in providing reliable information and data about forest cover.
→ Provide information about forecasting weather, smog, ozone depletion
→ Reserve of oil, minerals can be discovered.

5. World of wide web: It provides current data.
Applications → online learning
→ digital files on photos animation on environmental studies.

6. Role of information technology in human health:
The health service technology involves 3 systems.
→ Finance & accounting
→ Pathology
→ Patient administration - clinical system
Application: → Data regarding birth & death rates, immunization, sanitation problem are maintained.
→ Helps doctor to monitor the health of the people effectively.
→ The information regarding the outbreaks of epidemic deseases.
→ Online consultation with expert doctors for better treatment.
→ Drugs & its replacement.

SOCIAL ISSUES AND THE ENVIRONMENT

1. SUSTAINABLE DEVELOPMENT

Meeting the needs of the present, without compromising the ability of future generations, to meet their own needs.

Dimensions of sustainable development

Derived from interactions between society, economy and environment.

Aspects of sustainable development

- Inter-generational equity - states to hand over safe, healthy & resourceful environment to future generation.
- Intra-generational equity - Technological development of rich countries should support the economic growth of poor countries.

Approaches for sustainable development

- Developing appropriate technology - locally
- Reduce, reuse, recycle [3R] approach
- Providing environmental education and awareness
- Consumption of renewable resources
- Conservation of non renewable resources
- population control.

2. WATER CONSERVATION

The process of saving water for future utilization is known as water conservation.

Need for water conservation

- ✓ changes in environmental factors
- ✓ Better lifestyles need more water
- ✓ Increase in population
- ✓ Deforestation decreases annual rainfal
- ✓ Over exploitation of ground water leads to drought
- ✓ Agricultural and industrial activities require

more water.

Strategies of water conservation

Reducing evaporation loses → Can place asphalt below the soil surface

Reducing irrigation losses → Sprinkling, drip irrigation, irrigation in early Morning / later evening reduces evaporation

Re use of water → treated waste water from washings, bathrooms can be used for gardening

Preventing of wastage of water → closing taps when not is use, repairing leakage, using small capacity taps etc.

Decreasing run-off losses → Can be done by using Contours cultivation or terrace farming

Avoid discharge of sewage → discharge of sewage into water resources should be prevented

Methods of water conservation = 1. Rain water harvesting
2. water shed management.

3. RAINWATER HARVESTING :

It is technique of capturing & storing of rain-water for further utilization.

Objectives of rain water harvesting (1)

To meet the increasing demands

Raise the water table by recharging the ground water

Reduce ground water contamination

Reduce the surface run off loss & soil erosion

Increase in hydro static pressure.

Minimise water crisis & water conflicts

Roof top Rainwater Harvesting Method : (2)

Method of collecting rainwater from roof of the building & storing it in the ground for future use.

- Rain water is collected by PVC / aluminimum pipe to the pit
- The pit base is filled with stones & sand, which serve as sand filters.

Advantages of Rain water Harvesting (3):

- Reduces the use of current
- prevent drought
- Increase the water level in well
- Rise in ground water level
- Minimise soil erosion & flood hazards
- Upgrading the social & environmental status
- Future generation is assured of water.

4. WATER SHED MANAGEMENT -

Watershed is defined as the land area from which water drains due to gravity into stream, lake etc.

The management of rainfall and resultant run-off is called watershed management.

Objectives (1)

- To minimize of risk of floods
- For improving the economy
- For developmental activities
- To generate huge employment opportu
- To promote forestry
- To protect soil from ercosion.

Factors affecting watershed (2)

- Unplanned, uncontrolled, unscientific land use activities
- Deforestation, overgrazing, mining, construction activities.

- Droughty climates affects the watershed.

Watershed management Techniques (3):

- Trenches (pits)
- Earthern dam
- Farm pond
- Underground barriers (Dykes)

Maintenance of watershed (4):

- Water harvesting
- Afforestation
- Reducing soil erosion
- Scientific mining & Quarrying
- Public participation
- Minimizing livestock population

5. RESETTLEMENT AND REHABILIT

Causes

Due to Developmental activites = dams, mining, roads, airports, etc.

Due to Disaster (Natural disaster - earthquake, floods, droughts, landslide, avalanches, volcanic eruptions etc.)
(Manmade disasters - Industrial accidents, nuclear accidents, dam bursts etc)

Due to conservation initiatives = national park, Sanctuary, forest reserves, biosphere reserve etc.

Resettlement:

It is simple relocation / displacement of human population.

Rehabilitation:

Involves making the system to work again by replacing the lost economic assets, employment, land for building, repair damaged building etc.

Rehebilitation issues

✓ Displacement of tribal's increase proverty by ~~replacing the lost~~ economic assets, employment, land for building, repair damaged

losing home, land, jobs, food securing etc
- Breakup of families
- Communal ownership of property
- vanishing social and cultural activities like folk song & dances
- Loss of identity between the people.

Examples: Sardar Sarovar Dam, the Theri dam project, Pong Dam.

6. ENVIRONMENTAL ETHICS

Environmental ethics refers to the issues, principles and guidelines relating to human interactions with their environment.

Function of Environment (1):

→ A life supporting medium for all organisms
→ It provides food, air, water, & other natural resources
→ Moderates the climatic conditions
→ Disintegrates the waste discharged by the society
→ Healthy economy depends on healthy environment.

Environmental problems (2)

→ Deforestation
→ population growth & urbanisation
→ pollution due to effluent and smoke
→ Water scarcity
→ Land degradation.

~~Ethical~~ solutions to environmental problems (3)

→ Reducing the energy sources & waste production
→ Recycle and reuse of waste products
→ soil degradation must be minimized
→ Sustainable development by conservation on resources
→ Over-exploitation of natural resources must be reg

→ Protection of Bio-diversity
→ Reducing the population & increase the economic growth
→ Ethical Guidelines (4)
→ Love & honour the earth
→ Should be grateful to plants & animals
→ should not waste your resources
→ should not steal from future generation
→ should not pollute & hold other living things
→ should not consume more meterials
→ should share the precious earth resources

7. GREEN HOUSE EFFECT

The progressive warming of earth surface due to blanketing effect of man made CO_2 in the atmosphere is green house effect.

Green house gases - causing global warming are CO_2, CH_4, N_2O, $CFCs$.

CO_2 is the most important green house gas. Human activities increase the green house effect & raise the atmospheric temperature & this is called global warming.

Effect on global warming

1. sea level → glacial melting & thermal expansion of ocean raise the sea level
2. Agriculture and forestry → climatic pattern shifts
   rainfall is reduced
   soils are dried, res
   lt in drought,
   less crop production
3. Water resources → Rainfall pattern change, Drought & Floods will beco
   common, Rise in temperature
   will increase water demand

4.

5

4. Terrestrial ecosystem → Animals & plants will have problems in adapting, They will be in Risk of extinction

5. Human health → As earth become warmer, floods & droughts become frequent, This increase water-borne diseases, infectious diseases caused by mosquitoes.

Preventive Measures of Global Warming:

- Reducing CO_2 emission by reducing use of fossil fuels
- Plant more trees
- Adopt sustainable agriculture
- Stabilize population growth

8. ACID RAIN

→ Normal rain is slightly acidic due to CO_2 gas.
→ The pH of the rain water is further acidic due to SO_2 & NO_2 gases.
→ This type of precipitation of water is called acid rain.

Formation of Acid rain:

Thermal power plants, industries, & vehicles release nitreous oxide & sulphur dioxide into atmosphere When these gases react with water vapour they from acids

$$SO_x + H_2O \rightarrow H_2SO_4$$
$$NO_x + H_2O \rightarrow HNO_3$$

Effects of acid rain

1. On Human beings
→ Destroy life - nervous, respiratory and digestive system
→ Causes premature death from heart and lung disorders like asthma & bronchitis.

2. On Buildings
→ Taj Mahal in Agra suffer due to H_2SO_4 acid fume released from Mathura refinery.
→ British parliament building suffered due to H_2SO_4 rain
→ Acid rain reduce the value of buildings, bridges, cultural objects etc.
→ This increases the maintenance cost.

3. On terrestrial and Lake Ecosystem
→ Reduces rate of photosynthesis, growth of crops, Fish population.
→ Flies, mosquitoes & worm occur on the dead Fishes.
→ Nitrogen, & phosphorous stay up in dead wastage
→ Biomass production is reduced & Fish population decreases.

Control measures

- ✓ By clean combustion technologies
- ✓ Using pollution control equipments
- ✓ Replacement of coal by natural gas
- ✓ Liming of lakes and soils.
- ✓ Coal with lower sulphur content can be used
- ✓ Emission of SO_2 & NO_2 from industries can be reduced

9. OZONE LAYER DEPLETION

- Ozone gas O_3 found throughout the atmosphere is formed in the stratosphere by photo-chemical reaction.

It protects us from the Ultraviolet radiation of the sun.

Recent evidence shown that ozone layer is becoming thinner & holes have developed.

Ozone depleting chemicals

- chloro Fluro carbon (CFC)
- Hydro chloro fluoro carbon (HCFC)
- Bromo fluoro carbon (BFC)

Formation of ozone :

$$O_2 + h\nu \rightarrow O^{\cdot} + O^{\cdot}$$
$$O^{\cdot} + O_2 + M \rightarrow O_3 + M$$

Mechanism of Ozone layer depletion :

$$CF_2Cl_2 + h\nu \rightarrow Cl + CF_2Cl$$

$$CF_2Cl + O_2 \rightarrow CF_2O + ClO$$

$$Cl + O_3 \rightarrow ClO + O_2$$
$$ClO + O^{\cdot} \rightarrow Cl + O_2$$

- In 1970 it was found that ozone layer was attacked by CFCs.
- Each cholorine atom attack ozone molecule.
- Loss in ozone increases the UV radiation reaching the earth surface.

Effects

- On human health - ~~skin cancer~~
- On aquatic system
- On materials
- On climate

Control Measures

→ Replacing CFCs by less damaging materials
→ Use of methyl bromide - crop fumigant should be controlled
→ Manufacturing & wing of ozone depleting chemicals should be stopped.

NUCLEAR ACCIDENTS & HOLOCAUST

The release of large amounts of nuclear energy and radioactive products into the atmosphere.

Examples :

Bhopal gas tragedy :

On night of 3rd December 1984 in Bhopal city of Madhya pradesh. At Union carbide India Ltd, which manufacture carbonate pesticides using methyl isocyanate (MIC). Due to failure of coolant, the reactor got exploded & 40 tons of MIC leaked over 40 sq.km area.

Nature of MIC : It is a toxic gas, affects lungs, eyes & causes irritation in skin. Remove oxygen from lungs & cause death.

Effects in Bhopal : About 5000 persons died, 1000 became blind, 65,000 people suffered from eye, respiratory, neuromuscular problems.

Nuclear holocaust in Japan :

* In 1945 two nuclear atom bombs were dropped on Hiroshima & Nagasaki cities in Japan.
* This explosion emitted neutrons, gamma radiations, strontium (Sr^{*}_{90})
* This Sr90 has the property of replacing calcium in the bones & so many people were affected by bone deformities.

1,00,000 people were killed,

Effects of nuclear holocaust :

→ Nuclear winter [Black soot formed will absord all UV-radiations & prevent UV radiation to reach the earth.

This result in cooling effect & water evaporation will also reduce.

This process opposite to global warming is called nuclear winter.

→ Ignition of all combustible material, destroy all beings, material crushing, destruction of homes

Control Measures

→ Suitable precautions to avoid accident
→ Constant monitoring of the radiation level
→ Checks and control measures done by Atomic Energy Regulatory Board.

WASTE LAND RECLAMATION

Waste land :- The land which is not in use - unproductive, unfit for cultivation another economic uses.

Types of waste land

1. Uncultivable waste land - Barren rocky areas, hilly slopes, sandy deserts
2. Cultivable waste land - degraded forest lands, gullied lands. Marsh lands, saline land etc.

Causes for waste land formation

- Soil Erosion, Deforestation, Water logging, Salinity
- Excessive use of pesticides,
- Over-exploitation of natural resources.
- Sewage and industrial wastes.

Objectives of waste land reclamation

- To prevent soil erosion
- To conserve the biological resources.
- To supply fuel, fodder, timber for local use
- To provide source of income to the rural poor

Methods of waste land reclamation

- Drainage
- Leaching
- Irrigation practices
- Application of Gypsum
- Afforestation programmes

CONSUMERISATION OF WASTE PRODUCTS

- Consumerisation - Consumption of resources.
- Traditionally favorable rights of sellers.
- Traditionally buyer rights
- Right to introduce product, price, Incentives
- Right to buy, right to expect the product to perform as claimed

Important information to be known by buyers

- About ingredients
- Manufacturing dates,
- Expiry date, etc.
- Health and happiness

SOURCES OF WASTES = Glass, papers, garbage's, food waste, automobile waste, dead animals etc.

E-waste = Computers, Printers, mobile phones, Xerox machines, calculators etc.

Effects of wastes

Dangerous to human life
Degrade soil
Non biodegradable plastics reduce toxic gases.
Cadmium in chips, Cathode ray tube, PVC causes cancer and other respiratory problems.

ENVIRONMENTAL LEGISLATION AND LAWS - IMPORTANT PROTECTION ACTS

WATER ACT 1974 :

This act provides for maintaining & restoring the source of water provides for preventing & controlling water pollution.

Objectives :

- To protect water from all kinds of pollution
- To preserve the quality of water
- Any contravention of the standards leads to prison for 3 to 6 months.
- Requires permission to set up an industry which discharges effluent.

State pollution Control Board :

- Take step to establish any industry, disposal system, extension /addition in industry, discharge of effluent into river.
- Use any new / altered outlet for discharge of sewage
- Begin to make any new discharge of sewage.

Punishment : stoppage of supply of electricity, water / any other services Imprisonment for 1 1/2 yeares to 6 yeares & Rs. 5000 /- fine.

AIR ACT 1981 :

Enacted in the conference held at stockholm in 1972. Deals with problems related to air pollution, quality of air etc.

Objectives of air act :

To prevent, control & abatement of air pollution
To maintain the quality of air

Important features of air pollution :

- The state Board collect information about air pollution.
- violation of law is punishable with imprisonment & fine
- Operation of industrial unit is prohibited in a heavily polluted areas
- SB examine the standards of manufacturing Process & control equipment.

FOREST ACT 1980 :

Provides conservation of forests & related ar
Arrest deforestation

Objectives :

To protect & conserve the forest
To ensure judicious use of forest products

Important Features of Forest Act :

Forests are not diverted without the prior permission of the Central Government. Land registered for forest may not be used for non-forest purposes. Any illegal activity in a forest area can be stopped immediately. Clear-ance of forest land for re-afforestation is forbidden. One who violates the forest law is punishable.

Wildlife Act 1972 :

Aimed protect & preserve wildlife.
Wildlife refers to all animals & Plants
It is declining due to human actions for wildlife's skins, furs, feathers, ivory etc.

Objectives :

To maintain ecological process & life supporting system
To preserve biodiversity
To ensure a continuous use of species.

Important Features :

Covers the right & non-rights of forest dwellers
Provides restricted grazing in saetuaries & prohibits in national parks
Prohibits the collection of non-timber forest

Environment Act 1986 :

It is a general legislation law to rectify the gaps & laps in above acts.

This act empowers the Central Govt. to fix the standard of quality of air, water, soil & noise.

Objectives :

TO protect & improvement of the environment

TO prevent hazards to all living creatures & property

To maintain peaceful relationship between humans & their environment

Important Features of Environment Act :

Empowers safe guard measures to prevent accidents which cause pollution.

Gives remedial measures if accident occurs.

The govt. has authority to close or prohibit or regulate any industry and its operation.

One who violates the act will be punishable with fine up to 1 lakh.

If the violation continues, an additional fine of Rs 5000/- per day is imposed.

The act empowers the officers of Central govt to inspect the site/plant/machineries for preventing pollution.

Collect samples of air, water, soil or other material from any factory / its premises for testing

14. PUBLIC AWARENESS :

→ Create awarens among people of rural & city about ecological imbalance, local environment.

→ To organise meetings, group discussion on devlopment, tree plantation programmes exhibitions.

→ To learn to live simple & ecofriendly manner.

Methods of create environmental awareness :

- ✓ In schools and colleges.
- ✓ Through mass-media.
- ✓ Cinema
- ✓ Newspaper
- ✓ Audio-visual media
- ✓ Voluntary organizations
- ✓ Traditional techniques
- ✓ Arranging competitions.
- ✓ Leaders appeal
- ✓ Non-government organizations.