ENVIRONMENT, ECOSYSTEM AND BIODIVERSITY

DEFINITION, SCOPE AND IMPORTANCE

Environmental science is the study of nature and the facts about environment. Basically environment can be defined as “all the social, economical, physical & chemical factors that surrounds man” (or) “all abiotic and biotic components around man-all living and non living things surrounds man”.

Environment Components can be divided into biotic and abiotic components.

According to ancient man the environment was the Panchaboodhas (i.e) air, water, land, sky and energy. The human were disciples of nature. They were able to protect themselves from harmful one and protect the others. But according to modern man the env. is only air land and water. Exploitation of various earth resources to satisfy the increasing needs of human population has resulted in 1) depletion of various resources of earth 2) pollution.

Principles of environmental education:

- Examine the major environmental issues
- discover the root cause
- develop problem solving skills
- promote co-operation in solving problems
- emphasis active participation in prevention and solution to problems.

Scope of Environmental science:

- Studying the interrelationship between the components of env.
- Carrying out impact analysis and env. Audit
- Preventing pollution from existing and new industries
- Stopping the use of biological and nuclear weapons
- Managing unpredictable disasters etc.

Public awareness:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection.

- Public awareness of environmental Is at infant stage
- 30-40% of public of developing country are aware of environmental. Problems but they do not bother about it.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters
- Debate on environmental issues are treated as anti-developmental

**Reasons for environmental Ignorance:**

- Science, technology and economics failed to integrate the knowledge on environmental aspects in curriculum
- The decision makers do not process environmental angle of decision making
- Consideration of economic growth, poverty eradication has lead to environmental degradation
- Only few developmental activities are made considering the environmental aspects.

**Need For Public Awareness:**

The United Nations Conference on Environment and Development held at Rio de Janeiro in 1992 (popularly known as ‘Earth Summit’) and world summit on sustainable development at Johannesburg in 2002, have highlighted the key issues of global environmental concern. They have attracted the attention of people.

Any government at its own cannot achieve the goals of clear environment until the public participate in action. Public participation is possible only when the public is aware about the ecological and environmental issues. Eg. Ban the littering of polythene.

**Methods to propagate environmental awareness:**

1. Among students through education – introducing environmental studies in the curriculum.
2. Among public through mass media- environmental programmes through TV, radio etc.
3. Among decision makers, planners, leaders etc.

**Role of NGOs**

1. Advise the government in interacting with ground level people
2. Organize public meetings to create environmental awareness

Eg. Recent report of ‘centre for science and environment’ on permissible limits of pesticides in cola drinks.

Public awareness is needed in the area

1. Study of natural resources-conservation and management
2. Ecology and biodiversity – conservation
3. Environmental pollution and prevention
Energy flow:

Grass → worms → Insects → small birds → huge birds

Decomposition:

sediments

c. DESERT ECOSYSTEM

Types:
1. tropical desert-found in Africa-Sahara and Rajasthan –Thar
2. temperate desert-south California-Majave
3. cold desert-China-Gobi desert

Characteristics:
1. Air is dry
2. Climate is hot
3. Annual rainfall is less than 25 cm
4. Vegetation is poor

d. AQUATIC ECOSYSTEM

Definition:

Deals with water bodies and biotic communities present in them-Classified as fresh water and marine ecosystems. Fresh water systems are classified as lentic and lotic ecosystems.

Types:
1. Pond ecosystem: Small fresh water ecosystem – seasonal in nature – organisms: algae, aquatic plants, insects, fishes etc. Ponds are very often exposed to anthropogenic pressure like cloth washing, bathing, cattle bathing, swimming etc.
2. Lake ecosystem: Big fresh water ecosystem – Zonation or stratification, especially during summer is a common one.
Poaching of wild life
Due to poaching, illegal trade and smuggling activities most of our valuable fauna are under threat organised crime has moved into illegal wild life smuggling because of huge profit. Eg. Tiger, Deer – for hides, Rhinoceros – for horns, Elephant – for ivory tusk, Sea Horse, Star turtle – sold to foreign market.

(Extinction, the elimination of species, is a normal process of the natural world. Species die put and are replaced by others as part of evolutionary change.

Human caused reduction: The climate change caused by our release of green house gases in the atm. could have catastrophic effects. Human disturbance of natural habitat is the largest single cause pf loss of biological diversity. Woodlands and grasslands are converted now use about 10% of the world’s land surface for crop production and about twice the amount for pasture and grasslands.)

Hunting: Over harvesting is responsible for depletion or extinction of many species.

Eg. The American passenger pigeon was the world’s most abundant bird. In spite of this vast population, market hunting and habitat destruction caused the entire population to crash with in 20 years.

Fragmentation;
Habitat fragmentation reduces the biodiversity because many animals like bears and large cats require large territories to subsist. Some forest birds reproduce only in deep forest or habitat far from human settlement. A large island for example, can support more individuals of given species and therefore less likely to suffer extinction due to genetic problems and natural catastrophes.

Commercial products:
Smuggling of fuels, hides, horns and folk medicines also affect the biodiversity in an abrupt manner.

Conservation of biodiversity:
In general biodiversity is generally disturbed by human activities. To solve the problems, it is essential to protect our bio diversity by two ways.

1. In-situ or on-site conversion
2. Ex-situ conservation
In-situ conservation:

- Conservation of species in its natural habitat, in place where the species normally occurs
- The strategy involves establishing small or large protected areas, called protected areas
- Today in world, there are 9800 protected areas and 1500 national parks
Noise pollution during Diwali:

The environmental (protection) (2nd amendment) Rule 1999 has given the permissible limit of noise level produced from fire crackers to be 125 dB. According to recent test reports on fire crackers by National Physical Laboratory, the fire crackers available in the market produce noise beyond the permissible limit.

Atom bomb – 135-138 dB
Hydrogen bomb – “”

The Union Government and all the state governments shall follow the guidelines of amendment 89 of env. (Protection) Rule 1986 framed under Env. (Protection) Act 1986 which says

1. The manufacture, sale or use of fire crackers generating noise level exceeding 125 dB shall be prohibited.
2. For joined fire crackers the limit is taken as 5 log 10 (N) dB; where N= no. of crackers joined together
3. The use of fire crackers shall not be permitted except between 6.00 a.m and 10 p.m.
4. No crackers burning is permitted in/near silent zone – areas near hospitals, educational institutions, courts, religious places, etc.
5. The State Education Resource Centre shall take appropriate steps to educate students about the ill effects of air and noise pollution.

Control of noise pollution:
- Reduction in source of noise
- Noise making machines should be kept in containers with sound absorbing media
- Proper oiling will reduce noise from machinery
- Using silencers – fibrous material
- Planting trees
- Legislation can prevent excess sound production, unnecessary horn blowing etc.

f) THERMAL POLLUTION:-

Addition of excess undesirable heat to water

Causes:-
- Nuclear power plant
- Domestic sewage
- Hydro electric power

Effects:-
- Reduction in dissolved oxygen
- Increase in toxicity
Control measures:

1. Government can inform the earthquake prone zone and caution residence
2. Building should be designed to withstand tremors

CYCLONE:

Cyclone is meteorological phenomena intense depressions forming over the open oceans and moving towards the land

Effects:

1. Depends on the intensity of the cyclone
2. Damage to human life, crops, roads, transport, communication could be very heavy

Control measures:

1. Planting more trees on hostel areas
2. Construction of dams
3. Radar system is used to detect cyclone eg. Cyclone in AP

LANDSLIDES:

The movement of earth materials like coherent rock, mud, soil and debris from higher region to lower due to gravitational pull is called landslide.

Causes:

1. Earthquake, shock, vibration
2. Deep water ground mining
3. Movement of heavy vehicles on the unstable sleepy region

Effects:

1. Increase erosion of soil
2. Block the roads
3. Damage the houses, crop yield, livestock

Control measures:

1. Planting of deep rooted vegetation
2. Encouragement for construction of bridges water ways
3. Create national parks, sanctuaries, biosphere e.g. landslides in U.P
TIMBER EXTRACTION AND MINING:
The major activities in forest area are 1. timber extraction 2. mining

The important effects of timber extraction are

i) thinning of forests
ii) loss of biodiversity, particularly tree breeding species
iii) soil erosion and loss of soil fertility
iv) migration of tribal people from one place to another in search of new forest
v) extinction of tribal people and their culture

MINING:

Mining is a process of removing ores from area which is very much below the ground level. Mining is done for the extraction of several minerals of metals like Fe, Mn, Au, Ag, etc. The minerals are especially found in thick forests.

Mining can be carried out in two ways

1. Surface mining
2. Underground mining or sub-surface mining

The effects of underground mining on forest reserves is comparatively less than that of surface mining

Relation between forest and climate change:

Forests both influence and influence by climate change. They play an important role in the carbon cycle and the way we manage forests could significantly affect global warming.

Forests hold more than 50 percent of the carbon that is stored in terrestrial vegetation and soil organic matter. Hence, deforestation contributes significantly to net emissions of carbon dioxide into the atm.

If the predicted global warming occurs, the impact on forests is likely to be regionally varied, dramatic, and long-lasting. Even now, we can see how any extreme weather has great impact on forests. For example, the 1999 storms in Europe caused heavy damage to forests and also to trees outside forest areas.

The Kyoto Protocol on climate change may have a great impact on forest management. Under the Protocol, a country with forests earns emission credits, since its forests absorb carbon dioxide. These credits are tradable, that is, a developing country can sell its credits to an industrialized country that has exceeded its quota of emissions. The latter would invest in afforestation and reforestation projects in the developing country.
water pollution or contamination

- creates declining of water levels
- crops failure and reduction in agricultural production
- over pumping of ground water create drought, famine and food shortage
- over pumping of ground water sea water intrusion in coastal aquifers
- land subsidence may due to over pumping of ground water
- river pollution due to industrial activities and dumping of waste into rivers, which in turn force to utilize the ground water, ultimately leads to over pumping

Clean water is universal right. It is the responsibility of everyone to ensure the purity of water. Water is a valuable commodity and it has to be conserved.

Surface water:

When evaporation and transpiration rates are lower than the rainfall, surface water body like lake, river, pond, streams etc. are formed.

Flood: over flow of water, whenever the water in flow is greater than the carrying capacity of the channels flood occurs.

Causes:

1. heavy rainfall, snow melt, sudden release of water from dams.
2. Prolonged down pour leading to overflowing of rivers and lakes
3. Reduction in carrying capacity due to obstruction or sediments etc.
4. Deforestation, over grazing, mining increase water run off
5. Removal of dense forests from hilly regions

Effects:

1. Submerges the flooded area
2. Loss of soil fertility due to soil erosion
3. Extinction of civilization at costal area

Flood management:

1. Dams and reservoirs can be constructed
2. Embankments and proper channel management
3. Flood way should not be encroached
4. Forecasting or flood warning
5. Decrease of run off by infiltration through afforestation or rain water harvesting etc.
CONFLICTS OVER WATER

Due to increase in population and decrease in water resources conflicts over water starts

Conflicts over the water around world was classified as

- Control of water resources
- Military food resources
- Political resources
- Terrorism
- Military targets
- Development disputes

Causes:

- Conflicts through use 1. Shipping traffic in international water 2 dam construction
- Construction of power stations on
- Conflicts through pollution-rhine river, Europe
- Distributional conflict-relative shortage
- Euphrates, Nile, Yangtze - plataneous in upper basin, reduced in lower basin due to extensive use.
- Anatolian dam project by turkey Farakka dam in India

Distributional conflict: Absolute shortage. Colorado and Rio Grande, Jordan

Conflicts management:

- Enact laws to check practices to control water pollution
- Sharing river solved by interlinking river
- Power must be given to national water authority and river basin authority and river s-basin authority for equitable distribution of basin water-demand for nationalization of water needs
- Allows couples to describe their family size and also time spacing of their offspring
- Provide importance, knowledge and benefits of their small family to people
- Education in held and family welfare system
- Sex education awareness

WHO estimated 50% of worlds married couples adopted family planning measures, 300 million couples not assessed to family planning

**Environment and human health:**

Environment is defined as man along with his surroundings, which consists of biotic, abiotic and sociological components. Therefore, when we cause danger to these components, which surrounds us, they in turn affect our health.

The environmental dangers created by man are many: Population explosion, unregulated urbanization, creating water, air and landscape pollution, deforestation, desertification, use of pesticides in agriculture etc. Every one of these has implications for the health of the individual as well as society as a whole. None can be ignored because the scale of potential calamity is increasing day by day.

Health hazards may be arising from: water contamination or pollution, air pollution, use of pesticides enters through food chain, radiation effect of nuclear water, diseases caused from improper disposal of solid wastes and also due to noise pollution.

**Human rights:**

1. Human rights means that a human being must enjoy on this earth
2. Foundation of human was laid in 13th century. But positive hopes for all people for a happy, dignified and secure living condition wee raised only after “Universal Declaration of Human Rights (UNDHR) by UNO on 1012.1948
3. It highlights on protection to all individuals against injustice and human right violation
4. UNDHR defines specific rights to life, liberty, security, freedom of thought, association, freedom of movement right of equal pay for equal work, right to form or join union, right to health care, education etc.
5. Universal declaration rights are universal but disparity between developing and developed countries.
6. Poverty and population leads to violation of human rights.
   WHO estimates
   -One out of every five is malnourished, lacks clean drinking water, lacks hygienic conditions and health facilities.
   -one out of 3 lack fuel for cooking
   -1/5 is desperately poor
   -every year 40 million people die due to contaminated water
7. Acute scarcity of employment
6. What is disaster? Give few examples

Disaster is a geological processes and is defined as the sudden calamity which brings misfortune and miseries to human community.

e.g., flood, cyclone, landslide, earthquake and Tsunami

7. Differentiate between pollution prevention and pollution control

<table>
<thead>
<tr>
<th>Pollution prevention</th>
<th>Pollution control</th>
</tr>
</thead>
<tbody>
<tr>
<td>It means using processes, practices, materials, products or energy that avoid or minimize creation of pollutants and waste or environmental disturbances and reduce risk to human health.</td>
<td>The proper control measures prescribed to minimize the pollution level.</td>
</tr>
</tbody>
</table>

8. Differentiate between primary and secondary air pollutants with examples:

<table>
<thead>
<tr>
<th>Primary pollutants</th>
<th>Secondary pollutants</th>
</tr>
</thead>
<tbody>
<tr>
<td>These are emitted directly in the atmosphere in harmful form</td>
<td>These are pollutants in which some of the primary air pollutants may react with one another to form new pollutants</td>
</tr>
<tr>
<td>Examples: CO, NO, SO₂</td>
<td>Examples: NO, NO₂ → HNO₃/NO₃</td>
</tr>
</tbody>
</table>
9. Give any six air pollutants
   - Sulphur dioxide
   - Nitrogen oxides
   - Sulphur trioxide
   - Carbon dioxide
   - Hydrocarbons
   - Carbon monoxide

UNIT:3 NATURAL RESOURCES

1. Distinguish renewable and non-renewable sources of energy

<table>
<thead>
<tr>
<th>Energy renewable</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wide availability</td>
<td>Unreliable supply</td>
</tr>
<tr>
<td></td>
<td>Low cost</td>
<td>Produced in small quantity</td>
</tr>
<tr>
<td></td>
<td>Decentralized power production</td>
<td>Difficult to store</td>
</tr>
<tr>
<td></td>
<td>Low pollution</td>
<td>Can't more</td>
</tr>
<tr>
<td></td>
<td>Available for future</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy non renewable</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Available in high concentrated form</td>
<td>highly polluted</td>
</tr>
<tr>
<td></td>
<td>Easy to store</td>
<td>Produced only in few places</td>
</tr>
<tr>
<td></td>
<td>Reliable supply</td>
<td>High running cost</td>
</tr>
<tr>
<td></td>
<td>Lower cost</td>
<td>Limited supply and will one day get exhausted</td>
</tr>
</tbody>
</table>

2. What is sustainable development?
   Sustainable development is defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs, or extending progress, without exhausting resources, beyond the foreseeable future.

3. Write any two adverse effects caused by overgrazing.
   - Land degradation
   - Loss of useful species.

4. What is desertification? Give any two reasons for it.
   Desertification means degradation of one fertile land to desert like land.
   Reason-deforestation, overgrazing, mining, overgrazing

5. What are the reasons for deforestation?