KARPAGAM ACADEMY OF HIGHER EDUCATION

Coimbatore - 641021.

DEPARTMENT OF COMPUTER SCIENCE, CA & IT

SUBJECT : ENVIRONMENTAL STUDIES **SEMESTER : I**

SUBJECT CODE : 17AEC101 **CLASS : I B.Sc.CS**

COURSE OBJECTIVE:

The study creates awareness among the people to know about various renewable and nonrenewable resources of the region, enables environmentally literate citizens (by knowing the environmental acts, rights, rules, legislation, etc.) to make appropriate judgments and decisions for the protection and improvement of the earth.

COURSE OUTCOME:

- Creating the awareness about environmental problems among people.
- Developing an attitude of concern for the environment.
- Motivating public to participate in environment protection and improvement.

UNIT-I: Environment Definition, scope and importance, components, Ecosystem Definition, Concept, Scope, importance, Structure and functions of ecosystem. Energy flow, Ecological succession Food chains and food webs. Classification of ecosystem.

Unit II: Natural Resources - Renewable and Non-renewable Resources: Natural resources and associated problems. Forest resources, Water resources, Mineral resources, Food resources, Energy resources, Land resources : Use and over-utilization, exploitation. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. Ill-effects of fire works.

Unit III: Biodiversity and Its Conservation: Introduction, definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Unit IV: Environmental Pollution - Definition, Causes, effects and control measures of Air pollution, Water pollution, Soil pollution , Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: Foods, earthquake, cyclone and landslides.

Unit V: Social Issues and the Environment: From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear aCSUidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Population growth, variation among nations. Population explosion—Family Welfare Programme. Environment and human health. Human rights. Value education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in environment and human health.

Suggested Readings

T1: Tripathy.S.N. and Sunakar Panda. 2004. Fundamentals of Environmental Studies; 2nd Edition, Vrianda Publications Private Ltd., New Delhi.

T2: Arvind Kumar, 2004. A Textbook of Environmental Science; APH Publishing Corporation, New Delhi.

T3: P.S.Verma, V.K.Agarwal. 2001. Environmental Biology (Principles of Ecology); S.Chand and Company Ltd., New Delhi.

T4: Anubha Kaushik, C.P.Kaushik, 2004. Perspectives in Environmental Studies, New Age International Pvt. Ltd. Publications, New Delhi.

R1: Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.

R2: Daniel B.Botkin and Edward A. Keller. 1995. Environmental Science, John Wiley and Sons, Inc., New York.

R3: Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.

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Coimbatore - 641021.

(For the candidates admitted from 2017 onwards)

DEPARTMENT OF COMPUTER SCIENCE, CA & IT

LECTURE PLAN

STAFF NAME: N. MANONMANI, S. JOYCE

SUBJECT NAME: ENVIRONMENTAL STUDIES **SUB.CODE: 17AEC101**

SEMESTER: I **CLASS: I B.Sc (CS)**

S.No.	Lecture Duration	Topics to be Covered	Support Materials
Unit - I			
1.	1	Environment Definition, scope and importance	T4 : 1-4,T2:1,
2.	1	Components of environment	T1:1,2
3.	1	Ecosystem Definition, Concept, Scope, importance	T4 :65-66,T2:55,56, T4:52,53
4.	1	Structure of ecosystem	T4 :66-68
5.	1	Functions of ecosystem	T4 :68,76-78
6.	1	Energy flow through the ecosystem	T4 :76-78
7.	1	Ecological succession	T4 :84-87
8.	1	Food chains and food webs	T4 :69-72
9.	1	Classification of ecosystem.	T4 :76
10.	1	Recapitulation and Discussion of important questions	

Total No. of Hours Planned for Unit-I			**10**
Textbook		T1: Tripathy.S.N. and Sunakar Panda. 2004. Fundamentals of Environmental Studies; 2nd Edition, Vrianda Publications Private Ltd., New Delhi. T4: Anubha Kaushik, C.P.Kaushik, 2004. Perspectives in Environmental Studies, New Age International Pvt. Ltd. Publications, New Delhi.	
Unit - II			
1.	1	Natural resources and associated problems.	T4:6-9
2.	1	Forest resources	T4: 9-12
3.	1	Water resources	T4 : 13-22,T2:37-40
4.	1	Mineral resources	T4 : 23-28, T2: 43-48
5.	1	Food resources	T4: 30-36
6.	1	Energy resources	T4: 38-52,T2:32-35
7.	1	Land resources : Use and over-utilization, exploitation	T4: 40-43
8.	1	Role of an individual in conservation of natural resources.	T4: 59-61
9.	1	Equitable use of resources for sustainable lifestyles.	T4: 62-63
10.	1	Ill-effects of fire works	T4: 64-66, T2:47-49
11.	1	Recapitulation and Discussion of important questions	
Total No. of Hours Planned for Unit-II			**11**
Textbook		T4: Anubha Kaushik, C.P.Kaushik, 2004. Perspectives in Environmental Studies, New Age International Pvt. Ltd. Publications, New Delhi. T2: Arvind Kumar, 2004. A Textbook of Environmental Science; APH Publishing Corporation, New Delhi.	

Unit - III			
1.	1	Introduction, definition: genetic, species and ecosystem diversity.	T4 : 98,99, T3: 75-78
2.	1	Biogeographical classification of India.	T4:100-101
3.	1	Value of biodiversity: consumptive use, productive use	T4: 101-102
4.	1	Value of biodiversity: social, ethical, aesthetic and option values.	T4 :102,103
5.	1	Biodiversity at global, National and local levels	T4 :104-107, R1: 23-29
6.	1	India as a mega-diversity nation. Hot-spots of biodiversity.	T4 :107-111
7.	1	Threats to biodiversity: habitat loss, poaching of wildlife,	T4:111-112
8.	1	Man-wildlife conflicts	T4: 112-114
9.	1	Endangered and endemic species of India	T4 :115-118, T3: 92-98
10.	1	Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.	T4 :119-121
11.	1	Recapitulation and Discussion of important questions	
Total No. of Hours Planned for Unit-III			**11**
Textbook		T3: P.S.Verma, V.K.Agarwal. 2001. Environmental Biology (Principles of Ecology); S.Chand and Company Ltd., New Delhi. T4: Anubha Kaushik, C.P.Kaushik, 2004. Perspectives in Environmental Studies, New Age International Pvt. Ltd. Publications, New Delhi.	

Reference		R1: Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.	
Unit - IV			
1.	1	Definition, Causes, effects and control measures of Air pollution	T4:123-127
2.	1	Water pollution	T4: 132-135
3.	1	Soil pollution	T4: 141-143
4.	1	Marine pollution	T4:140,141
5.	1	Noise pollution	T4: 127-132
6.	1	Thermal pollution	T4:136-139
7.	1	Nuclear hazards	T4: 143,144
8.	1	Solid waste management: Causes, effects and control measures of urban and industrial wastes	T4:145-148 R3: 163-169
9.	1	Role of an individual in prevention of pollution	T4:148-150
10.	1	Pollution case studies	T4:150-153
11.	1	Disaster management: Foods, earthquake, cyclone and landslides.	T4:154-158
12.	1	Recapitulation and Discussion of important questions	
		Total No. of Hours Planned for Unit-IV	**12**
Textbook		T4: Anubha Kaushik, C.P.Kaushik, 2004. Perspectives in Environmental Studies, New Age International Pvt. Ltd. Publications, New Delhi.	
Reference		R3: Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.	

Unit - V			
1.	1	From unsustainable to sustainable development. Urban problems related to energy.	T4:161-165
2.	1	Water conservation, rain water harvesting, watershed management.	T4: 165-171, R2:143-145
3.	1	Resettlement and rehabilitation of people; its problems and concerns.	T4:171-172
4.	1	Environmental ethics: Issues and possible solutions.	T4: 173-177
5.	1	Climate change, global warming, acid rain, ozone layer depletion	T4:178-180, R2: 157-163
6.	1	Nuclear accidents and holocaust. Case studies. Wasteland reclamation.	T4: 181-189
7.	1	Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act.	T4:192-195
8.	1	Water (Prevention and Control of Pollution) Act. Wildlife Protection Act	T4: 196-201
9.	1	Issues involved in enforcement of environmental legislation, Public awareness. Population growth, variation among nations.	T4:204-213
10.	1	Population explosion—Family Welfare Programme. Environment and human health. Human rights	T4:216-223
11.	1	Value education. HIV/AIDS. Women and Child Welfare.	T4:225-229
12.		Role of Information Technology in environment and human health.	T4: 230-233

13.	1	Recapitulation and Discussion of important questions	
14.	1	Recapitulation and Discussion of previous semester question papers	
15.	1	Recapitulation and Discussion of previous semester question papers	
16.	1	Recapitulation and Discussion of previous semester question papers	
Total No. of Hours Planned for Unit-V			**16**
Textbook		T4: Anubha Kaushik, C.P.Kaushik, 2004. Perspectives in Environmental Studies, New Age International Pvt. Ltd. Publications, New Delhi.	
Reference		R2: Daniel B.Botkin and Edward A. Keller. 1995. Environmental Science, John Wiley and Sons, Inc., New York.	
Total No. of Hours Planned			**60**

UNIT-I

Syllabus

Environment Definition, scope and importance, components, Ecosystem Definition, Concept, Scope, importance, Structure and functions of ecosystem. Energy flow, Ecological succession Food chains and food webs. Classification of ecosystem.

ENVIRONMENT

DEFINITION

- Environment is derived from the French word Environner which means to encircle or surround.
- All the biological and non-biological things surrounding an organism are thus included in environment.
- Thus environment is sum total of water, air and land, inter-relationships among themselves and also with the human beings, other living organisms and property.
- The above definition given on Environment (Protection) Act, 1986 clearly indicates that environment includes all the physical and biological surroundings and their interactions.

COMPONENTS

- The natural environment of a living organism can be divided into three components.
    - Biotic components
    - Abiotic components
    - Energy components

Biotic Components

- It consists of all the living organisms present within the environment.

Abiotic components

- All other substances except living organisms are known as abiotic components.
- The abiotic components broadly consist of atmosphere (air), Hydrosphere (water) and Lithosphere (soil).

Energy components

- The energy component may be solar energy, geo-chemical energy, thermo-electrical energy, hydro-electrical energy, atomic energy and energy due to radiation.

ECOSYSTEM

Definition

Tansley (1935) – self regulating group of biotic communities of species interacting with one another and with their non-living environment exchanging energy and matter

CONCEPT OF ECOSYSTEM

- Living organisms cannot be isolated from their non-living environment because the later provides materials and energy for the survival of the farmer.
- An ecosystem is therefore defined as a natural functional ecological unit comprising of living organisms and their non-living environment that interact to form a stable self supporting system.

  Eg. Pond, lake, desert, grassland, forest, etc.

Ecosystem characteristics

- Structural features - composition and organization of biological communities and abiotic components constitute- structure of Ecosystem.
- Biotic structure – Plants, animals, microorganisms – form biotic components – nutritional behavior and status in the ecosystem – producers or consumers – how do they get their food.

SCOPE OF ECOSYSTEM

- Modern ecology focuses on the basic functional ecological unit the ecosystem.
- An ecosystem is any spatial or organizational unit which includes a community of living organisms and non-living substances of environment interacting to produce an exchange of materials between the living and non-living parts.
- It may be as small as a puddle or as large as the entire earth (biosphere or ecosphere).
- Further, an ecosystem may be natural as a pond, a lake, a river, an estuary, an ocean, a forest, etc., or it may be man-made or artificial like an aquarium, a dam, a cropland, a garden, an orchard, a city and so on.
- The term ecosystem was coined by A.G. Tansely (1935) – its ‘eco’ part means environment and the ‘system’ part implies, a complex of coordinated units.

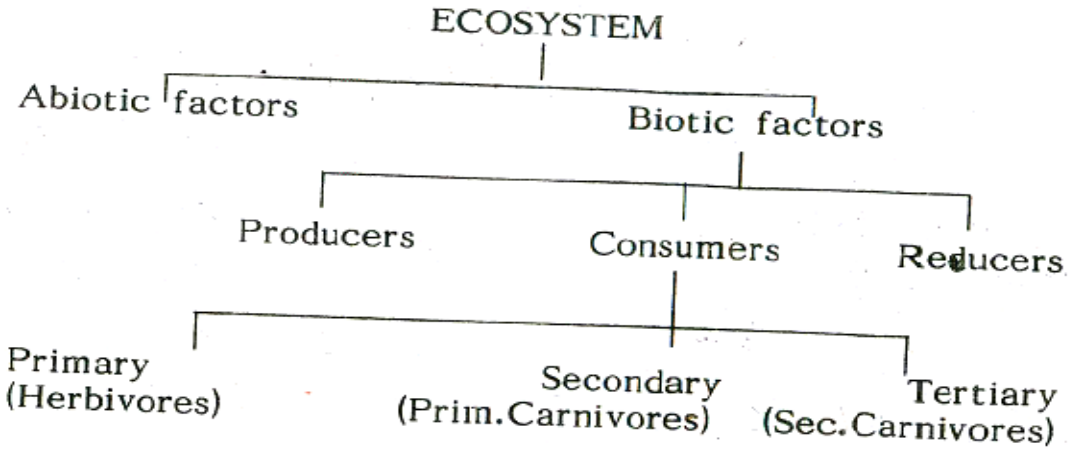
IMPORTANCE OF ECOSYSTEM

- Ecosystem study indicates the available solar energy and the efficiency of an ecosystem to trap the same.
- It gives information about the available essential minerals and their recycling periods.
- Gross and net productivity of an ecosystem are known.
- It provides knowledge about the web of interactions and interrelations amongst the various populations as well as between populations and the abiotic environment.

- It helps human beings to know about conservation of resources, protection from pollution and inputs required for maximizing productivity.

STRUCTURE OF ECOSYSTEM

- The structure of any ecosystem is formed of two components, namely
  - Abiotic factors
  - Biotic factors.



Structure of an ecosystem.

Abiotic Factors

- The abiotic factors of an ecosystem include the non-living substances of the environment.

Example

- Water, soil, air, light, temperature, minerals, climate, pressure etc.
- The biotic factors of the ecosystem depend on the abiotic factors for their survival.

Biotic Factors

- The biotic factors include the living organisms of the environment.

Example

- Plants, animals, bacteria, viruses etc.
- The biotic factors of an ecosystem are classified into three main groups
  - Producers
  - Consumers
  - Reducers or decomposers.

Producers

- The organisms which carryout photosynthesis constitutes the producers of an ecosystem.
  - **Eg.** Plants algae and bacteria.
- The producers depend on the abiotic factors of the ecosystem for producing energy.
- They are provided with chlorophyll.
- Chlorophyll is used in the synthesis of energy rich compounds with the utilization of abiotic factors like light, CO2, water and minerals

- A portion of the energy synthesized, is used by the producers for their growth and survival and the remaining energy is stored for future use.

Consumers

- Consumers are organisms which eat or devour other organisms.
- The consumers are further divided into three or more types.
- They are primary consumers, secondary consumers and tertiary consumers.

(i) Primary Consumers

- They eat the producers like plants, algae and bacteria.
- The primary consumers are also called herbivores.
- Elton referred the herbivores as key industry animals.
- Rabbit, deer, etc., are primary consumers in a terrestrial ecosystem.

(ii) Secondary Consumers

- They kill and eat the-herbivores.
- They are also called carnivores.
- As these carnivores directly depend on herbivores, they are specifically called primary carnivores.
- Fox, wolf, etc. are the secondary consumers in a terrestrial ecosystem.

(iii) Tertiary Consumers

- They kill and eat the secondary consumers.
- They are also called secondary carnivores.
    - **Eg**. Lion, tiger, etc.

Reducers or Decomposers

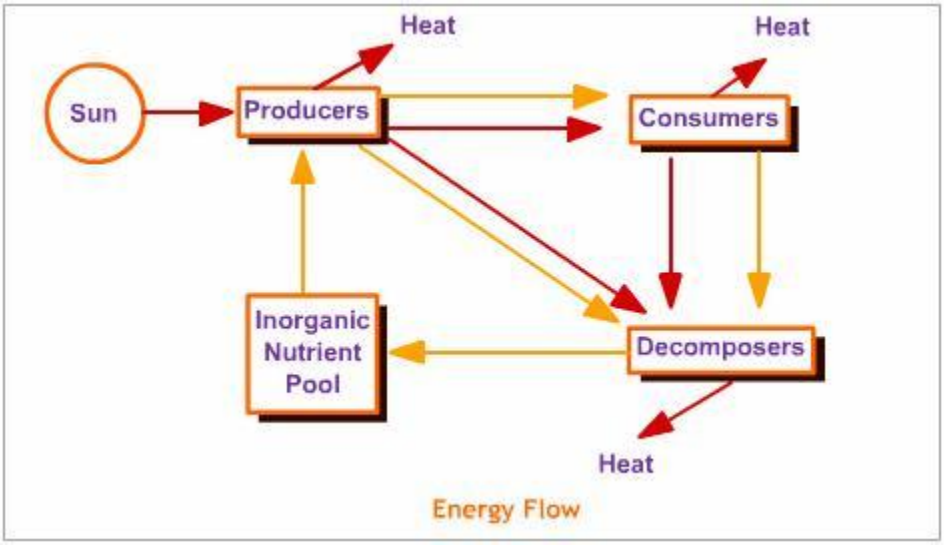
- The decomposers are organisms that break up the dead bodies of plants and their waste products.
- They include fungi and certain bacteria.
- They secrete enzymes.
- The enzymes digest the dead organisms and the debris into smaller bits or molecules.
- These molecules are absorbed by the reducers.
- After taking energy, the reducers release molecules to the environment as chemicals to be used again by the producers.

FUNCTIONS OF ECOSYSTEMS

- Ecosystems have some functional attributes which keep the component parts running together.
- For example – green leaves prepare food and roots absorb nutrients from the soil.

- Herbivores feed on part of the plant production, and in turn serve as food for carnivores.
- Decomposers carry out the function of breaking down complex organic materials into simple inorganic product which can be used by the producers.
- All these functions in an ecosystem occur through delicately balanced and controlled processes.
- Thus, this cycle goes on and on, leading to efficient continuous functioning of the ecosystem.
- Food chain, food web and trophic structure.
- Energy flow
- Cycling of nutrients (biogeochemical cycles)
- Primary and secondary production
- Ecosystem development and regulation.

ENERGY FLOW IN ECOSYSTEM



- The diagram above shows how both energy and inorganic nutrients flow through the ecosystem.
- We need to define some terminology first.
- Energy "flows" through the ecosystem in the form of carbon-carbon bonds.
- When respiration occurs, the carbon-carbon bonds are broken and the carbon is combined with oxygen to form carbon dioxide.
- This process releases the energy, which is either used by the organism (to move its muscles, digest food, excrete wastes, think, etc.) or the energy may be lost as heat.
- The dark arrows represent the movement of this energy.
- Note that all energy comes from the sun, and that the ultimate fate of all energy in ecosystems is to be lost as heat. Energy does not recycle!!
- The other component shown in the diagram is the inorganic nutrients.
- They are inorganic because they do not contain carbon-carbon bonds.

- These inorganic nutrients include the phosphorous in your teeth, bones, and cellular membranes; the nitrogen in your amino acids (the building blocks of protein); and the iron in your blood (to name just a few of the inorganic nutrients).
- The movement of the inorganic nutrients is represented by the open arrows.
- Note that the autotrophs obtain these inorganic nutrients from the inorganic nutrient pool, which is usually the soil or water surrounding the plants or algae.
- These inorganic nutrients are passed from organism to organism as one organism is consumed by another.
- Ultimately, all organisms die and become detritus, food for the decomposers.
- At this stage, the last of the energy is extracted (and lost as heat) and the inorganic nutrients are returned to the soil or water to be taken up again.
- The inorganic nutrients are recycled, the energy is not.
- Many of us, when we hear the word "nutrient" immediately think of calories and the carbon-carbon bonds that hold the caloric energy.
- IT IS VERY IMPORTANT that you be careful in your use of the word nutrient in this sense.
- When writing about energy flow and inorganic nutrient flow in an ecosystem, you must be clear as to what you are referring.
- Unmodified by "inorganic" or "organic", the word "nutrient" can leave your reader unsure of what you mean.
- This is one case in which the scientific meaning of a word is very dependent on its context. Another example would be the word "respiration", which to the layperson usually refers to "breathing", but which means "the extraction of energy from carbon-carbon bonds at the cellular level" to most scientists (except those scientists studying breathing, who use respiration in the lay sense).

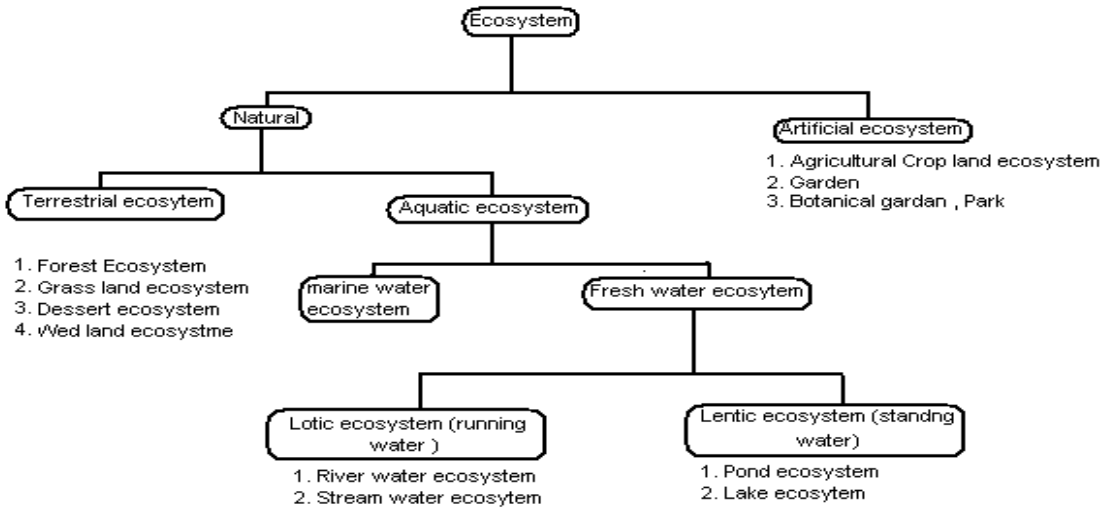
To summarize: In the flow of energy and inorganic nutrients through the ecosystem, a few generalizations can be made:

1. The ultimate source of energy (for most ecosystems) is the sun
2. The ultimate fate of energy in ecosystems is for it to be lost as heat.
3. Energy and nutrients are passed from organism to organism through the food chain as one organism eats another.
4. Decomposers remove the last energy from the remains of organisms.
5. Inorganic nutrients are cycled, energy is not.

ECOLOGICAL SUCCESSION

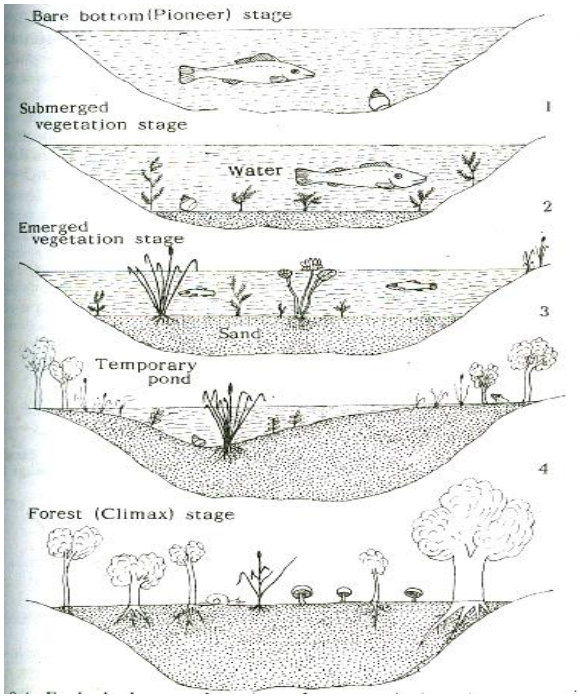
- The communities in any area are not stable.
- They are changing into other forms of communities from time to time.
- Thus in a particular area one community may be replaced by another community or by a series of communities.

Types of ecosystem



For example

- A pond community can be transformed into a marshy land community, if he pond is gradually filled with sand and mud.
- The marshy land in the course of time may give rise to a grassland community or a forest community according to the environmental factors prevailing there.
- This process of development of new communities is called ecological succession.
- It can be defined as an orderly and progressive replacement of one community by another till the development of a stable community in that area (Smith, 1965).



Ecological succession. A pond community is replaced by a forest community through ecological succession

Significance of Succession

- Ecological succession creates a stable community in the fluctuating physical environment. The stable or climax community has the ability to buffer and control the physical forces like water, temperature etc.
- It plays an important role in the slow dispersal of animals.

FOOD CHAINS

- The biotic factors of the ecosystem are linked together by food.

For example

- The producers form the food for the herbivores.
- The herbivores the food for the carnivores.
- The sequence of the eaters being eaten is called food chain.

  Producers ----------> Herbivores ----------> Carnivores
- The various steps in a food chain are called trophic levels.
- Owing to repeated eating being eaten the energy is transferred from to another trophic level.
- This transfer of energy from one trophic level to another is called energy flow.
- A typical food chain can be seen in a pond ecosystem.
- The algae and phytoplankton are eaten by the zooplankton.
- The zooplankton are eaten by fishes which are eaten by snakes.

Pond Ecosystem

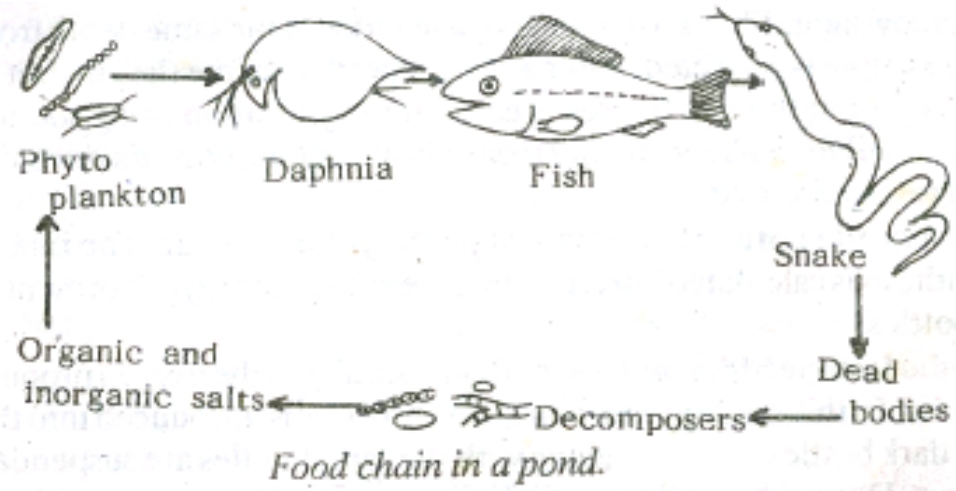
Phytoplankton ----------> Zooplankton ----------> Fishes ---------> Snakes

Grassland Ecosystem

Plants ----------> Mouse ----------> Snake ----------> Hawk

Forest Ecosystems

Plants ----------> Goat ----------> Man ----------> Lion



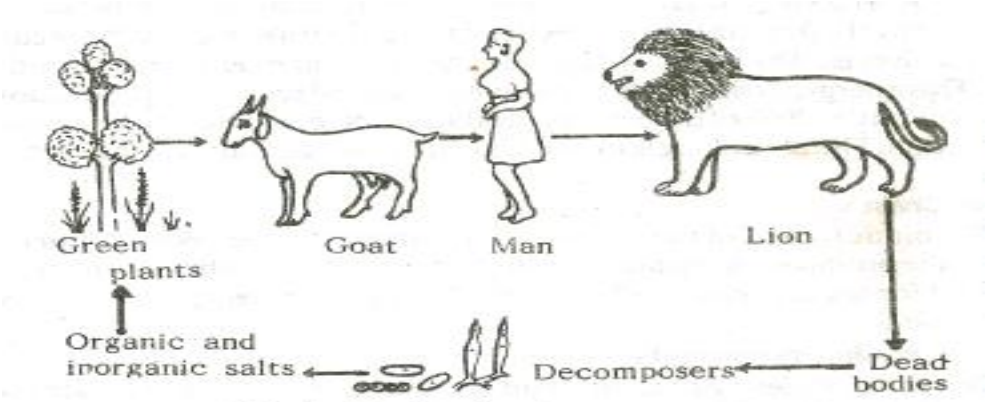
Food chain in a pond.

Types of food chains

- The food chains are of two types, namely
  - Grazing food chain
  - Detritus food chain

Grazing food chain

- This food chain starts from plants, goes through herbivores and ends in carnivores.
  Plants-----> Herbivores ------> Primary carnivores-----> secondary carnivores
- This type of food chain depends on the autotrophs which capture the energy from solar radiation.



Food chain in a forest.

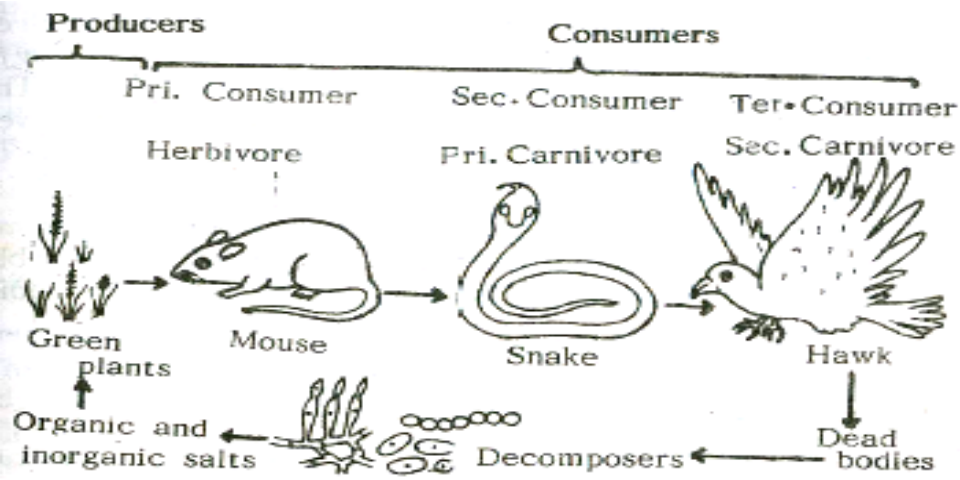
A few chains are given below

Grass --------> Grasshopper --------> Lizard --------> Hawk
Grass --------> Mouse ----------> Snake ---------> Hawk
Phytoplankton ----------> Zooplankton ----------> Fishes ---------> Snakes

- The grazing food chain is further divided into two types, namely
  - Predator chains
  - Parasitic chains

Predator chains

- In predator food chains one animal capture and devours another animal.
- The animal which is called prey and the animal which eats other animals is called predator.
- The predator food chain is formed of plants, herbivores, primary carnivores, secondary carnivores and so on.



Food chain in a grassland.

Parasitic chain

- The plants and animals of the grazing food chain are infected by parasites.
- The parasitic chain within the grazing food chain is formed.

Detritus food chain

- It starts with dead organic matter and ends in inorganic compounds.
- There are certain groups of organisms which feed exclusively on the dead bodies of animals and plants.
- These organisms are called Detritivores.
- The Detritivores include algae, bacteria, fungi, protozoans, insects, millipeds, centripeds, crustaceans, mussels, clams, annelid worms, nematodes, ducks, etc.
- These organisms ingest and digest the dead organic materials.
- Some amount of energy is trapped and the remainder is excreted in the form of simple organic compounds.
- These are again used by another set of Detritivores until the organic compounds are converted into CO2 and water.

Dead organic materials ----------> Detritivores ----------> CO2 + H2O

Linking of Grazing and Detritus Food Chains

- The two main food chains cannot operate independently.

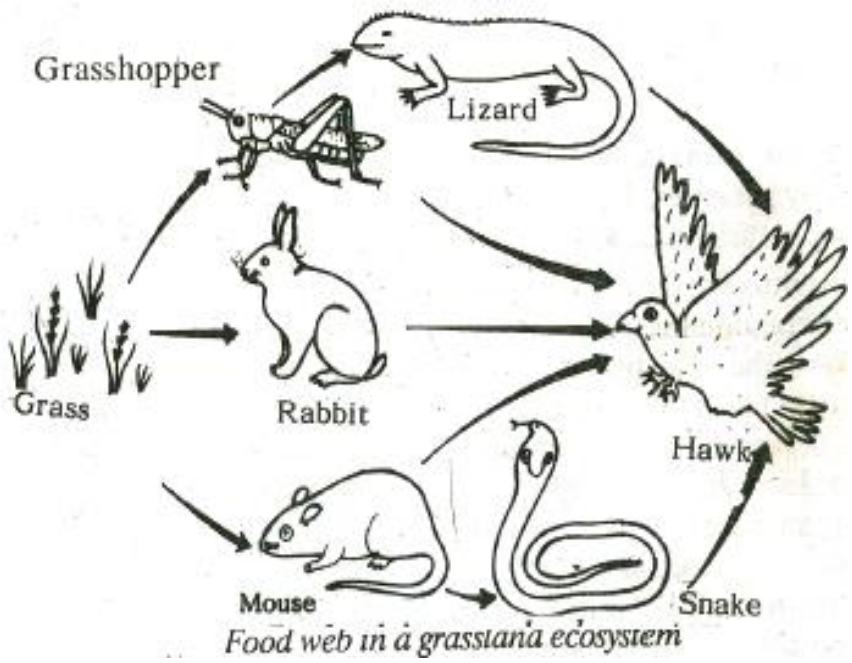
- They are interconnected at various levels.
- According to Wilson and Bossert (1971) the stability of the ecosystem directly proportional to the number of such links.
- The detritus feeders obtain energy form the dead bodies of animals and plants which are components of the grazing food chain.
- Again some of the detritus feeders are eaten by the consumers of the grazing food chain.
- For example, in a pond ecosystem earthworms belonging to the detritus food chain are eaten by fishes belonging to the grazing food chain.

FOOD WEB

- In an ecosystem the various food chains are interconnected with each other to form a net work called food web.
- The interlocking of many food chains is called food web.
- Simple food chains are very rare in nature.
- This is because each other organisms may obtain food from more than one trophic level.
- In other words, one organism forms food for more than one organisms of the higher trophic level.

Examples

- In a grassland ecosystem, grass is eaten by grasshopper, rabbit and mouse.
- Grasshopper is eaten by lizard which is eaten by hawk.
- Rabbit is eaten by hawk.
- Mouse is eaten by snake which is eaten by hawk.
- In addition hawk also directly eats grasshopper and mouse.
- Thus there are five linear food chains which are inter interconnected to form a food web.
- This is a very simple food web.
- But in any ecosystem the food web is more complex.
- For example, in the grassland itself, in addition to hawk, there are many other carnivores such as vulture, crow, wolf, fox, man, etc.



Food web in a grassland ecosystem

Significance of Food Web

- Food webs are very important in maintaining the stability of an ecosystem.
- For example, the deleterious growth of grasses is controlled by the herbivores.
- When one type of herbivores becomes extinct, the other types of herbivores increase in number and control the vegetation.
- Similarly, when one type of herbivores animal becomes extinct, the carnivores predating on this type may eat another type of herbivore.

CLASSIFICATION OF ECOSYSTEMS

- The ecosystem may be large, as large as the world or small, as small as a cow dung ecosystem.
- The biosphere (the total life content of the world) is the major ecosystem.
- It comprises all other ecosystems.

Mega Ecosystem

- The biosphere is formed of four mega ecosystems.

(i) Marine Ecosystem

- It includes saline-water ecosystems like oceans, seas, estuaries, brackish waters, etc.

(ii) Limnic Ecosystem

- It includes all fresh water ecosystems like pond, pools, lakes, rivers, streams, etc.

(iii) Terrestrial Ecosystems

- It includes the ecosystems of air, forests, grasslands, deserts, etc.

(iv) Industrial Ecosystems

- These are man-made ecosystems. Eg. Cropland, city town, etc.

Macro Ecosystems

- The mega ecosystem is further divided into sub units called macro ecosystems.

Examples

- Forests.
- The terrestrial macro ecosystem is formed of many forest ecosystem.

Meso Ecosystems

- The macro ecosystem is further divided into meso ecosystems.

Examples

- The forest ecosystem is formed of many meso ecosystems like deciduous forest, coniferous forest, etc.

Micro Ecosystems

- The meso ecosystem is further divided into micro ecosystems.

Examples

- A low land in a forest, a mountain in a forest, etc.
- All ecosystems in the world are further divided into natural and artificial ecosystems.

Natural Ecosystems

- These are self-regulating systems without much direct human interference and manipulations.

Examples

- Ponds, lakes, rivers, seas, oceans, grasslands, deserts, etc.

Artificial Ecosystems

- These are man-made ecosystems.

Examples

- Crop lands, cities, towns, villages, etc.

POSSIBLE QUESTIONS

Part-A(20*1=20 Marks)

ONLINE EXAMINATION

Part- B (5*2=10 Marks)

1. Define environment.
2. What is meant by ecosystem? Write its types.
3. Write a short note on energy flow.
4. Add a note on ecological succession with an Example.
5. Write s note on food chains given example.

Part – C (5*6=30 Marks)

1. Explain in detail the components of ecosystems.
2. Explain in detail about the structure and functions of ecosystem.
3. What is the need for studying environmental studies?
4. What are food chains and food webs? Give examples and discuss their significance.
5. Describe in detail about Natural Resource and its types.

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ENVIRONMENTAL STUDIES

PART - A OBJECTIVE TYPE/MULTIPLE CHOI

ONLINE EXAMINATIONS ONE MARK

	UNIT 1		
S.NO	Question	Option 1	Option 2
1	Valuable, practical services that help to preserve ecosystem performed by nature are called_____	ecosystem service	biological control
2	The surrounding physical and biological factor with which organisms closely interact and remain adapted is known as _____	nature	ecology
3	The organic matter produced by the Photosynthetic activity of green plants is called as _____	light energy	cellular process
4	_____ is diffused into the ground by gravitational force	Rain water	Ocean
5	Solar energy stored in material such as wood, grain, sugar, and municipal waste is called _____	fossil fuels	biomass
6	Decomposers are otherwise called as _____	detritivores	primary consumers
7	Light energy is transformed into chemical energy by _____	photosynthesis	respiration
8	All food chains starts with _____ and ends with decay	environment	organisms
9	In grazer food chain the living plants are directly_____	destroy	consume
10	Energy transformation through the food chain is _____	regular	comfortable
11	_____ is the most populated city in India	Mumbai	Calcutta
12	The total number of major languages in India are _____	18	17

13	Any unit that includes all the organisms that interact with the physical environment is called _____	community	population
14	A pond, serves as a good example for a _____ water ecosystem	fresh	brackish
15	The type of ecosystem with the highest mean plant productivity is_____	tropical rain forest	temperate grassland
16	In an aquatic ecosystem, the tropic level equivalent to cows in grasslands is_____	nekton	zooplankton
17	Bhopal disaster occur on _____	Dec 4, 1982	Dec 3, 1984
18	Which gas was liberated in Bhopal gas tragedy?	Ethyl isothiocyanate	Sodium isothiocyanate
19	Smog is a combination of_____	air and water vapour	water and smoke
20	The most serious pollutant to rubber tyres is _____	CO2	CO
21	All species on earth together with their environments collectively comprise_____	lithosphere	hydrosphere
22	_____ is the study that deals with the interaction of organisms with their environment	Etiology	Ecology
23	Organisms that feed upon other living organisms as a source of energy and nutrients are called as_____	producers	consumers
24	A food web is _____	like a food chain	a set of interconnected food chains, illustrating the
25	The first tropic level refers to _____	all herbivores	all green plants
26	A biomass pyramid is important because it illustrates_____	how energy flows through a food we	the number of species in each tropic level
27	Fungi is/are _____	single-celled prokaryotes	Phototrophic eukaryotes
28	Basidiospores are considered to be a major source of _____	airborne allergens	water borne allergens

29	Man and biosphere programme is affiliated with _____	UNESCO	IUCN
30	_____ gases has an important role in maintaining atmospheric temperature	Nitrogen	Oxygen
31	Trichodermaharzianum has proved a useful microorganism for _____	reclamation of wastelands	bioremediation of contaminated
32	Non-Ionizing radiations with specific biological effects are_____	Gamma rays	Beta-rays
33	Radiations are harmful as it_____	causes skin cancer	causes anemic
34	Ozone depletion in the stratosphere will cause _____	increased incidence of skin cancer	forest tires
35	Maximum deposition of DDT will occur in _____	phytoplankton	cr
36	Most harmful environmental pollutants are _____	natural nutrients in excess	human organic wastes
37	_____ is not true regarding Green House Gases (GHG)	It can be removed from the atmosphere by a photochemical change	The use of chlorofluorocarbons (CFCs) in refrigeration systems increases GHG
38	Nuclear accidents mostly release radioactive _____ into the atmosphere	carbon	iodine
39	Minimum risk level of mercury is below_____ micro gram per dl of bloo	10	15
40	Low level ozone is referred to as _____ ozone	tropospheri	stratospheri
41	The ozone at ground level is primarily from _____ precursors	fossil fuel	CFCs
42	The most serious environmental effect posed by hazardous wastes is _____	air pollution	contamination of groundwater
43	EEAT scheme was launched during _____ Five Year Plan	5th	6th

44	Black lung disease is associated with _____	farmers	coal miners
45	Pottery workers are at high risk of _____ lung disease	asbestosis	asthm
46	_____ water is otherwise known as potable water	Raw	Irrigation
47	_____ is the totality of genes, species and ecosystems in a region	Habit	Habitat
48	_____ is the primary effect of excess phosphorous in the aquatic environment	Fixation	Nitrification
49	_____ pathogen is associated with amoebic dysentery	Protozo	Virus
50	The main source of water in India is_____	rain water	ground water
51	_____ are organisms consuming other living organisms	Carnivorous	Saprophages
52	Floods are caused by_____	afforestation	cutting the forests
53	An increase in altitude is similar to an increase in latitude in that_____	it becomes more sunny	it becomes warmer
54	In parasitism, _____	both species benefit	neither species benefits
55	_____ is not an example of a biome	Mid-latitude grasslan	Desert
56	Minute particles and liquid droplets are collectively called _____	convection current	ozone
57	_____ limits the mixing between troposphere and the other upper zones	Ozone	Stratospause
58	Water vapor contains a huge amount of stored energy known as _____	latent heat	solar energy
59	The source of energy of the sun is _____	nuclear fission	chemical reaction

60	Nuclear energy is derived by _____	combustion of atoms of U 235	fission of atoms of U 235

UCATION

ENCE

ICE QUESTIONS

S QUESTIONS

Option 3	**Option 4**	**Option 5**	**Option 6**	**Answer**
the green house effect	biosphere balancing			**ecosystem service**
forest	environment			**environment**
energy flow	primary productivity			**primary productivity**
River water	sea			**Rain water**
geothermal energy	natural gas			**biomass**
organic matter	secondary consumers			**detritivores**
recycling	productivity			**photosynthesis**
photosynthesis	fungi			**photosynthesis**
decay	grown			**consume**
propose	inefficient			**inefficient**
Delhi	Chennai			**Mumbai**
16	15			**16**

biosphere	ecosystem			**ecosystem**
marine	se			**fresh**
desert	tundra			**tropical rain forest**
phytoplankton	benthos			**zooplankton**
Dec 8, 1986	Dec 9, 1980			**Dec 3, 1984**
Methyl isocyanate	Phenyl isocyanate and phosgene			**Methyl isocyanate**
smoke and fog	fire and water			**smoke and fog**
O3	NO2			**O3**
atmosphere	biosphere			**biosphere**
Botany	Biology			**Ecology**
pests	decomposers			**consumers**
the set of prey species that are consumed by animals in	the tropic (feeding) levels that can be observed in			**a set of interconnected food chains, illustrating the**
sunlight	all animals			**all green plants**
the biomass of all organisms at each tropic	the number of tropic levels in a system			**the number of tropic levels in a system**
eukaryotes single-celled and primitive multi-celled	heterotrophic eukaryotes			**heterotrophic eukaryotes**
animal faeces	bioweapon			**airborne allergens**

WWF	WIPO			**UNESCO**
Argon	Carbon dioxide			**Carbon dioxide**
biological control of soil-borne plant pathogens	gene transfer in higher plants			**bioremediation of contaminated soils**
UV radiations	X-rays			**UV radiations**
alters body tissues	is unstable			**causes skin cancer**
global warming	hole			**hole**
eel	sea gull			**sea gull**
non-biodegradable chemicals	waste animal fee			**non-biodegradable chemicals**
It can absorb and emit infrared radiation	It does not affect the temperature of the earth			**It does not affect the temperature of the earth**
phosphorus	sulphur			**iodine**
20	25			**10**
ionosperi	exospheri			**troposphere**
oxygen	methane			**fossil fuel**
increased use of land for landfills	destruction of habitat			**contamination of groundwater**
7th	8th			**6th**

textile industry workers	sweepers			**coal miners**
silicosis	bronchitis			**silicosis**
Drinking	Surface			**Irrigation**
Biodiversity	Food chain			**Biodiversity**
Eutrophication	Radiation			**Eutrophication**
Bacteri	Worm			**Protozo**
surface water	sea water			**rain water**
Herbivorous	Biophages			**Biophages**
tilling the lan	constructing mega dams			**cutting the forests**
precipitation increases	it becomes colder			**it becomes colder**
one species benefits, but the other is weakene	one species benefits, and the other is not affecte			**one species benefits, but the other is weakene**
Forest-grassland ecotone	Tropical rain forest			**Forest-grassland ecotone**
UV radiation	aerosols			**UV radiation**
Tropause	UV radiation			**Ozone**
stored heat	mechanical energy			**latent heat**
nuclear fusion	photoelectric effect			**nuclear fusion**

fusion of atoms of U 235	the breaking of U 235 bonds			**fission of atoms of U 235**

Unit II

Syllabus

Natural Resources - Renewable and Non-renewable Resources: Natural resources and associated problems. Forest resources, Water resources, Mineral resources, Food resources, Energy resources, Land resources: Use and over-utilization, exploitation. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. Ill-effects of fireworks.

NATURAL RESOURCES

- Any component of the environment which can be transferred in a way such that it becomes more valuable and useful is termed as resource.
- Life on this planet earth depends upon the large number of things and services provided by the nature which are known as natural resources.

Resources

- There are two types of resources (i) renewable and (ii) non renewable resources

Renewable resources

- They have the capacity to renew. Example. Clean air, clean water.

Non renewable resources

- Available in minute quantities
- They cannot be regenerated
- Example. Ground water, minerals.

The major resources are (i) Forest (ii) water (iii) mineral (iv) food (v) energy and (vi) Land resources

FOREST RESOURCES:

- Forests are one of the most important resources of the world.
- They act as a blanket on the surface of the earth.
- Around 1/3rd of world land area was found to be forests.

USES OF FOREST:

Commercial uses

- Forests provide timber
- fire wood

- food material
- resin
- gum
- non edible oils,
- drugs
- medicine
- rubber
- fibers
- Bamboo.

Ecological uses:

- Production of Oxygen: Photosynthesis – earth's lungs
- Reducing global warming – sink for carbon di oxide
- Wild life habitat – 7 million species in tropical forests alone
- Regulation of hydrological cycle – prevent surface run off – giant sponges – 50-80% moisture.
- Soil conservation – hold solid particles tightly and prevent soil erosion – wind breaks.
- Pollution moderators: absorb toxic gases and purify air reduce noise pollution.

ASSOCIATED PROBLEMS OF FOREST RESOURCES

DEFORESTATION

Deforestation is mainly done for the following reasons:

- For shifting of Cultivation
- For fuel requirement
- To get raw materials for industrial use
- For the developmental projects of the Government
- To meet the growing food needs
- By overgrazing

CONSEQUENCES OF DEFORESTATION

1. Threatens many wild life species due to destruction of natural habitat
2. Biodiversity is lost along with that genetic diversity
3. Hilly regions are made prone to landslides
4. Soil erosion and loss of soil fertility
5. Hydrological cycle is affected
   (loss of rainfall, flood, drought etc)

TIMBER EXTRACTION AND MINING

The important effects of timber extraction are

- thinning of forests
- loss of biodiversity, particularly tr ee breading species
- soil erosion and loss of soil fertility
- migration of tribal people from one place to another in search of new forest
- extinction of tribal people and their culture

CONSTRUCTION OF DAMS

Uses of dams are

- Dams are regarded as symbol of national development.
- provides large scale employment of tribal people and increase the std. of living of
- them
- contribute for economic uplift and growth
- help in checking flood
- generate electricity
- reduce power and water shortage
- provide irrigation water
- provide drinking water to remote areas
- promote navigation and fishery.

Associated Environmental problems:

1. Displacement of tribal people
2. Loss of flora and fauna
3. Siltation and sedimentation near reservoir
4. Stagnation and water logging near reservoir
5. Growth of aquatic weeds
6. Micro climatic changes
7. causes earthquakes
8. Breeding of disease vectors

WATER RESOURCES

- Water is an indispensible resource. Around 97% of world surface is covered with water. Most of the animals and plants have 60-65% of water in their body.

USES OF WATER RESOURCES

Water is used for

- Domestic
- irrigation and
- industrial purposes

ASSOCIATED PROBLEMS OF WATER RESOURCES

- Due to economic development, rapid industrial growth and population explosion over utilization of ground water leads to rapid depletion of water resources, ground subsidence, lowering of water table and water logging.
- The use of ground water and surface water rate which are higher than that of recharge ultimately leads to Water scarcity, Water logging, Salination, alkalization.
- creates declining of water levels
- crops failure and reduction in agricultural production
- over pumping of ground water create drought 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

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

Causes:

- heavy rainfall, snow melt, sudden release of water from dams.
- Prolonged down pour leading to overflowing of rivers and lakes
- Reduction in carrying capacity due to obstructions or sediments etc.
- Deforestation, overgrazing, mining increases water run off
- Removal of dense forests from hilly regions

Effects:

- Submerges the flooded area
- Loss of soil fertility due to soil erosion
- Extinction of civilization at costal area

Flood management:

- Dams and reservoirs can be constructed
- Embankments and proper channel management
- Flood way should not be encroached
- Forecasting or flood warning
- Decrease of run off by infiltration through afforestation or rain water harvesting etc.

Drought : Unpredictable delay in climatic condition occurring due to monsoon rain failure.

Types:

- **Meterological** : in order of month or year, actual moisture supply at a given place consistently falls below critical level.
- **Hydrological:** deficiency in surface and subsurface water supplies
- **Agricultural:** inadequate soil moisture to meet the need of a particular crop at particular time or susceptibility of crops during different stages in its development
- **Socioeconomic:** reduction in the availability of food and social securing of people

Causes:

- Deforestation and lesser rainfalls coupled with cutting of trees for timber leads to desertification.
- Over drafting of ground water, subsidence of soil, drying of wetlands
- Pollution of soil with solid waste, industrial effluents etc makes land useless and dry
- Population explosion in man and livestock leads to enhanced requirement of timber, fuel wood, grazing
- Shifting cultivation

Effects:

- Increase of water in stream pond
- Ground water table get declined
- Loss of agricultural crops
- Loss of biodiversity
- Government spent a lot of money as drought relief fund

Control measures

- Rain water harvesting
- Watershed management
- Prevent deforestation
- Encourage afforestation

MINERAL RESOURCES

Environmental impacts of over extraction of mineral resources:

- Depending on the conditions of terrain and depth of ore deposits 2 types of mining operations are carried out. 1. open cast mining and 2. underground mining.

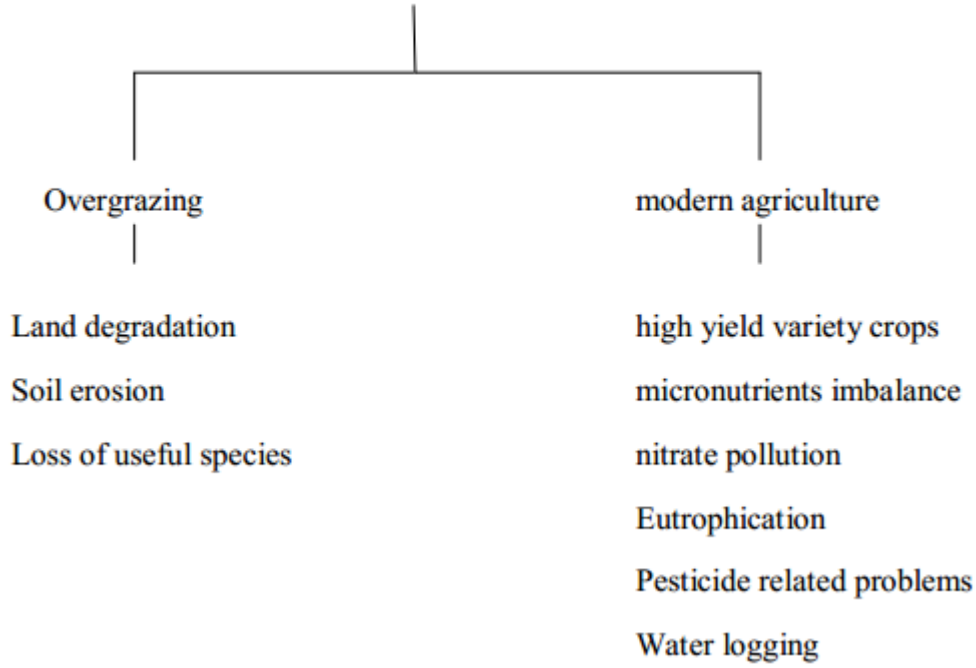
Both types of mining processes in each step produce several environmental effects such as,

- Deforestation takes place due to removal of vegetal covers.
- Great volume of debris has been generated which disrupt the surface and ground water circulation. It also reduces the water carrying capacity of streams very close to mining area

- The stacking of over burden and building of soil banks creates problems of landslides
- Under ground fire in coalmines is a hazard that is difficult to control
- Mining and ore processing normally causes air pollution and water pollution
- The acid water generated in coalmines can pose a serious problem of water pollution, which adversely affects the flora and fauna.
- Deeper excavation of ground causes lowering of water table, which leads to drying of wells or sea water intrusion
- In stone quarries, blasting of rocks not only annoying the people nearby, but also cause hazard from fly rocks and dusts and damage to buildings due to vibrations
- The disposal of waste material produced after concentrations of ore create increase concentration of heavy metals and toxic elements in the environment.

FOOD RESOURCES:

PROBLEMS FACED BY FOOD RESOURCES



CHANGES CAUSED BY OVERGRAZING AND AGRICULTURE:

Overgrazing:

Process of eating away the vegetation along with its roots without giving a chance to regenerate

- Land degradation-leads to organically poor, dry, compacted soil cannot be used for further cultivation
- Soil erosion-cover of vegetation gets removed from soil

- Loss of useful species-good quality grasses and herbs with high nutritive value, when grazed lose even the root stocks which carry the reserve food for regeneration get destroyed which gives raise to secondary species like parthenium, Lantane, Xanthium etc
- To prevent –match the forage supplement to the herd"s requirement.eg.Switch grass

Modern agriculture:

- The practice through which specific plant species are cared and managed so as to obtain maximum yield of consumable parts of plants –agriculture
- Makes use of hybrid seeds and selected and single crop variety, high tech equipment and lots of energy subsides in the form of fertilizers, pesticides and irrigation water e.g. green revolution

Due to modern agriculture

- Damage to soil occurs
- Water contamination takes place
- Water scarcity occurs
- Global climate change takes place
- Water logging-results when soil is over irrigated
- Soil salinity-increase plant productivity, interferes with water uptake by plants
- Fossil fuels and pesticides produce air pollution

Impacts related to high yielding varieties:

- Monoculture ie the same genotype is grown over vast areas. Disease spread easily
- Micronutrient imbalance e.g Zinc deficiency-affect soil productivity
- Nitrate pollution-nitrogenous fertilizers applied deep soil contaminates ground water. cause blue baby syndrome methaemoglobinemia- affects infants
- Eutrophication: Over nourishment of lakes due to agriculture field wash out -leads to algal bloom-dead organic matters increases due to decomposition-leads to oxygen demand

Problems associated with pesticide use:

- Evolution of genetic resistance
- Imbalance in ecosystem
- Creation of new pest
- Persistence, Bioaccumulation and Biomagnification
- Mobility through soil, water, air, washed away into rivers, streams, when it rains can harm fishes
- Creating super pest
- Death of non starget organisms
- Salinity
- Water logging

ENERGY RESOURCES

Growing energy needs:

- Population explosion, Luxurious life, Industries, Agriculture, mining, transportation, lighting, cooling, heating, building all need energy. Fossil fuels like coal, oil, natural gas produce 95% of energy

Sources of energy

Primary- **Renewable energy**-resources which can be generated continuously in nature and are in exhaustible and can be used again endlessly. wood, Tidal, Solar, wind, hydropower, biomass, biofuel, geothermal, hydrogen.

Non – renewable energy- Resources which have accumulated in nature over a long span of time and cannot be quickly replenished when exhausted.coal, petroleum, natural gas

Secondary-petrol, electrical energy, coal burning

Energy renewable	Advantage	Disadvantage
	1. Wide availability 2. Low cost 3. Decentralized power production 4. Low pollution 5. Available for the future	1. Unreliable supply 2. Produced in small quantity 3. Difficult to store 4. Cost more
Energy non renewable	1. Available in high concentrated form 2. Easy to store 3. Reliable supply 4. Lower cost	1.highly pollution Available only in few places High running cost Limited supply and will one day get exhausted

Use of alternate energy sources:

- Refers to energy sources which are not based on the burning of fossil fuels or the splitting of atoms. Such as solar energy, wind energy, hydro power, tidal energy, ocean thermal energy, geothermal energy, biomass energy.

LAND RESOURCE

- Land is critically important national resource which supports all living organisms including plants and animals. The soil profile of land determines its ability to serve socio-economic needs.

ASSOCIATED PROBLEMS

- Land Degradation: Land degradation is defined as the reduction in soil capacity to produce in terms of quality, quantity goods and services.
- Land slides- The hill slopes are prone to land slides, landslips, rockslides etc. These hazardous features have reduced the overall progress of the region as they obstruct the roads, communication media and water flow.
- Soil erosion:

ROLE OF INDIVIDUAL IN CONSERVATION OF NATURAL RESOURCES:

Natural resources are forest, water, soil, food, mineral and energy resources. Overuse of these resources cause problems

Conserve water:

- Don"t keep water taps running
- Install water saving toilets
- Check for water leaks
- Reuse soapy water
- Use drip and sprinkling irrigation

Conserve energy

- Turn off lights, fan when not in use
- Use solar cooker for cooking
- Try riding bicycle

Protect soil:

- Don"t uproot plants
- Grow grass which binds soil and prevent erosion
- Make compost
- Use green manure
- Don"t over irrigate
- Use mixed cropping

EQUITABLE USEOF RESOURCES FOR SUSTAINABLE IFE STYLE:

- Most developed countries like USA, Canada, Japan, Australia have 22% of natural resources, use 88%.73%of its energy and command 85%of its income
- Less developed countries has 78% of population, 12% Usage of natural resources, 27% of energy, 15% of income
- Gap arises due to increase in population distribution of resources and wealth
- Problem solved by equitable distribution of resources and wealth
- Global consensus has to be reached for more balanced distribution of basic resources like safe drinking water, food, fuel etc. So poor low developed countries able to sustain their life
- Two basic cause of unsustainability are over population in poor countries and over consumption of resources by rich countries generate wastes
- Rich countries lower down their consumption level
- Poor countries fulfilled by providing them resources

POSSIBLE QUESTIONS

Part-A(20*1=20Marks)

ONLINE EXAMINATION

Part- B (5*2=10Marks)

1. Define pollution
2. Define air pollution with a real time Example.
3. What is thermal pollution?
4. Describe soil pollution.
5. List out any four causes of water pollution given example.
6. Mention effects of noise pollution.

Part – C (5*6=30 Marks)

1. What are the adverse effects and control measures of water pollution? Explain.
2. What are the major sources of soil pollution? How does soil pollution affect soil productivity?
3. Discuss various effects and control measures of air pollution.
4. Explain in detail about Water Pollution Give Real Time Example.
5. Discuss in detail about Solid Waste Management.

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ENVIRONMENTAL STUDIES

PART - A OBJECTIVE TYPE/MULTIPLE CHO

ONLINE EXAMINATIONS ONE MARK

	UNIT 2		
S.NO	**Question**	**Option 1**	**Option 2**
1	_____is one of the following is the non-renewable resource	Water	Oxygen
2	_____ soil is the best for plant growth	Sandy soil	Clay
3	_____ of stratosphere provides protection to our life	Nitrogen	Hydrogen
4	Atomic energy is obtained by using the ores of _____	copper	uranium
5	The death of last individual of a species is called _____	extinction	cla
6	Red data books provide a list of _____	advanced plants	rare, endangered or endemic species
7	The areas of sociology that covers the size, compensation and distribution of population is called _____	environmental sociology	geography
8	Both power and manure are provided by _____plants	thermal	nuclear
9	The resources that are derived from bio-mass of living organisms are called _____ resources	renewable	non-renewable
10	_____ is the major raw material for biogas	Plant leaves	Cow dung
11	Bio gas generation is mainly based on the principle of _____	fermentation	degradation
12	The number of lives births per 1000 people in a population in a year is known as _____	fecundity	the crude birth rate
13	The dramatic increase in agricultural production that have been made possible by highyield “miracle crops” are called_____	biotechnical revolution	bioeconomic revolution
14	The nation whose government is promoting large families because of an aging population and low fertility rate is _____	the United States	India
15	The two components that acid rain contains that are most damaging to the environment are sulfuric acid and _____	nitric acid	carbon dioxide
16	Blue revolution is associated with _____	agriculture	iron and steel

17	A form of energy or matter that is essential for the functioning and sustained survival of living organism within a specific population or ecosystem is called _____	resources	natural resource
18	Water which is an universal solvent for most of the biochemical and biological process, constitutes about the total volume of _____ billion kilometers	15	20
19	The complete failure of monsoon rainfall with a dry climate accompanied by acute shortage of water causes _____	soil erosion	flash flood
20	The study of minerals is called _____	geology	mineralogy
21	The resources that are obtained from any non-living materials are called _____resources	non-renewable	renewable
22	_____ is the degradation of land in arid, semi-arid and dry sub-humid areas	Land fertility	Desertification
23	_____ is a useful biological indicator of sulphur-dioxide pollution	Bryophytes	Algal blooms
24	_____deserts are formed between tall mountain ranges which prevent moisture-rich clouds from reaching areas on the ice, or protected side, of the range	Polar	Trade win
25	Oil spills are a source of pollution for_____	water	land and water
26	Air is composed of gases, water vapours and _____	rainfall	snowfall
27	_____ is a water borne disease	Small Pox	Meningitis
28	Increase in global mean temperature causes _____	greenhouse effect	forest fire
29	_____ is the gas that produces the most damaging acid rains	SO2	NO2
30	_____ is the natural phenomenon, caused by an unlimited and unprecedented Rainfall	Soil erosion	Cyclone
31	_____ scale is useful to record the force of win	decibel	richter
32	The first 'Green revolution' in _____ produced a large amount of food	1960s	1970s
33	_____ is a nonrenewable energy resource	Solar	Methane
34	_____ types of habitats are there in a biosphere	4	2
35	Flora is the _____ life occurring in a particular region or time	plant	animal
36	_____ is the leading source of energy used in the United States today	coal	oil resources
37	The energy used for all plant life processes is derived from _____radiation	ultra violet	infra re
38	Of all of the energy production in the United States, _____ percentage is lost in distribution and inefficient use	10	25
39	_____ is least likely to contain an oil trap	an anticline	fault

40	_____ rock types would most likely be the best oil reservoir	Granite	Shale
41	About 75% of electricity comes from water in _____	South America	India
42	Two-thirds of the world's known oil reserves are located in _____	Siberia	gulf of mexico and caribbean
43	Oil derived from coal, oil shales or tar sands is called _____	natural gas	biomass
44	India ranks _____ amongst the wind-energy producing countries of the world	first	second
45	_____ energy is derived from heated groundwater	solar	geothermal
46	Gobar gas is obtained from_____	manure	cow dung
47	Water used for paper mills should not contain _____	magnesium	sodium
48	Oil spills are a source of pollution for_____	water	land and water
49	_____ is not a primary pollutant	Particulate matter	Carbon monoxide
50	Ozone releases _____ atoms	carbon	nitrogen
51	World's most problematic aquatic weed is _____	azoll	wolffi
52	The pollutant that causes hole in the ozone layer is _____	SF6	nitrous oxide
53	Air is composed of gases, water vapours and _____	rainfall	snowfall
54	The newspaper contains one of the following toxic materials which is _____	C	P
55	_____ cycle is not a gaseous biogeochemical cycle in ecosystem	Nitrogen	Carbon
56	_____ book written by Rachel Carson resulted in banning DDT in USA	Silent spring	The environmentalism
57	_____rain that contains chemical waste and causes of damage to plants and animals	Smog	Acid Rain
58	Increased surface UV leads to increased _____ozone	troposphere	stratosphere
59	Carbon dioxide is called green-house gas because it is _____	transparent to sunlight but traps heat	transparent to heat but traps sunlight
60	The slow rate of decomposition of fallen logs in nature is due to their _____	poor nitrogen content	low moisture content

DUCATION

IENCE

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DICE QUESTIONS

KS QUESTIONS

Option 3	**Option 4**	**Option 5**	**Option 6**	**Answer**
Sunlight	Coal			**Coal**
Gravel	Loamy Soil			**Loamy Soil**
Ozone	Argon			**Ozone**
lithium	radium			**uranium**
vanished	climax			**extinction**
disease resistant animals	minerals			**rare, endangered or endemic species**
anthropology	demography			**demography**
biogas	hydroelectric			**biogas**
environmental	natural			**renewable**
Mud	Grass			**Cow dung**
purification	sedimentation			**fermentation**
fertility	the basic demographic equation			**the crude birth rate**
green house effect	green revolution			**green revolution**
France	Chin			**France**
water	nitrogen			**nitric acid**
irrigation	fishing			**fishing**

environment	forest			**resources**
25	30			**15**
loss of bio-diversity	drought			**drought**
mining science	metallurgy			**mineralogy**
natural	environmental			**non-renewable**
Ecosystem	Vegetation			**Desertification**
Pseudomonas	Lichens			**Lichens**
Rain shadow	Costal			**Rain shadow**
land and air	air and noise			**land and water**
dust particles	light			**dust particles**
Diarrhea	Choler			**Choler**
desertification	loss of fertility			**greenhouse effect**
CO2	H2			**SO2**
Floods	Hightening			**Floods**
beaufort	fujit			**richter**
1980s	1990s			**1960s**
Hydroelectric	Coal			**Coal**
3	6			**4**
human	microbial			**plant**
natural gas	nuclear power			**oil resources**
bet	solar			**solar**
40	50			**40**
natural stratigraphy	syncline			**syncline**

Sandstone	Salt			**Sandstone**
Australia	China			**South Ameri**
the middle east	indonesia			**the middle east**
syncrude	biogas			**syncrude**
third	fourth			**fourth**
hydroelectric	nuclear			**solar**
crop residues	fossil			**cow dung**
iron	chlorine			**iron**
land and air	air and noise			**land and water**
Sulfuric acid	Nitrogen oxides			**Sulfuric acid**
oxygen	hydrogen			**oxygen**
eichorni	trap			**eichorni**
CFCs	PFCs			**CFCs**
dust particles	light			**dust particles**
Mg	Hg			**P**
Sulphur	Phosphorus			**Phosphorus**
Biomagnification	Food chain			**Silent spring**
Seasonal Rain	Monsoon Rain			**Acid Rain**
Ionosphere	exosphere			**troposphere**
used in green-house to increase plant growth	transparent to both sunlight and heat			**transparent to sunlight but traps heat**
low cellulose content	anaerobic environment around them			**low moisture content**

Unit III

Syllabus

Biodiversity and Its Conservation: Introduction, definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

BIODIVERSITY AND ITS CONSERVATION

Biodiversity and its conservation

- If we divide the whole earth's mass into 10 billion parts, it is only in one part where life exists and the astounding variety of living organ-isms numbering somewhere around 50 million species are all restricted to just about a kilometer- thick layer of soil, water and air. Isn't it wonderful to see that so much diversity has been created by nature on this earth from so little physical matter!
- Biodiversity refers to the variety and variability among all groups of living organisms and the ecosystem complexes in which they occur.
- From the driest deserts to the dense tropical rainforests and from the high snow-clad mountain peaks to the deepest of ocean trenches, life occurs in a marvellous spectrum of forms, size, colour and shape, each with unique ecological inter-relationships.
- Just imagine how monotonous and dull the world would have been had there been only a few species of living organisms that could be counted on fingertips!
- In the Convention of Biological diversity (1992) biodiversity y has been defined as the variability among living organisms from all sources including *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they arc a part.

Biodiversity

- Biodiversity is the abbreviated word for "biological diversity" (bio-life or living organisms, diversity-variety).
- Thus biodiversity is the total variety of life on our planet, the total number of races, varieties and species.
- The sum of total of various types of microbes, plants and animals (producers, consumers and decomposers) in a system.

Levels of Biodiversity

- Units of biodiversity may range from the genetic level within a species to the biota in a specific region and may extend up to the great diversity found in different biomes.

GENETIC DIVERSITY

- It is the basic source of biodiversity.
- The genes found in organisms can form enormous number of combinations each of which gives rise to some variability.
- Genes are the basic units of hereditary information transmitted from one generation to other.
- When the genes within the same species show different versions due to new combinations, it is called genetic variability.
- For example, all varieties belong to the species *Oryza*, but there are thousands of wild and cultivated varieties of rice which show variations at the genetic level and differ in their color, size, shape, aroma and nutrient content of the grain.
- This is the genetic diversity of rice.

SPECIES DIVERSITY

- This is the variability found within the population of a species or between different species of a community.
- It represents broadly the species richness and their abundance in a community.
- There are two popular indices of measuring species diversity known as *Shannon -Wiener index* and *Simpon index*.

What is the number of species on this biosphere?

- The estimates of actual number vary widely due to incomplete and indirect data.
- The current estimates given by Wilson in 1992 put the total number of living species in a range of 10 million to 50 million.
- Till now only about 1.5 million living and 300.000 fossil species have been actually described and given scientific names.
- It is quite likely that a large fraction of these species may become extinct even before they are discovered and en-listed.

ECOSYSTEM DIVERSITY

- This is the diversity of ecological complexity showing variations in ecological niches, strophic structure, food-webs, nutrient cycling etc.
- The ecosystems also show variations with respect to physical parameters like moisture, temperature, altitude, precipitation etc.
- Thus, there occurs tremendous diversity within the ecosystems, along these gradients.
- We may consider diversity in forest ecosystem, which is supposed to have mainly a dominance of trees.
- But, while considering a tropical rainforest, a tropical deciduous forest, a temperate deciduous forest and a boreal forest, the variations observed are just too many and they are mainly due to variations in the above mentioned physical factors.
- The ecosystem diversity is of great value that must be kept intact.
- This diversity has developed over millions of years of evolution.
- If we destroy this diversity, it would disrupt the ecological balance.
- We cannot even replace the diversity of one ecosystem by that of another.

- Coniferous trees of boreal forests cannot take up the function of the trees of tropical deciduous forest lands and vice versa, because ecosystem diversity has evolved with respect to the prevailing environmental conditions with well regulated ecological balance.

BIOGEOGRAPGHICAL CLASSIFICATION OF INDIA

- India has different types of climate and topography in different parts of the country and these variations have induced enormous variability in flora and fauna.
- India as a rich heritage of biological diversity and occupies the tenth position among the plant rich nations of the world.
- It is very important to study the distribution, evolution, dispersal and environmental relationship of plants and animals in time and space.
- Biogeography comprising of Phytogeography and zoogeography deals with these aspects of plants and animals.
- In order to gain insight about the distribution and environmental interactions of flora and fauna of our country, it has been classified into ten biogeographic zones.
- Each of these zones has its own characteristic climate, soil, topography and biodiversity.

India's major bio-geographic habitats

S. No.	Biogeographic Zone	Biotic Province	Total area (Sq.Km.)
1	Trans-Himalayan	Upper Regions	186200
2	Himalayan	North-West Himalayas West-Himalayas Central Himalayas East Himalayas	6900 720000 123000 83000
3	Desert	Kutch Thar Ladakh	45000 180000 NA
4	Semi-Arid	Central India Gujarat-Rajwara	107600 400400
5	Western Ghats	Malabar Coast Western Ghat Mountains	59700 99300
6	Deccan Peninsula	Deccan Plateau South Central Plateau Eastern Plateau Chhota Nagpur Central Highlands	378000 341000 198000 217000 287000
7	Gangetic Plain	Upper Gangetic Plain Lower Gangetic Plain	206400 153000
8	North-East India	Brahmaputra Valley North-Eastern Hills	65200 106200
9	Islands	Andaman Islands Nicobar Islands Lakshadweep Islands	6397 1930 180

10	Coasts	West Coast East Coast	6500 6500

Value of Biodiversity

- The value of biodiversity in terms of its commercial utility, ecological services, social and aesthetic value is enormous.
- We get benefits from other organisms in innumerable ways.
- Sometimes we realize and appreciate the value of the organism only after it is lost from his earth.
- Very small, insignificant, useless looking organisms may play a crucial role in the ecological balance of the ecosystem or may be a potential source of some invaluable drug for dreaded diseases like cancer or AIDS.
- The multiple uses of biodiversity or biodiversity value has been classified by McNeely *et al* in 1990.

i) Consumptive use value

- These are direct use values where the biodiversity product can be harvested and consumed directly.
    - E.g. fuel, food, drugs, fibre, etc.

Food

- A large number of wild plants are consumed by human beings as food.
- About 80,000 edible plant species have been reported from wild.
- About 90% of present day food crops have been domesticated from wild tropical plants.
- Even now our agricultural scientists make use of the existing wild species of plants that are closely related to our crop plants for developing new hardy strains.
- Wild relatives usually possess better tolerance and hardiness.
- A large number of wild animals are also our sources of food.

Drugs and medicines

- About 75% of the world's population depends upon plants or plant extracts for medicines.
- The wonder drug *Penicillin* used as an antibiotic is derived from a fungus called *penicillium.*
- Likewise, we get *Tetracyclin* from a bacterium.
- Quinine, the cure for malaria is obtained from the bark of Cinchona tree, while *Digitalin* is obtained from foxglove (Digitalis) which is an effective cure for heart aliments.
- Recently *vinblastin* and *vincristine*, two anticancer drugs, have been obtained from Periwinkle (*Catharanthus*) plant, which possesses anticancer alkaloids.
- A large number of marine animals are supposed to possess anti-cancer properties which are yet to be explored systematically.

Fuel

- Our forests have been used since ages for fuel wood.
- The fossil fuels coal, petroleum and natural gas arc also products of fossilized biodiversity.

- Firewood collected by individuals are not normally marketed, but are directly consumed by tribals and local villagers, hence falls under consumptive value.

ii) Productive use values

- These are the commercially usable values where the product is marketed and sold.
- It may include lumber or wild gene resources that can be traded for use by scientists for introducing desirable traits in the crops and domesticated animals.
- These may include the animal products like tusks of elephants, musk from musk deer, silk from silk-worm, wool from sheep, fir of many animals, lac from lac insects etc, all of which are traded in the market.
- Many industries are dependent upon the productive use values of biodiversity.
    - **E.g.** the paper and pulp industry, Plywood industry, Railway sleeper industry, Silk industry, textile industry, ivory-works, leather industry, pearl industry etc.
- Despite international ban on trade in products from endangered species, smuggling of fur, hide, horns, tusks, live specimen etc. worth millions of dollars are being sold every year.
- Developing countries in Asia, Africa and Latin America are the richest biodiversity centers and wild life products are smuggled and marketed in large quantities to some rich western countries and also to China and Hong Kong where export of cat skins and snake skins fetches a booming business.

iii) Social Value

- These are the values associated with the social life, customs, religion and psycho-spiritual aspects of the people.
- Many of the plants are considered holy and sacred in our country like Tulsi (holy basil), Peepal, Mango, Lotus, Bael etc.
- The leaves, fruits of flowers of these plants are used in worship or the plant itself is worshipped.
- The tribal people are very closely linked with the wild life in the forests.
- Their social life, songs, dances and customs are closely woven around the wildlife.
- Many animals like Cow, Snake, Bull, Peacock, Owl etc. also have significant place in our psycho-spiritual arena and thus hold special social importance.
- Thus biodiversity has distinct social value, attached with different societies.

iv) Ethical value

- It is also sometimes known as existence value.
- It involves ethical issues like "all life must be preserved".
- It is based on the concept of "Live and Let Live".
- If we want our human race to survive, then we must protect all biodiversity, because biodiversity is valuable.
- The ethical value means that we may or may not use a species, but knowing the very fact that this species exists in nature gives us pleasure.
- We all feel sorry when we learn that "passenger pegion" or "dodo" is no more on this earth.
- We are not deriving anything direct from Kangaroo, Zebra or Giraffe, but we all strongly that these species should exist in nature.

- This means, there is an ethical value or existence value attached to each species.

v) Aesthetic value

- Great aesthetic value is attached to biodiversity.
- No one of us would like to visit vast stretches of barren lands with no signs of visible life.
- People from far and wide spend a lot of time and money to visit wilderness areas where they can enjoy the aesthetic value of biodiversity and this type of tourism is now known as eco-tourism.
- The "Willingness to pay" concept on such eco-tourism gives us even a monetary estimate for aesthetic value of biodiversity.
- Ecotourism is estimated to generate about 12 billion dollars of revenue annually that roughly gives the aesthetic value of biodiversity.

vi) Option values

- These values include the potentials of biodiversity that are presently unknown and need to be explored.
- There is a possibility that we may have some potential cure for AIDS or cancer existing within the depths of a marine ecosystem, or a tropical rain-forest.
- Thus option value is the value of knowing that there are biological resources existing on this biosphere that may one day prove to be an effective option for something important in the future.
- Thus, the option value of biodiversity suggests that any species may prove to be a miracle species someday.
- The biodiversity is like precious gills of nature presented to us.
- We should not commit the folly of losing these gills even before unwrapping them.
- The option value also includes the values, in terms of the option to visit areas where a variety of flora and fauna, or specifically some endemic, rare or endangered species exist.

vii) Ecosystem service value

- Recently, a non-consumptive use value related to self maintenance of the ecosystem and various important ecosystem services has been recognized.
- It refers to the services provided by ecosystems like prevention of soil erosion, prevention of floods, maintenance of soil fertility, cycling of nutrients, fixation of nitrogen, cycling of water, their role as carbon sinks, pollutant absorption and reduction of the threat of global warming etc.
- Different categories of biodiversity value clearly indicate that ecosystem, species and genetic diversity all have enormous potential and a decline in biodiversity will lead to huge economic, ecological and socio-cultural loss.

THREATS TO BIODIVERSITY

- Extinction or elimination of a species is a natural process of evolution.
- In the geologic period the earth has experienced mass extinctions.
- During evolution, species have died out and have been replaced by others.
- However, the rate of loss of species in geological past has been a slow process, keeping in view the vast span of time going back to 444 million years.

- The process of extinction has become particularly fast in the recent years of human civilization.
- In this century, the human impact has been so serve that thousands of species and varieties are becoming extinct annually.
- One of the estimates by the noted ecologist, E.O. Wilson puts the figure of extinction at 10, 000 species per year or 27 per day.
- This startling figure raises an alarm regarding the serious threat to biodiversity.
- Over the last 150 years the rate of extinction has escalated more dramatically.
- If the present trend continues we would lose $1/3^{rd}$ to $2/3^{rd}$ of our current biodiversity by the middle of twenty first century.
- Let us consider some of the major causes and issues related to threats to biodiversity.

LOSS OF HABITAT

- Destruction and loss of natural habitat is the single largest cause of biodiversity loss.
- Billions of hectares of forests and grasslands have been cleared over the past 10,000 years for conversion into agricultural lands, pastures, settlement areas or development projects.
- These natural forests and grasslands were the natural homes of thousands of species which perished due to loss of their natural habitat.
- Severe damage has been caused to wetlands thinking them to be useless ecosystems.
- The unique rich biodiversity of the wetlands, estuaries and mangroves are under the most serious threat today.
- The wetlands are destroyed due to draining, filling and pollution thereby causing huge biodiversity loss.
- Sometimes the loss of habitat is in installments so that the habitat is divided into small and scattered patches, a phenomenon known as habitat fragmentation.
- There are many wild life species such as bears and large cats that require large territories to subsist.
- They get badly threatened as they breed only in the interiors of the forests.
- Due to habitat fragmentation many song birds are vanishing.
- There has been a rapid disappearance of tropical forests in our country also, at a rate of about 0.6% per year.
- With the current rate of loss of forest habitat, it is estimated that 20-25% of the global flora would be lost within a few years.
- Marine biodiversity is also under serious threat due to large scale destruction of the fragile breeding and feeding grounds of our oceanic fish and other species, as a result of human intervention.

POACHING

- Illegal trade of wildlife products by killing prohibited endangered animals i.e., poaching is another threat to wildlife.
- Despite international ban on trade in products from endangered species, smuggling of wildlife items like furs, hides, horns, tusks, live specimens and herbal products worth millions of dollars per year continuous.

- The developing nations in Asia, Latin America and Africa are the richest source of biodiversity and have enormous wealth of wildlife.
- The rich countries in Europe and North America and some affluent countries in Asia like Japan, Taiwan and Hong Kong are the major importers of the wild life products or wild life itself.
- The trading of such wild life products is highly profit making for the products who just hunt these prohibited wild life and smuggle it to other countries mediated through a mafia.
- The cost of elephant tusks can go upto $100 per kg; the leopard fur coat is sold at $100,000 in Japan while bird catchers can fetch upto $10,000 for a rare hyacinth macaw, a beautiful coloured bird, from Brazil.
- The worse part of the story is that for every live animal that actually gets into the market, about 50 additional animals are caught and killed.
- If you are fond of rare plants, fish or birds, please make sure that you are not going for the endangered species or the wild-caught species.
- Doing so will help in checking further decline of these species.
- Also do not purchase furcoat, purse or bag, or items made of crocodile skin or python skin.
- You will certainly help in preserving biodiversity by doing so.

MAN-WILDLIFE CONFLICTS

- We have discussed about the need to preserve and protect our wildlife.
- However, sometimes we come across conflicting situations when wildlife starts causing immense damage and danger to man and under such conditions it becomes very difficult for the forest department to pacify the affected villagers and gain local support for wild-life conservation.
- Instances of man animal conflicts keep on coming to lime light from several states in our country.
- In Sambalpur, Orissa 195 humans were killed in the last 5 years by elephants.
- In retaliation the villagers killed 98 elephants and badly injured 30 elephants.
- Several instances of killing of elephants in the border regions of Kote-Chamarajanagar belt in Mysore have been reported recently.
- The man-elephant conflict in this region has arisen because of the massive damage done by the elephants to the farmer's cotton and sugarcane crops.
- The agonized villagers electrocute the elephants and sometimes hide explosives in the sugarcane fields, which explode as the elephants intrude into their fields.
- In fact, more killings are done by locals than by poachers.
- Recently, in early 2004, a man-eating tiger was reported to kill 16 Nepalese people and one 4-year old child inside the Royal Chitwan National Park, 240Km South west of Kathmandu.
- The Park renowned for its wildlife conservation effort has become a zone of terror for the locals.
- At times, such conflicting situations have been reported from the border regions of Corbett, Dudhwa, Palamau and Ranthambore National Parks in our country as well.
- Very recently in June, 2004 two men were killed by leopards in Powai, Mumbai.

- A total of 14 persons were killed during 19 attacks since January by the leopards from the Sanjay Gandhi National Park, Mumbai which has created a panic among the local residents.

Causes of Man-animal conflicts

- Dwindling habitats of tigers, elephants, rhinos and bears due to shrinking forest cover compels them to move outside the forest and attack the field or sometimes even humans.
- Human encroachment into the forest areas raises a conflict between man and the wildlife, perhaps because it is an issue of survival of both.
- Usually the ill, weak and injured animals have a tendency to attack man.
- Also, the female tigress attacks the human if she feels that her newborn cubs are in danger.
- But the biggest problem is that if human-flesh is tasted once then the tiger does not eat any other animal.
- At the same time, it is very difficult to trace and cull the man-eating tiger and in the process many innocent tigers are also killed.
- Earlier, forest departments used to cultivate paddy, sugarcane etc. within the sanctuaries when the favorite staple food of elephants i.e. bamboo leaves were not available.
- Now due to lack of such practices the animals move out of the forest in search of food.
- It may be noted that, one adult elephant needs 2 quintals of green fodder and 150 kg of clean water daily and if it is not available, the animal strays out.
- Very often the villagers put electric wiring around their ripe crop fields.
- The elephants get injured, suffer in pain and turn violent.
- Earlier there used to be wild-life corridors through which the wild animals used to migrate seasonally in groups to other areas.
- Due to development of human settlements in these corridors, the path of wildlife has been disrupted and the animals attack the settlements.
- The cash compensation paid by the government in lieu of the damage caused to the farmers crop is not enough.
- In Mysore, a farmer gets a compensation of Rs. 400//- per quintal of expected yield while the market price is Rs. 2400/- per quintal.
- The agonized farmer therefore gets revengeful and kills the wild animals.

Remedial Measures to Curb the Conflict

- Tiger conservation project (TCP) has made provisions for making available, vehicles, tranquillizer guns, binoculars and radio sets etc. to tactfully deal with any imminent danger.
- Adequate crop compensation and cattle compensation scheme must be started, along with substantial cash compensation for loss of human life.
- Solar powered fencing should be provided along with electric current proof trenches to prevent the animals from straying into fields.
- Cropping pattern should be changed near the forest borders and adequate fodder, fruit and water should be made available for the elephants within forest zones.
- Wild life corridors should be provided for mass migration of big animals during unfavorable periods.

- About 300 km^2 area is required for elephant corridors for their seasonal migration.
- In similipal Sanctuary, Orissa there is a ritual of wild animal hunting during the months of April-May for which forest is burnt to flush out the animals. Due to massive hunting by people, there is a decline in prey of tigers and they start coming out of the forest in search of prey.
- Now there is WWF-TCP initiative to curb this ritual of "Akhand Shikar" in Orissa.

POSSIBLE QUESTIONS

Part-A(20*1=20Marks)

ONLINE EXAMINATION

Part- B (5*2=10Marks)

1. Define Biodiversity.
2. Write a note on biogeographical area of India.
3. Define consumptive use value.
4. What is meant by productive use value?
5. Mention any two approaches of biodiversity conservation.
6. What is meant by genetic biodiversity?
7. Write the social value of biodiversity.
8. What is consumptive values?
9. Define endangered species.
10. List out the major Biosphere Reserves in India.
11. Give a short note on ecosystem diversity.

Part – C (5*6=30 Marks)

1. Explain genetic diversity, species diversity and ecosystem diversity.
2. Explain in detail about values of biodiversity.
3. Discuss in detail about Biogeographical classification of India.
4. Write a short note on
    a. Social value (ii) Ethical value (iii) aesthetic value and (iv) Option value
5. What are the various types of biodiversity? List out major biodiversity zones of India.
6. Explain in detail about habitat loss and poaching of wildlife.
7. What are the threats to biodiversity? Discuss the remedial steps that can curb the conflict.
8. As an individual in this biosphere how will you conserve natural resources?

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ENVIRONMENT

PART - A OBJECTIVE TYPE/MU

ONLINE EXAMINATIONS

UNIT 3

S.NO	Question	Option 1
1	_____ plants also consume coal and produce similar pollutants	Green
2	The most important indoor air pollutant is	radon gas
3	Fossil fuel burning produces black soot	white soot
4	Pollutants also erode waxy coating of the leaves called	photosynthesis
5	Sound is mechanical energy from a _____ source	floating
6	CPCB stands for	Central Pollution Control Board
7	Proper _____ will reduce the noise from the machinery	cleaning
8	Excess of fluoride in drinking water causes defects in teeth and bones called	fluorosis
9	Nitrate when present in excess in drinking water causes	bioaccumulation
10	_____ are used to kill pests that damage crops	Pesticides
11	Thermal power plants generate a large quantity of	fire
12	_____ from the fertilizers in soil reach nearby	Nitrogen & phosphorus
13	_____ organic waste should be used for generation of biogas	Biodegradable
14	Radioactive substances are present in	land
15	The isotopes release energy in the form of	gamma rays

16	The _____ particles are fast moving positively charged particles	beta
17	Metabolic activities of aquatic organisms increase at high temperature and require more	oxygen
18	COD stands for	chemical oxygen damage
19	Mercury dumped into water is transformed into water soluble methyl mercury by _____ action	viral
20	Compounds containing nitrogen and phosphorus helps in the growth of	algae
21	No fire works or fire crackers shall be used between	10.00 p.m. and 6.00 a.m.
22	Noise can cause temporary or permanent	visual loss
23	Air pollutants mixing up with rain can cause high _____ in fresh water lakes	alkality
24	_____ causes constriction of respiratory passage and can cause bronchitis like conditions	SO2
25	Presence of waste heat in the water which can cause undesirable changes in the natural environment is known as	air pollution
26	Power plants utilize only _____ of the energy provided by fossil fuels for their operations	1/3
27	_____ becomes a barrier for oxygen penetration into deep cold waters	Low temperature
28	Fish migration is affected due to formation of various	thermal zones
29	Decomposing organic matter in soil also produces	good vapours
30	_____ should be used for methane generation	plastic
31	Solid waste management can be classified as municipal, _____ agricultural, medical, miningwaste and sewage sludge.	chemical
32	solid waste management can be classified as _____types	4
33	_____includes anatomical wastes, pathological wastes, infectious wastes etc	Bio medical waste
34	_____ waste contains a variety of discarded materials like polyethylene bags, empty metal and aluminum cans,	horticulture
35	The urban solid waste materials that can be degraded by micro-organisms are called _____	biodegradable wastes

36	Wastes that cannot be degraded by micro-organisms are called_____	biodegradable wastes
37	Soil waste management stress on three 'R's-Reduce,_____ and recycle before destruction and safe storage of wastes.	Reuse
38	_____ is the reprocessing of discarded materials into new useful products.	Rotation
39	Types of discarding wastes are sanitary landfill, composting and _____	Incineration
40	small effort made by each individual at his own place will have pronounced effect at the global level as _____	Think globally act locally
41	The _____ tragedy occurred in a suburb of Niagara Falls, New York.	Bhopal gas
42	Fog which formed due to accumulation of cold air at the bottom of the river valley persisted for 4 consecutive days, is called	Rotation
43	Geological processes like earthquakes, volcanoes, floods and landslides are normal natural events which have resulted in the formation of the earth called as	Creative management
44	_____ occur due to sudden movements of earths crust	Earthquakes
45	The point on a fault at which the first movement occurs during an earthquake is called the _____	Valcono
46	Earthquake-generated water waves called _____ can severely affect coastal areas	Ocean
47	Heavy rains or sudden snow melt the quantity of water in streams exceeds their capacity and water overflows the banks and causes inundation of the surrounding land is called_____	flood
48	_____occurs when coherent rock of soil masses move downslope due to gravitational pull.	flood
49	_____ of water gradually cause chemical weathering of rocks making them prone to landslides.	physicl action
50	Tropical _____ in the warm oceans are formed because of heat and moisture	water
51	SST means_____	sea surface temperature
52	Tropical cyclones are called _____ in the Atlantic, Caribbean and north eastern Pacific	Typoons
53	Tropical cyclones are called _____in the western Pacific	hurricanes
54	Tropical cyclones are called _____in the the sea around Australia	willy willies
55	_____ are recurring phenomena in the tropical coastal regions	hurricanes

56	In India,_____ is considered to be amongst the worst flood hit states of the country	Andhra pradesh
57	_____ pollution can be prevented by using really clean fuel i.e. hydrogen fuel	Air
58	CFC stands for_____	chlorofluorocarbons
59	_____ in the use of raw materials will correspondingly decrease the production of waste.	Reduction
60	_____consists of a large number of materials including factory rubbish, packaging material,Metals etc.	Industrial waste

F HIGHER EDUCATION

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TAL STUDIES

LTIPLE CHOICE QUESTIONS

ONE MARKS QUESTIONS

Option 2	Option 3	Option 4	Option 5	Option 6	Answer
Fertilizer	Metallurgical	Power			**Metallurgical**
bio-gas	LPG gas	bio-mass			**radon gas**
red soot	green soot	black soot			**black soot**
cuticle	biphenyls	bronchitis			**cuticle**
winding	vibrating	tracking			**vibrating**
Central Population Control Board	Central Prevention Control Board	Central Perspective Control Board			**Central Pollution Control Board**
replacing	changing	oiling			**oiling**
methaemoglobinemia	minamata disease	Itai-itai			**fluorosis**
biomagnification	fluorosis	blue baby syndrome			**blue baby syndrome**
Fertilizer	Crop boosters	Refineries			**Pesticides**
lava	fly ash	radon gas			**fly ash**
strontium & isotopes	radium & uranium	iodine & caesium			**Nitrogen & phosphorus**
Microbial	Solid wastes	Effluents			**Biodegradable**
ocean	nature	space			**nature**
sun rays	moon rays	light rays			**gamma rays**

teta	alpha	gamma			**alpha**
nitrogen	carbon-di-oxide	helium			**oxygen**
chemical ozone damage	chemical oxide damage	chemical over damage			**chemical oxygen damage**
fungal	bacterial	acidic			**bacterial**
fungai	virus	bacteria			**algae**
10.00 a.m. and 6.00 p.m.	6.00 p.m. and 10.00 a.m.	6.00 a.m. and 10.00 p.m.			**10.00 p.m. and 6.00 a.m.**
physical loss	hearing loss	internal loss			**hearing loss**
acidity	abscission	necrosis			**acidity**
H2O	CO2	O2			**SO2**
water pollution	noise pollution	thermal pollution			**thermal pollution**
2/3	1/4	1/2			**1/3**
Very low temperature	High temperature	Very High temperature			**High temperature**
water zones	final zones	solar zones			**thermal zones**
waste vapours	toxic vapours	water vapours			**toxic vapours**
paper	iron	Cattle dung			**Cattle dung**
industrial	mechanical	Biomedical			**industrial**
5	6	7			**6**
mechanical waste	chemical waste	industrial waste			**Bio medical waste**
Domestic	construction	agricultural			**Domestic**
mechanical waste	Non biodegradable wastes	industrial waste			**biodegradable wastes**

industrial waste	mechanical waste	Non biodegradable wastes			**biodegradable wastes**
Risk	Rotation	Reproduction			**Reuse**
Recycling	Risk	Reproduction			**Recycling**
Dioxin	polychronite	Biodegrade			**Incineration**
Talk globally act locally	Teach globally act locally	To globally act locally			**Think globally act locally**
Air gas	Love canal	Donar air			**Love canal**
inversion	comparison	formation			**inversion**
Inversion Management	Disaster management	information management			**Disaster management**
Valcono	Flood	landslide			**Earthquakes**
Epicenter	landslide	Flood			**Epicenter**
Flood	tsunamis	Earthquake waves			**tsunamis**
Creative manangement	landslide	Epicenter			**flood**
Epicenter	Landslide	Earthquakes			**Landslide**
Water action	Chemical action	Biological action			**Chemical action**
Flood	cyclones	landslide			**cyclones**
sea space temperature	space surface temperature	surface space temperature			**sea surface temperature**
cyclones	willy willies	hurricanes			**hurricanes**
Typoons	cyclones	willy willies			**Typoons**
hurricanes	Typoons	cyclones			**willy willies**
willy willies	cyclones	Typoons			**cyclones**

Uttar Pradesh	Maharastra	Kerala			**Uttar Pradesh**
Water	Ocean	Soil			**Air**
chlorofluorocarbons	chlorofluorocarbondioxide	chemical fluorocarbons			**chlorofluorocarbons**
Rotation	Decrease	Reproduction			**Reduction**
Domestic waste	Agricultural	Biological			**Industrial waste**

Unit IV

Syllabus

Environmental Pollution - Definition, Causes, effects and control measures of Air pollution, Water pollution, Soil pollution , Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: Foods, earthquake, cyclone and landslides.

ENVIRONMENTAL POLLUTION

Definition

Pollution may be defined as an undesirable change in the physical, chemical or biological characteristics of our air, water and land that may or will harmfully affect human life, the lives of the desirable species, our industrial processes, living conditions and cultured assets, or that may or will waste or deteriorate our raw material resources.

Types of environmental pollution

- Air pollution
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards

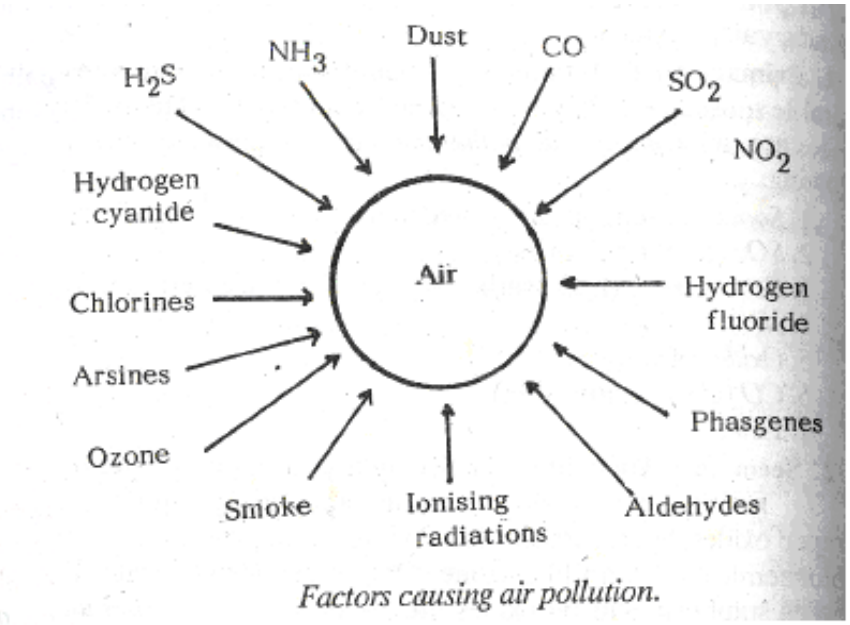
AIR POLLUTION

- Air pollution refers to the undesirable change occurring in air causing harmful effects on man and domesticated species.

Air pollutants

- Dust
- Smoke
- Sulphur oxides (CO)
- Nitrogen oxides (SO_2)
- Ammonia (NH_3)
- Nitrogen dioxide(NO_2)
- Hydrogen cyanide

- Hydrogen fluorides
- Hydrogen sulphide (H_2S)
- Chlorines
- Phosgenes
- Arsines
- Aldehydes
- Ozone
- Ionizing radiations
- CO_2



Factors causing air pollution.

Air pollutants are two types

- Primary air pollutants
- Secondary air pollutants

Primary Air Pollutants

- Air is polluted by poisonous gases and undesirable substances.
- They are released by burning fossil fuels.
- These substances are called primary air pollutants.
- The tissues present in the tip of dusheri mango turns black when they are exposed to sulphur dioxide (SO_2) fumes.

The primary pollutants are following

- Soot released from unburned fuel
- SO_2

- Benzopyrene (hydrocarbon) released from cigarette smoke.
- NH_3
- Oxides of nitrogen
- CO (carbon monoxide)
- Lead

Secondary Air Pollutants

- Secondary air pollutants are poisonous nitrogen oxides, hydrocarbons and O_2 interact to produce more powerful photochemical oxidants like ozone (O_3), peroxyacetyl nitrate (PAN), Aldehydes, sulphuric acid, peroxides, etc.
- All these constitute photochemical smog.

CAUSES OF AIR POLLUTION

Agriculture

- Hydrocarbons released by plants, pollen grains, insecticides etc. cause air pollution.

Dust

- Dust in the air is increased by dust storms, wind, volcanoes, automobiles, etc.

Industries

- The Combustion of fossil fuels like coal, petroleum, etc. in industries is the main source of pollution.

Automobiles

- The combustion of petrol and diesel in automobiles releases harmful gases into the air.
- They also produce dust.

Ionising Radiations

- Ionizing radiations include alpha particle, beta particles and gamma rays.
- They are released into the air from testing atomic weapons and atomic explosions.

Freons

- Use of freons and other chlorine-flourine-carbons as refrigerants, coolants and as filling agents in aerosol pachages cause pollution.

Aerosols

- Aerosols are small particles of all sorts of solid or liquid substances suspended in the air.
- They block the stomata of plants and prevent he gaseous exchanges between plants and atmosphere.
- They may also change the climate of an area.

Biological indicators

- Some plants are sensitive to certain air pollutants.
- These plants are used to indicate the presence of these substances.
- These plants are called biological indicators

Example

- Pinto beans and petunias are used to indicate the presence of peroxy acetyl nitrate (PAN).
- Tobacco and annual blue-grass plants are used to show the presence of ozone (O_3).

ECOLOGICAL EFFECTS OF AIR POLLUTION

Death

When air is polluted with poisonous gases, death comes as a result immediately. Bopha episode is a good example.

Bhopal episode

- On 2nd December 1984about 3000 human beings died about 5000 paralysed and thousands of cattle, bird, dogs and cats died in one night at Bhopal.
- This mass death is due to the leakage of methyl isocyanate (toxic gas) into the air from art insecticide plant managed by Union Carbide.

Chlorosis

- The disappearance of chlorophyll is called Chlorosis.
- It is caused by SO_2 and fluorides present in the air.

Necrosis

- The breakdown of cells is called necrosis.
- It is caused by SO_2, nitrogen dioxide, ozone and fluorides.

Green house effect

- CO_2 is released into the air by the combustion of fuels.
- It is estimated that CO_2 content of the is increasing at the rated 0.4% per annum.
- This will result in an appreciable warming up of the ear.
- This is called green house effect.
- It is very likely that this will cause the melting of polar ice caps resulting in a rise of nearly 60 feet on the sea level.

- Coastal regions and low lying areas allover the world will be go under water.

Crop losses

- Heavy loss of crop plants is caused by smog.
- Smog denotes a combination of smoke and fog.
- The important components of s ozone and PAN (Peroxyacetyl nitrate).
- They damage leafy vegetables, cereals, textile crops, ornamental plants, fruits and forest trees.

Respiratory disorders

- Excessive ethylene accelerates respiration causing premature senescence (old age) and abscission (accumulation of yellow fluid (pus) in the body).
- Aldehydes irritate nasal and respiratory tracts.
- Chlorine and phosgenes (carbonyl chloride) cause pulmonary oedema.

Nausea

- H_2S smells like rotten eggs and nausea.

Vomiting

- SO_2 causes vomiting.

Jaundice

- Arsines induce RBC breakdown and jaundice.

Oxygen carrying capacity

- CO reduces O_2 carrying capacity of RBC by its permanent combination with haemoglobin.

Coughing

- Coughing is induced by phosgenes (carbonyl chloride).

Headache

- SO_2 causes headache.

Cancer

- Cancer is caused by air pollutants like ash, soot, smoke. chromium, nickel and radioactive elements.

Mutation

- Radioactive elements produce mutation.
- Ozone produces chromosomal aberrations.

Cardiac diseases

- Cadmium causes high blood pressure and heart diseases.

Pneumonia

- Pneumonia is caused by breathing in too much of manganese particles.

Depletion of Ozone Umbrella

- In the atmosphere, about 30km above the surface of the earth, the ozone molecules (O_3) form an umbrella.
- It prevents the penetration of harmful ultra violet radiation from the sun and thus protects the life of the earth.
- It is now feared that there is danger of appearing holes on the ozone umbrella.
- This is caused by the use of freons and other chlorine-fluorine-carbons as refrigerents, coolants in domestic refrigerators and otter cold storage facilities, and as filling agents in foam plastics and in aerosol packages.
- Reaching ozone umbrella, they destroy ozone molecules as a result of photochemical reactions.
- Over the past 16 years, the density of the ozone layer has been diminishing at an average rate of 3%.
- It is calculated that the depletion of ozone layer by I% results in an increase in the incidence of skin cancer by 5% to 7%.

Acid Rains

- One of the major environmental issues facing human society at the National and International level is the problem of acid.
- The rainwater is always slightly acidic as CO_2 in the atmosphere gets dissolved in it.
- However during recent years, it has been noted a further lowering of pH of rainwater often as 2.4.
- This lowering of pH is due to the dissolution of acids in the rain water.
- Precipitation of oxides of sulphur and nitrogen with rain is termed acid rain.
- Acid rain is caused by air pollution.
- When atmospheric air contains sulphur dioxide (SO_2) and oxides of nitrogen such as nitrous oxide (N_2O) and nitric oxide (NO), they dissolve in rainwater forming sulphuric acid and nitric acid.
- The rain water falls as acid rain.
- The main source of oxides of sulphur and nitrogen is the burning of fossil fuels in power plants based on coal and oil contribute more than 60% of all sulphur oxides and 25 to 20% of nitrogen oxides in the atmosphere.
- Automobiles make a sustainable contribution in large cities.
- Ozone is now recognized as a major factor in the formation of acid rain.

- Acid rain affects both materials and organisms.
- It attacks building materials principally sandstone, limestone, marble, steel and nickel.
- In plants, it leads to Chlorosis (gradual yellowing in which the chlorophyll making mechanism is impeded) or depigmentation of leaves.
- Acid rain increases the acidity of lakes and rivers.
- Vast tracts of forests and lakes in Europe and North America have been destroyed by acid.
- Acidity kills fish, bacteria and algae and the aquatic ecosystem collapses into sterility leaving a crystal clear but ultimately a dead lake.

CONTROL OF AIR POLLUTION

- The emission of exhaust from automobiles can be reduced by devices, such as positive crankcase ventilation valve and catalytic converter.
- Electrostatic precipitators can reduce smoke and dust from industries.
- Later birds, cats and dogs which me the marine animals died.
- Finally many men who ate fish, crabs and shell fish died.
- Their initial symptoms of Minamata disease include the numbness of limbs, lips and tongue, impairment of motor control, deafness and blurring of vision.
- Finally it affects and destroys the brain.
- As a result of the attack of Minamata disease about 17 persons died and 23 became permanently disabled in the year 1953, in Japan.

Diarrhoea

- It is caused by mercury, cadmium and cobalt.

Mortality of Plankton and Fish

- Chlorine which is added to water control the growth of algae and bacteria in the cooling system of power stations may persist in streams to cause the mortality of plankton and fish.

Reduction in Productivity

- Intensive agriculture increases the amount of silt in lakes and rivers.
- Silt prevents the penetration of light to depths and thus reduces primary production.

Siltation

- Siltation is a phenomenon by which the gills of fish deposited with silt.
- This causes heavy mortality among fishes.

Poor Oxygenation

- Oil present on the surface of water prevents water oxygenation.
- This reduces respiration and metabolism in aquatic organisms.

Poor Photosynthesis

- Oil-pollution prevents photosynthesis in phytoplankton.

Red Tide

- When coastal waters are enriched with nutrients of sewage dinoflagellates multiply rapidly and form bloom.
- This blooming lat. liberate into the water toxic metabolic by-products which can result in a large scale death of marine fishes.
- This is called red tide.

Biochemical Oxygen Demand

- Sewage enriches the water with nutrients.
- This causes rapid growth of plankton and algae.
- This leads to oxygen depletion in water.
- The oxygen depletion causes the death of algae.
- They decay and decomposition of algae consumes more oxygen from water.
- Biochemical Oxygen Demand or biological oxygen demand (BOD) is the amount of oxygen required by the microorganisms in water.
- BOD is higher in polluted water (sewage) and lesser in drinking water.
- Increased BOD lowers the contents of dissolved O_2 in water causing the suffocation and death of aquatic flora and fauna.

Water-borne diseases

- Disease like jaundice, cholera, typhoid, diarrhoea, etc. are transmitted through water contaminated with sewage.

Methaemoglobinema

- The nitrate used in fertilizers enters the intestine of man through drinking water.
- In the intestine it is converted into nitrite.
- Nitrite is absorbed into the blood where it combines with haemoglobin to form methaemoglobin: Methaemoglobin cannot transport oxygen.
- This leads to suffocation and breathing troubles, especially in infants.
- This disease is called methaemoglobinema.
- Gaseous pollutants arising from industries can be removed by differential solubility of gases in water.
- A finepray of water in the device called scrubber can separate many gases like NH_3, SO_2, etc. from the emitted exhaust.
- Certain gases can be removed by filtration or absorption through activated carbon.

- Certain gases can be made chemically inert by chemical conversion.
- At the Government level pollution can be controlled by framing legislations.

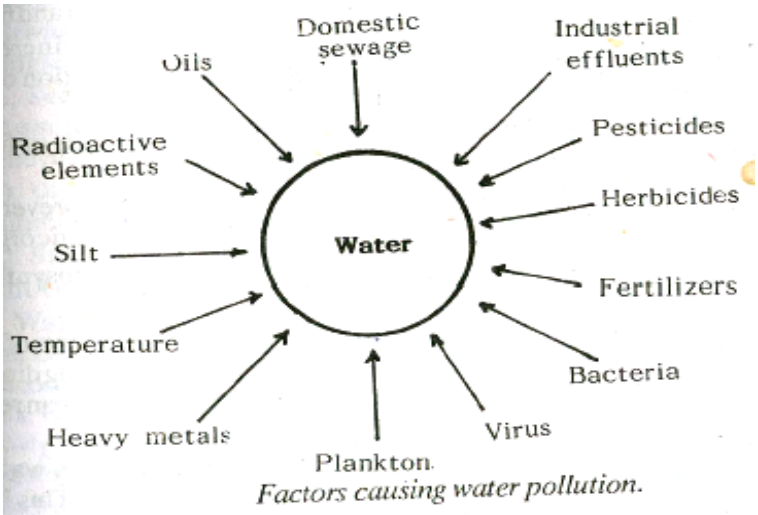
WATER POLLUTION

- Water is the soul of nature; its pollution will perish the world.
- Water pollution refers to the undesirable change occurring in water which may harmfully affect the life activities of man and domesticated species.

Water pollutants

The common water pollutants are as follows

- Domestic sewage
- Industrial effluents
- Pesticides
- Herbicides
- Fertilizers
- Bacteria and viruses
- Plankton blooms
- Heavy metals like mercury
- Temperature
- Silt
- Radioactivity
- Oils, etc.



Factors causing water pollution.

CAUSES OF WATER POLLUTION

Domestic sewage

- Domestic sewage consists of human faeces, urine, and the dirty used-up water in houses.
- It contains a large number of pathogenic bacteria and virus.
- The sewage is released into the rivers on the banks of which most of the cities are situated.

Industrial effluents

- All industrial plants produce some organic and inorganic chemical wastes.
- Those nonusable chemicals are dumped in water as a means of getting rid of them.
- The industrial wastes include heavy metals (Hg, Cu, lead zinc etc), detergents, petroleum, acids, alkalies, phenols, carbonate, alcohol cyanides, arsenic, chlorine, etc.

Thermal Pollution

- Many industries use water for cooling.
- The resultant warm water is discharged into rivers.
- This brings about thermal pollution.

Agricultural pollution

- The fertilizers used for crops are washed into ponds and rivers.

Pesticides

- Pesticides are used to control pests in fields and houses.
- They include DDT, BHC, endrin etc.

Radioactive wastes

- Liquid radioactive wastes are released into the sea around nuclear installations.
- The oceanic currents carry the radioactive contaminants everywhere.
- Oil pollution
- Oil is a source of pollution in sea-water.
- Oil pollution is due to ship accidents, loading and discharging of oil at the harbour, oil refineries and off-shore oil production.

Retting

- The process of decaying coconut husk to get fibre for making coir is called retting.
- Retting releases H_2S.
- It makes water polluted.

ECOLOGICAL EFFECTS OF WATER POLLUTION

Minamata disease

- This disease is caused by mercury poisoning.
- It is characterized by crippling and death.
- This disease appeared in a coastal town, Minamata, in Japan.

- The primary cause for this disease was a p industry which was started on the san coast of Japan in 1905.
- From this factory a by-product called mercury was disposed into the sea.
- This mercury cumulated in marine animals.

Eutrophication

- Domestic sewage and fertilizers add large quantities of nutrients such as nitrates and phosphates to the fresh water ecosystems.
- The rich supply of these nutrients makes blue green algae, green algae and other phytoplankton to grow abundantly.
- This increased productivity of lakes and ponds brought about by nutrient enrichment is known as eutrophication.
- As the algae use O_2 of the water for respiration, the O_2 is depleted from the water.
- The rapid growth also consumes all the nutrients of the water.
- The depletion of O_2 and nutrients lead to the death of algae and other phytoplankton.
- As other organisms, such as zooplankton and fishes of the water, depend on the blue green algae and phytoplankton for their food, they also die.
- This eutrophication leads to the complete depletion of the fauna from the ecosystem.

CONTROL OF WATER POLLUTION

Sewage Treatment

Pollution control by sewage treatment includes the following steps

- Sedimentation
- Dilution
- Storage

(i) Sedimentation

- When sewage is allowed to stand, the suspended particles settle to the bottom.
- So by sedimentation the suspended particles are removed from sewage.

(ii) Dilution

- The sewage can be diluted with water.
- This increases the O_2 contents and reduces BOD and CO_2.

(iii) Storage

- The diluted sewage is stored in a pond.
- This facilities the growth of microorganisms.
- This renders further oxidation of sewage.

Waste stabilization pond or oxidation pond

- The national Environmental Engineering Research Institute (NEERI) at Nagpur has devised a very economical method for the treatment of industrial and domestic effluents.

- Domestic and industrial wastes are stored in a dilute condition in shallow ponds called oxidation or stabilization ponds.
- After a few days micro-organisms and algae flourish.
- The micro-organisms decompose the organic wastes by oxidation, and the water is purified.
- This water is rich in nitrogen, phosphorus, potassium and other nutrients.
- This water can be used for fish agriculture etc.

Recycling

- Pollution can be prevented to a certain extent by reutilizing the wastes.
- This is called recycling.

Example

- The dung of cows and buffaloes can be used for the production of gobargas.
- Sewage can be used for irrigation fish culture after treatment in oxidation pond.
- Certain pollutants from industrial effluents can be removed by filtration and selective absorption.
- Excessive use of pesticides and herbicides should be avoided.
- At the Government level, legislations should be framed to control water pollution.

SOIL POLLUTION

- The contamination of soil by human and natural activities which may cause harmful effects on living beings.

Causes

- Industrial waste
- Urban waste
- Agricultural practices
- Radioactive pollutants
- Biological agent

Effects

- Affect human health
- Affect soil fertility
- Reduce soil productivity
- Cause abnormalities

Control measures

- Properly collect solid waste
- Microbial degradation
- Recovery of products from waste

- For methane generation, use cattle dung
- For biogas generation, use biodegradable organic waste

NOISE POLLUTION

- The word noise has a Latin origin nausea meaning a feeling of sickness at the stomach with an urge to vomit.
- Noise is defined as unwanted sound or sound without value.
- Noise pollution is the unwanted sound dumped into the environment.
- Noise is measured by the unit decibel (dB).
- One decibel is equal to the faintest sound that can be heard by the human ears.
- Some people feel discomfort with the sound of 85dB.
- But more people do not feel discomfort with the sound of 115 dB.
- Pain is usually felt at 145dB.

Causes of Noise Pollution

- Scooters
- Motor bikes
- Cars
- Tempos
- Vans
- Buses
- Trucks
- Tractors
- Aircrafts
- Supersonic aircrafts
- Motor boats
- Ships
- Loud speakers
- Loud pop-music
- Social gatherings
- Machines of factories
- Mills
- Industries
- Kitchen appliances
- Fire crackers and generators are some of the chief sources of pollutions.

ECOLOGICAL EFFECTS OF NOISE POLLUTION

- Noise diminishes the power of hearing.
- It gives pain to the ear.
- It interferes with communication-systems.
- It causes stress.

- It causes fright.
- It increases the rate of heart beat.
- It causes the constriction of blood vessels.
- It increases blood pressure.
- It causes head-ache.
- It causes the dilation of pupil of the eye.
- It causes emotional upsets and
- It causes deafness.
- Noise causes physical or mental fatigue and lack of concentration.
- In industrial situations this effect results in lowered efficiency, reduced work rate and higher chances for accident.
- Noise disturbs sleep.
- High frequency or ultrasonic sound can affect the semicircular canals of the internal ear and cause nausea and dizziness.

CONTROL OF NOISE POLLUTION

Noise pollution can be controlled in the following ways

- Legislations should be framed.
- The sources that generate unwanted sound should be reduced.
- Noisy automobiles should be condemned.
- Wheels of automobiles should be oiled properly.
- Industrialists must take up necessary steps to control noise.
- Loudspeakers should be set at a low sound.
- Trees absorb noise and thus reduce noise pollution. So thick vegetation must be grown around industries, cities and on the sides of roads.
- Noise-producing machines should be placed in closed rooms.
- Residential houses should be constructed far away from in factories and airports.

THERMAL POLLUTION

- Increase or decrease in the temperature of water, air and land by human activity is called thermal pollution.

Sources of thermal pollution

CO_2

- CO_2 is produced during the combustion of fuel in houses, factories, power stations, etc.
- It is also released by plants and animals in the process of respiration.
- The CO_2 contents of the atmosphere has gone up by 15% in the past 100 years.
- It is estimated that by the year 2000 AD the increase in the CO_2 contents of the air will be nearly 25%.
- This will result in an appreciable warming up of the earth.
- This is called green house effect.

- It is very likely that this will cause the melting of polar ice caps.
- This will result in an ice caps will lead to rise of nearly 60 feet in sea level.
- As a result coastal areas and low-lying areas all over the world will be flooded and will go under water.

Hot water

- Power stations, industries and nuclear reactors use large quantities of water for cooling purposes.
- The resulting hot waters are released into the rivers.

ECOLOGICAL EFFECTS OF THERMAL POLLUTION

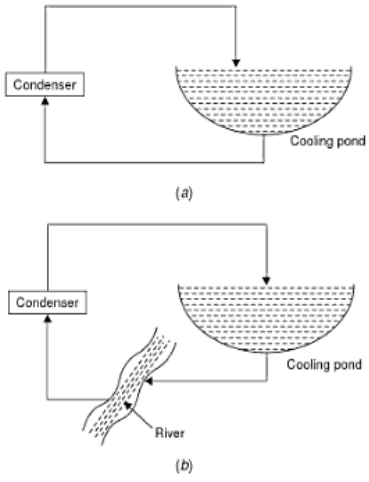
- When the temperature of the earth increases, ice caps melt. This will flood the coastal and low lying areas of land.
- A rise of 10°C in temperature increases the rate of exchange of salts between the organisms and the environment. This will accelerate the entry of toxins into the body from the external medium.

CONTROL OF THERMAL POLLUTION

- Cooling ponds
- Spray Ponds
- Cooling towers

Cooling Ponds

- Water from condensers is stored in ponds where natural evaporation cools the water which can then be recirculated or discharged in nearby water body.

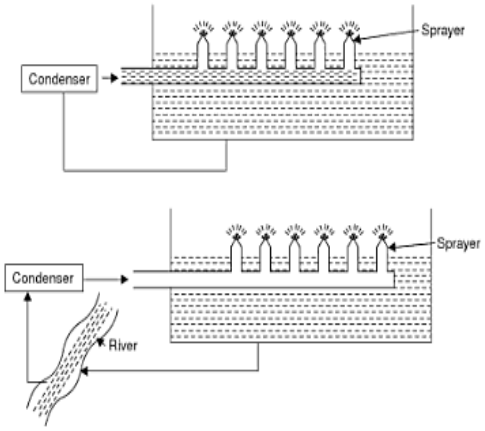


Dissipation of heat by cooling ponds

Spray Ponds

- The water from condensers is received in spray ponds.

- Here the water is sprayed through nozzles where fine droplets are formed.
- Heat from these fine droplets is dissipated to the atmosphere.

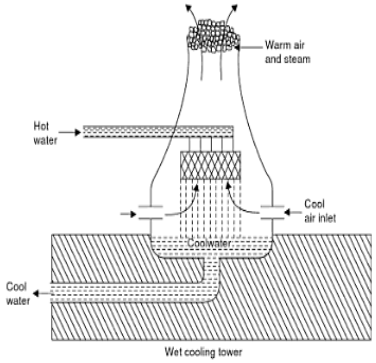


Dissipation of heat by spray ponds.

Cooling Towers

(i) Wet cooling tower

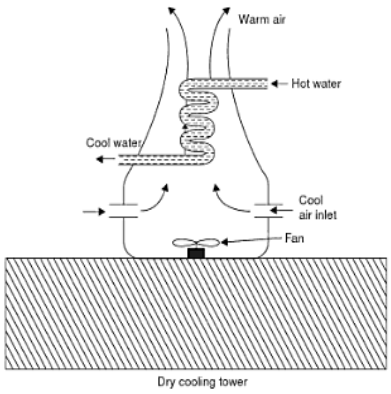
- Hot water is sprayed over baffles.
- Cool air entering from sides takes away the heat and cools the water.
- This cool water can be recycled or discharged.
- Large amount of water is lost through evaporation and in the vicinity of wet cooling tower extensive fog is formed which is not good for environment and causes damage to vegetation.



Wet cooling tower

(ii) Dry cooling tower

- The heated water flows in a system of pipes.
- Air is passed over these hot pipes with fans.
- There is no water loss in this method but installation and operation cost of dry cooling tower is many times higher than wet cooling tower.



POSSIBLE QUESTIONS

Part-A(20*1=20Marks)

ONLINE EXAMINATION

Part- B (5*2=10Marks)

1. What are the two important principles of watershed management?
2. Write a short note on rain water harvesting.
3. What is the need for water conservation?
4. What the objectives of rainwater harvesting?
5. What are the impacts of human activities on watershed?
6. What are the measures you will take for sustainable utilization of water?

Part – C (5*6=30 Marks)

1. Explain in detail about environment and human health
2. Give a detailed account on landslides and its disaster and rehabilitation management.
3. Explain in detail cyclone and its disaster management
4. Explain in detail about the value of education.
5. Explain in detail about watershed management.
6. Explain any one natural resource and its associated problem. What are the measures to be followed for its sustainable utilization?
7. Explain in detail about rain water harvesting.
8. Describe the role of individuals in conservation of natural resources.
9. Discuss in detail about resettlement and rehabilitation issues.

KARPAGAM ACADEMY OF HIGHER

DEPARTMENT OF COMPUTER

I B.Sc CS (Batch 2017-202

ENVIRONMENTAL STUD

PART - A OBJECTIVE TYPE/MULTIPLE C

ONLINE EXAMINATIONS ONE MA

UNIT 4

S.NO	Question	Option 1	Option 2
1	Which of the following is not an air pollutant ?	Smoke	Carbon Dioxide
2	Which part of plant evaporates water ?	Stomata	Fruit
3	A fossil fuel is best described as	a flammable solid or gas	a fuel that contains carbon.
4	An example of a non-renewable, non-fossil energy resource is	oil.	coal.
5	Which of the following is not a renewable energy source?	wind	solar
6	The term ‘exothermic’ refers to a chemical reaction	in which heat is absorbed.	in which heat is given out.
7	What percentage of the coal’s energy reaches the city?	approximately 30%	approximately 50%
8	How much of the energy contained in the diesel-oil fuel is not converted to electricity when burnt in the power station?	4800 kJ	3200 kJ
9	Mercury is particularly hazardous to human health because	it bioaccumulates high up the food chain.	as a heavy metal, it can cause serious impact injury.
10	Which of the following is the best description of sulfur dioxide?	a gas less dense than air	a gas more dense than air

11	The dosage of sulfur dioxide is best described as	a measure of the harm sulfur dioxide does to a person.	the amount of sulfur dioxide a person experiences in a given time.
12	The toxicity of mercury is best described as	how mercury enters the environment.	a measure of the harm mercury does to a person.
13	In some regions, the combination of acid rain and smog causes damage to forests that is worse than the impact of either acid rain or smog on its own. This is an example of	specificity.	acute toxicity.
14	Which one of the following best accounts for mercury's significant harm to the environment	persistence	degradability
15	The main purpose of the Environmental Risk Assessment is to	. ensure maximum local employment on the project.	. eliminate any disruption to the environment during repair.
16	Which one of the following factors best indicates that the dam repair is ecologically sustainable	disruption to local wildlife is temporary	employment is created during the repair project
17	After the dam is repaired, it is found that soil sediments in the flood plain of the river contain significant levels of phosphorus that were not present before the water release. A scientist suggests that this can be corrected by planting a particular type of vegetation that absorbs and bioaccumulates phosphorus from the soil. This is an example of	recycling.	soil bioremediation.
18	The dominant gas in biogas is:	CH4	C2 H5
19	Maximum amount of gas found in air is	Oxygen	Carbon dioxide
20	which state of matter, the distance between the molecules is minimum ?	Solid	Plasma
21	Which energy is converted into electrical energy by a solar cell ?	Nuclear Energy	Chemical Energy
22	Carrier of Dengue disease is	Aedes Mosquito	Culex Mosquito
23	Which state of India is known as 'Tiger State'? `	Gujarat	West Bengal

24	Which of the following has maximum speed ?	Air	Water Current
25	Tobacco addiction is caused due to	Cocaine	Nicotine
26	Which of the following is called artificial kidney?	dialyzer	donor kidney
27	Which of the following causes AIDS ?	Bacteria	Fungus
28	Global warming is caused due to	lack of rainfall	presence of a hole in ozone layer
29	The most abundant green house gas is	NO2	CO2
30	Which is considered as a future source of power, that can meet our unlimited demand	Hydel power	Hydrogen
31	What is the rate of growth of human population ?	10 million per year	90 million per year
32	Which is a better method to dispose large amounts of water carrying relatively small amounts of chemical wastes?	land filling method	Deep-well injection
33	Nuclear family refers to	Any family born after 1950	Family includes parents and their children
34	Which country has the maximum number of tube-wells in the world ?	America	Australia
35	Which of the following is not an air pollutant ?	Smoke	Carbon Dioxide
36	Which part of plant evaporates water ?	Stomata	Fruit
37	In elbow and knee joints, the bones can move in -	all directions	four directions
38	Which energy is converted into electrical energy by a solar cell ?	Chemical Energy	Nuclear Energy
39	Carrier of Dengue disease is	Aedes Mosquito	Culex Mosquito
40	Wildlife Week is celebrated on	1st October to 7th October	15th October to 2 1st October
41	In which state of matter, the distance between the molecules is minimum ?	Solid	Liquid
42	The biochemical laboratory of human body is	Stomach	Liver

43	Which state of India is known as 'Tiger State'?	Gujarat	West Bengal
44	Habitat of Dog Fish is	River	Pond
45	Which of the following has maximum speed ?	Air	Water Current
46	Tobacco addiction is caused due to	Cocaine	Caffeine
47	Ozone layer is found in	Thermosphere	Stratosphere
48	Full form of CNG is	Common National Gas	Compressed Natural Gas
49	Renewable source of energy is	Coal	Petroleum
50	Sugar is form of _____	Protein	Carbohydrate
51	The mosquito repellent (coils, mats and liquids) that we generally use in our homes are:	Pesticides	Fertilizers
52	The young ones of the frog are called:	Young frogs	Frog cubs
53	How many muscles are there in a human body?	600	700
54	A battery or cell converts _____ energy into electrical energy	Solar	Heat
55	We have days and nights because of:	Earth's rotation	Earth's revolution
56	Which of the following plays an important role in the cause of rainfall	Evaporation	Condensation
57	The process of solid changing into liquid upon the supply of heat is called:	Condensation	Evaporation
58	Our sun is:	Planet	Satellite
59	During summer the earth is	Closer to the sun	Away from the sun
60	When we exhale, our lungs have to:	Contract	Expand
61	Which of the following is a biodegradable waste?	Plastics	Polythene

R EDUCATION

SCIENCE

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HOICE QUESTIONS

ARKS QUESTIONS

Option 3	Option 4	Option 5	Option 6	Answer
Nitrogen Gas	Sulphur Dioxide			**Nitrogen Gas**
Branch	Root			**Stomata**
fossilized rock that will burn in a power station.	a flammable substance formed from ancient biological material.			**a flammable substance formed from ancient biological**
tidal	uranium.			**tidal**
biomass	natural gas			**biomass**
that proceeds very rapidly.	that requires high temperatures to begin the reaction.			**that requires high temperatures to begin the reaction.**
approximately 60%	approximately 90%			**approximately 90%**
2400 kJ	1200 kj			**2400 kJ**
as a pure metal it is very soluble in water, hence easily absorbed through drinking water.	it is light and volatile, and so is widely dispersed through the environment by wind			**as a heavy metal, it can cause serious impact injury.**
a gas insoluble in water	an acidic liquid at ordinary room temperature			**an acidic liquid at ordinary room temperature**

the amount of sulfur dioxide absorbed by a person in a given time.	the amount of sulfur dioxide entering the environment in a given time			**the amount of sulfur dioxide absorbed by a person in a given time.**
the persistence of mercury in the environment.	how much mercury a person experiences in a given time			**the persistence of mercury in the environment.**
chronic toxicity.	synergistic action.			**chronic toxicity.**
specificity	synergism			**synergism**
minimise the number of people likely to object to the project	balance any environmental damage against the benefit of the repair			**minimise the number of people likely to object to the project**
the habitat of endemic threatened populations has	previously submerged heritage buildings can be			**previously submerged heritage buildings can be**
water conservation.	waste minimisation.			**waste minimisation.**
CO2	NO2			**CH4**
Hydrogen	Nitrogen			**Nitrogen**
Liquid	Gas			**Plasma**
Solar Energy	Magnetic Energy			**Solar Energy**
Housefly	Anopheles Mosquito			**Aedes Mosquito**
Madhya Pradesh	Assam			**Madhya Pradesh**

Sound	Light			**Light**
Caffeine	Histamine			**Nicotine**
tissue-matched	preserved kidney			**dialyzer**
Retro virus	TMV			**Retro virus**
human activities against nature	extinction of animals and plants			**human activities against nature**
O3	SO2			**CO2**
Thermal power	Solar power			**Hydrogen**
1 million per year	80 million per year			**90 million per year**
Surface impoundments	incineration			**Surface impoundments**
Entire family including children, their parents and grandparents	Only husband and wife			**Family includes parents and their children**
China	India			**India**
Nitrogen Gas	Sulphur Dioxide			**Nitrogen Gas**
Branch	Root			**Stomata**
one directions	two directions			**one directions**
Solar Energy	Magnetic Energy			**Solar Energy**
Housefly	Anopheles Mosquito			**Aedes Mosquito**
1st June to 7th June	15th June to 21st June			**1st October to 7th October**
Gas	Plasma			**Solid**
Intestine	Kidney			**Liver**

Madhya Pradesh	Assam			**Madhya Pradesh**
Lake	Sea			**Sea**
Sound	Light			**Light**
Nicotine	Histamine			**Nicotine**
Troposphere	Mesosphere			**Stratosphere**
Common Natural Gas	Cirtified Natural Gas			**Compressed Natural Gas**
Plants	Uranium			**Plants**
Fat	Water			**Carbohydrate**
Sedatives	Insecticides			**Insecticides**
Puppies	Tadpoles			**Tadpoles**
800	900			**600**
Mechanical	Chemical			**Chemical**
Sun's rotation	Sun's revolution			**Earth's rotation**
Both evaporation & condensation	Filtration			**Both evaporation & condensation**
Melting	Boiling			**Melting**
Comet	Star			**Star**
Closer to the moon	Away from the moon			**Closer to the sun**
Be still	None of the above			**Contract**
Glass	None of these			**None of these**

Unit V

Syllabus

Social Issues and the Environment: From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Population growth, variation among nations. Population explosion—Family Welfare Programme. Environment and human health. Human rights. Value education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in environment and human health.

SOCIAL ISSUES AND THE ENVIRONMENT

Sustainable development

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

True sustainable development

Optimum use of natural resources with high degree of reusability, minimum wastage, least generation of toxic by products and maximum productivity.

Dimensions of sustainable development

Multi dimensional concept – derived from interactions between society, economy and environment.

Aspects of sustainable development

i. Inter-generational equity
ii. Intra-generational equity

Approaches for sustainable development

1. Developing appropriate technology - locally adaptable, eco-friendly, resource efficient and culturally suitable.
2. Reduce, reuse, recycle [3R] approach – reduces waste generation and pollution
3. Providing environmental education and awareness – changing attitude of the people
4. Consumption of renewable resources – attain sustainability

5. Conservation of non renewable resources – conserved by recycling and reusing
6. Population control

SOCIAL ISSUES AND THE ENVIRONMENT

- Human beings live in both natural and social world. Our technological development has strong impacts on the natural as well as the social components.
- When we talk of development, it cannot be perceived as development only for a privileged few who would have a high standard of living and would derive all the benefits.
- Development has to be visualized in a holistic manner, where it brings benefits to all, not only for the present generation, but also for the future generations.
- There is an urgent need to inter-link the social aspects with development and environment.
- In this unit we shall discuss various social issues in relation to environment.

URBAN PROBLEMS RELATED TO ENERGY

- Cities are the main centers of economic growth, trade, education, innovations and employments.
- Until recently, a big majority of human population lived in rural areas and their economic activities centered around agriculture, cattle rearing, fishing, hunting or some cottage industry.
- It was some 200 years ago, with the dawn of industrial era, the cities showed a rapid development.
- Now about 50 percent of the world population lives in urban areas and there is increasing movement of rural folk to cities in search of development.
- The urban growth is so fast that is becoming difficult to accommodate all the industrial, commercial and residential facilities within a limited municipal boundary.
- As a result there is spreading of the cities into the sub-urban or rural areas too, a phenomenon known as urban sprawl.
- In developing countries too urban growth is very fast and in most of the cases it is uncontrollable and in planned growth.
- In contrast to the rural set-up the urban set-up is densely populated, consumes a lot of energy and materials and generates a lot of waste.
- The energy requirements of urban population are much higher than that of rural ones.
- This is because urban people have a higher standard of life and their life style demands more energy inputs in every sphere of life.

The energy demanding activities include

- Residential and commercial lighting.
- Transportation means including automobiles and public transport for moving from residence to workplace.
- Modern life-style using a large number of electrical gadgets in everyday life.
- Industrial plants using a big proportion of energy.

- A large amount of waste generation which has to be disposed off properly using energy based techniques.
- Control and prevention of air and water pollution which need energy dependent technologies.
- Due to high population density and high energy demanding activities, the urban problems related to energy are much more magnified as compared to the rural population.

WATER CONSERVATION AND MANAGEMENT

- Water being one of the most precious and indispensable resources needs to be conserved.
- The following strategies can be adopted for conservation of water.

Decreasing run-off losses

- Huge water-loss occurs due to run-off on most of the soils, which can be reduced by allowing most of the water to infiltrate into the soil.
- This can be achieved by using contour cultivation, terrace farming, water spreading, chemical treatment or improved water-storage system.

(i) Contour cultivation

- On small furrows and ridges across the slopes trap rainwater and allow more time for infiltration.
- Terracing constructed on deep soils have large water-storage capacity.
- On gentle slopes trapped run off is spread over a large area for better infiltration.

(ii) Conservation-bench terracing

- Conservation-bench terracing involves construction of a series of benches for catching the run off water.

(iii) Water spreading

- Water spreading is done by channeling or lagoon-leveling.
- In channeling, the water-flow is controlled by a series of diversions with vertical intervals.
- In lagoon leveling, small depressions are dug in the area so that there is temporary storage of water.

(iv) Chemical wetting agents (Surfactants)

- Chemical wetting agents (Surfactants) increase the water intake rates when added to normal irrigated soils.

(v) Surface crop residues

- Surface crop residues, Tillage, mulch, animal residues etc. help in reducing run-off by allowing more time for water to penetrate into the land.

(vi) Chemical conditioners

- Chemical conditioners like gypsum ($CaSO_4.2H_2O$) when applied to sodic soils improve soil permeability and reduce run off.
- Another useful conditioner is HPAN (hydrolysed polyacrylonitrile).

(vii) Water-storage structures

- Water storage structure like farm ponds, dug-outs etc. built by individual farmers can be useful measures for conserving water through reduction of runoff.

Reducing evaporation losses

- This is more relevant in humid regions.
- Horizontal barriers of asphalt placed below the soil surface increase water availability and increase crop yield by 33-40%.
- This is more effective on sandy soil but less effective on loamy sand soils.
- A co-polymer of starch and acrylonitrile called 'super slurper' has been reported to absorb water upto 1400 times its weight.
- The chemical has been found to be useful for sandy soils.

Storing water in soil

- Storage of water takes place in the soil root zone in humid regions when the soil is wetted to field capacity.
- By leaving the soil fallow for one season water can be made available for the crop grown in text season.

Reducing irrigation losses

- Use of lined or covered canals to reduce seepage.
- Irrigation in early morning or late evening to reduce evaporation losses.
- Sprinkling irrigation and drip irrigation to conserve water by 30-50%.
- Growing hybrid crop varieties with less water requirements and tolerance to saline water help conserve water.

Re-use of water

- Treated wastewater can be used for ferti-irrigation.
- Using grey water from washings, bath-tubs etc. for watering gardens, washings cars or paths help in saving fresh water.

Preventing wastage of water

- This can be done in house-holds, commercial buildings and public places.
    - Closing taps when not in use
    - Repairing any leakage from pipes
    - Using small capacity flush in toilets

Increasing block pricing

- The consumer has to pay a proportionately higher bill with higher use of water.
- This helps in economic use of water by the consumers

RAINWATER HARVESTING

- Rainwater harvesting is a technique of increasing the recharge of groundwater by capturing and storing rainwater.
- This is done by constructing special water-harvesting structures like dug wells, percolation pits, lagoons, check dams etc.
- Rainwater, wherever it falls, is captured and pollution of this water is prevented.
- Rainwater harvesting is not only proving useful for poor and scanty rainfall regions but also for the rich ones.
- The annual average rainfall in India is 1200 mm, However, in most places it is concentrated over the rainy season, from June to September.
- It is an astonishing fact that Cherapunji, the place receiving the second highest annual rainfall as 11000 mm suffers from water scarcity.
- The water flows with run off and there is little vegetation to check the run off and allow infiltration.
- Till now there is hardly any rain-water harvesting being done in this region, thereby losing all the water that comes through rainfall.

Rainwater harvesting has the following objectives

- To reduce run off loss
- To avoid flooding of roads
- To meet the increasing demands of water
- To raise the water table by recharging ground water
- To reduce groundwater contamination
- To supplement groundwater supplies during lean season.

Rainwater can be mainly harvested by any one of the following methods

  - By storing in tanks or reservoirs above or below ground.
  - By constructing pits, dug-we., lagoons, trench or check-dams on small rivulets
  - By recharging the groundwater.
- Before adopting a rain-water harvesting system, the soil characteristics, topography, rainfall pattern and climatic conditions should be understood.

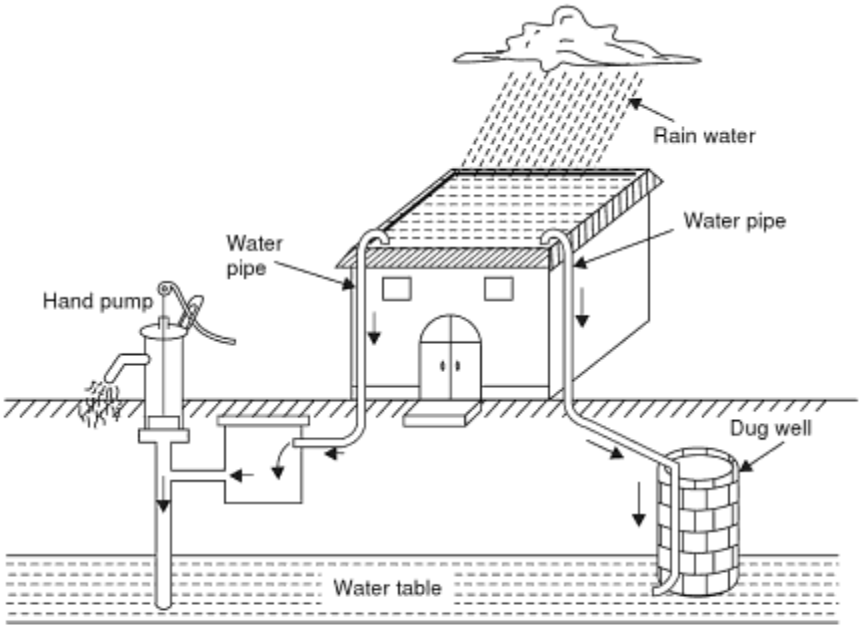
Traditional Rain Water Harvesting

- In India, it is an old practice in high rainfall areas to collect rainwater from roof-tops into storage tanks.
- In foot hills, water flowing from springs are collected by embankment type water storage.
- In Himalayan foot-hills people use the hollow bamboos as pipelines to transport the water of natural springs.
- Rajasthan is known for its `tankas' (under-ground tanks) and khadins (embankments) for harvesting rainwater.

- In our ancient times we had adequate Talaabs, Baawaris, Johars, Hata etc. in every city, village and capital cities of our kings and lords, which were used to collect rain-water and ensured adequate water supply in dry periods.

Modern Techniques of Rain Water Harvesting

- In arid and semi-arid regions artificial ground water recharging is done by constructing shallow percolation tanks.
- Check-dams made of any suitable native material (brush, poles, rocks, plants, loose rocks, wire-nets, stones, slabs, sacks etc.) are constructed for harvesting runoff from large catchment areas.
- Rajendra Singh of Rajasthan popularly known as "water man" has been doing a commendable job for harvesting rain-water by building check dams in Rajasthan and he was honoured with the prestigious Magsaysay Award for his work.
- Groundwater flow can be intercepted by building groundwater dams for storing water underground.
- As compared to surface dams, groundwater dams have several advantages like minimum evaporation loss, reduced chances of contamination etc.
- In roof top rainwater harvesting, which is a low cost and effective technique for urban houses and buildings, the rain-water from the top of the roofs is diverted to some surface tank or pit through a delivery system which can be later used for several purposes.
- Also, it can be used to recharge underground aquifers by diverting the stored water to some abandoned dug-well or by using a hand pump.
- All the above techniques of rainwater harvesting are low-cost methods with little maintenance expenses.
- Rainwater harvesting helps in recharging the aquifers, improves groundwater quality by dilution, improves soil moisture and reduces soil erosion by minimizing run-off water.



Roof-top rainwater harvesting by recharging
(*i*) through hand pump or (*ii*) through abondoned dugwell.

WATERSHED MANAGEMENT

- The watershed is defined as the land area from which water drains under gravity to a common drainage channel.
- Thus, watershed is a delineated area with a well-defined topographic boundary and one water outlet.
- The watershed can range from a few square kilometers to few thousand square kilometers in size.
- In the watershed the hydrological conditions are such that water becomes concentrated within a particular location like a river or a reservoir, by which the watershed is drained.
- The watershed comprises complex interactions of soil, landform, vegetation, land use activities and water.
- People and animals are an integral part of a watershed having mutual impacts on each other.
- We may live anywhere; we would be living in some watershed.
- A watershed affects us as it is directly involved in sustained food production, water supply for irrigation, power generation, and transportation as well as for influencing sedimentation and erosion, vegetation growth, floods and droughts.
- Thus, management of watersheds, treating them as a basic functional unit, is extremely important and the first such Integrated Watershed Management was adopted in 1949 by the Damodar Valley Corporation.

Watershed degradation

- The watersheds are very often found to be degraded due to uncontrolled, unplanned and unscientific land use activities.
- Overgrazing, deforestation, mining, construction activities, industrialization, shifting cultivation, natural and artificial fires, soil erosion and ignorance of local people have been responsible for degradation of various watersheds.

The objectives of watershed management are as follows:

- Rational utilization of land and water resources for optimum production causing minimum damage to the natural resources is known as watershed management.
- To rehabilitate the watershed through proper land use adopting conservation strategies for minimizing soil erosion and moisture retention so as to ensure good productivity of the land for the farmers.
- To manage the watershed for beneficial developmental activities like domestic water supply, irrigation, hydropower generation etc.
- To minimize the risks of floods, droughts and landslides.
- To develop rural areas in the region with clear plans for improving the economy of the region.

Watershed Management Practices

- In the Fifth Five Year Plan, watershed management approach was included with a number of programmes for it and a national policy was developed.
- In watershed management, the aspects of development are considered with regard to the availability of resources.
- The practices of conservation and development of land and water are taken up with respect to their suitability for peoples' benefit as well as sustainability.

Various measures taken up for management include the following:

(i) Water harvesting

- Proper storage of water is done with pro-vision for use in dry seasons in low rainfall areas.
- It also helps in moderation of floods.

(ii) Afforestation and Agroforestry

- In watershed development, afforestation and crop plantation play a very important role.
- They help to prevent soil erosion and retention of moisture.
- In high rainfall areas woody trees are grown in between crops to substantially reduce the runoff and loss of fertile soil.
- In Dehradun trees like Eucalyptus and Leucaena and grasses like Chysopogon are grown along with maize or wheat to achieve the above objectives.
- Woody trees grown successfully in such agroforestry programmes include Dalbergia sissoo (Sheesham), Tectona panda (Teak) and Acacia nilotica (Keekar) which have been used in watershed areas of river Yamuna.

(iii) Mechanical measures for reducing soil erosion and runoff losses

- Several mechanical measures like terracing, bunding, bench terracing, no-till farming, contour cropping, strip cropping etc. are used to minimize runoff and soil erosion particularly on the slopes of water-sheds.
- Bunding has proved to be a very useful method in reducing run-off, peak discharge and soil loss in Dehradun and Siwaliks.

(iv) Scientific mining and quarrying

- Due to improper mining, the hills lose stability and get disturbed resulting in landslides, rapid erosion etc.
- Contour trenching at an interval of 1 meter on overburden dump, planting some soil binding plants like Ipomoea and Vitex and draining of water courses in the mined area are recommended for minimizing the destructive effects of mining in watershed areas.

(v) Public participation

- People's involvement including the farmers and tribals is the key to the success of any watershed management programme, particularly the soil and water conservation.
- People's cooperation as well as participation has to be ensured for the same.
- The communities are to be motivated for protecting a freshly planted area and maintaining a water harvesting structure implemented by the government or some external agency (NGO) independently or by involving the local people.
- Properly educating the people about the campaign and its benefits or sometimes paying certain incentives to them can help in effective people's participation.
- Successful watershed management has been done at Sukhomajri Panchkula, Haryana through active participation of the local people.
- Watershed management in Himalayan region is of vital importance since most of the watersheds of our country lie here.
- Several anthropogenic activities accelerate its slope instability which needs to be prevented and efforts should be made to protect the watershed by preventing overgrazing, terracing and contour farming to check runoff and erosion etc.
- On steeper slopes with sliding faces, straw mulching tied with thin wires and ropes helps in establishing the vegetation and stabilizing the slopes.

RESETTLEMENT AND REHABITILISAION

Problems and Concerns

- Economic development raises the quality and standard of living of the people of a country.
- Developmental projects are planned to bring benefits to the society.
- However, in the process of development, very often there is over-exploitation of natural resources and degradation of the environment.
- Besides this, quite often, the native people of the project site are directly affected.
- These native people are generally the poorest of the poor, underprivileged tribal people.

- Various types of projects result in the displacement of the native people who undergo tremendous economic and psychological distress, as the socio-economic and ecological base of the local community is disturbed.

(a) Displacement problems due to dams

- The big river valley projects have one of the most serious socio-economic impacts due to large scale displacement of local people from their ancestral home and loss of their traditional profession or occupation.
- India is one of countries in the world leading in big dam construction and in the last 50 years more than 20 million people are estimated to have been directly or indirectly affected by these dams.
- The Hirakund Dam has displaced more than 20,000 people residing in about 250 villages.
- The Bhakra Nangal Dam was constructed during 1950.s and till now it has not been possible to rehabiltate even half of the displaced persons.
- Same is the case with Tehri Dam on the river Bhagirathi, construction of which was green signalled after three decades of long campaign against the project by the noted activist Sunderlal Bahuguna the propagator of Chipko Movement .
- The immediate impact of the Tehri Dam would be on the 10,000 residents of the Tehri town. While displacement is looming large over the people, rehabilitation has become a more burning issue.

(b) Displacement due to Mining

- Mining is another developmental activity, which causes displacement of the native people.
- Several thousands of hectares of land area is covered in mining operation and the native people are displaced.
- Sometimes displacement of local people is due to accidents occurring in mined areas like subsidence of land that often leads to shifting of people.

(c) Displacement due to Creation of National Parks

- When some forest area is covered under a National Park, it is a welcome step for conservation of the natural resources.
- However, it also has a social aspect associated with it which is often neglected.
- A major portion of the forest is declared as core-area, where the entry of local dwellers or tribals is prohibited. When these villagers are deprived of their ancestral right or access to the forests, they usually retaliate by starting destructive activities.
- There is a need to look into their problems and provide them some employment.

REHABILITATION ISSUES

- The United Nations Universal Declaration on Human Rights [Article 25(1)] has declared that right to housing is a basic human right.

- In India, most of the displacements have resulted due to land acquisition by the government for various reasons.
- For this purpose, the government has the Land Acquisition Act, 1894 which empowers it to serve notice to the people to vacate their lands if there is a need as per government planning.
- Provision of cash compensation in lieu of the land vacated exists in section 16 of the Act.

The major issues related to displacement and rehabilitation are as follows:

- Tribals are usually the most affected amongst the displaced who are already poor. Displacement further increases their poverty due to loss of land, home, jobs, food insecurity, loss of access to common property assets, increased morbidity and mortality and social isolation.
- Break up of families is an important social issue arising due to displacement in which the women are the worst affected and they are not even given cash/land compensation.
- The tribals are not familiar with the market policies and trends. Even if they get cash compensation, they get alienated in the modern economic set-up.
- The land acquisition laws ignore the communal ownership of property, which is an inbuilt system amongst the tribals. Thus the tribals lose their communitarian basis of economic and cultural existence. They feel like fish out of water.
- Kinship systems, marriages, social and cultural functions, their folk-songs, dances and activities vanish with their displacement. Even when they are resettled, it is individual-based resettlement, which totally ignores communal settlement.
- Loss of identity and loss of the intimate link between the people and the environment is one of the biggest loss. The age-long indigenous knowledge, which has been inherited and experienced by them about the flora, fauna, their uses etc. gets lost.

Rehabilitation Policy

- There is a need for a comprehensive National Rehabilitation Policy.
- Different states are following different practices in this regard.
- There is a need to raise public awareness on these issues to bring the resettlement and rehabilitation plans on a humane footing and to honour the human rights of the oustees.

ENVIRONMENTAL ETHICS

Refers to the issues, principles and guidelines relating to human interactions with their environment.

Environmental problems

1. Deforestation
2. Population growth
3. Pollution due to effluent and smoke
4. Water scarcity
5. Land degradation

Solutions

1. Reducing the energy sources
2. recycle and reuse of waste products
3. Soil degradation
4. Sustainable development
5. Protection of Bio – diversity
6. Reducing the population

ENVIRONMENTAL ETHICS

- Over exploitation of forests, land, water as well as various living components of biosphere and failure to tackle the problem of pollution and environmental degradation are exposing the humanly to the thread of a global environment crisis.
- It emphasis that real development cannot occur unless the strategies which are formulated are implemented are environmentally sustainable.
- Even though our government is formulating several rules, regulations, policies, laws, it is the duty of each and every one to protect our nature.
- Therefore human beings are ethically responsible for the preservation of the world's ecological integrity.
- The environment ethics literally means conscious efforts to protect environment and to maintain its stability from the pollutants.

Following are some of the ways to safeguard environment.

- To sacrifice the consumption of some of the good which reduces environment quality.
- Minimize the resource utilization and conservation
- Adopt sustainable and eco friendly development. (e.g) reduction of waste, recycling, waste management and harvesting non conventional energy.
- If we change as individuals then the society will also change by itself.
- The society is nothing but an extension of the individual.

Climate

The average weather of an area
Causes of climate change:
1. Presence of green house gases
2. Depletion of ozone gases
Effect of climate change
1. Migration of animals
2. upsetting the hydrological cycles results in floods and droughts
3. changes in global pattern of winds.

Climate is the average weather of an area. It is the general weather. conditions, seasonal variations and extremes of weather in a region. Such conditions which average over a long period- at least 30 years is called climate.

The Intergovernmental Panel on Climate Change (IPCC) in 1990 and 1992 published best available evidence about past climate change, the green house effect and recent changes in global temperature. It is observed that earth's temperature has changed considerable during the geological times.

It has experienced several glacial and inter- glacial periods. However, during the past 10,000 years of the current interglacial period the mean average temperature has fluctuated by 0.5. 1°C over 100 to 200 year period.

We have relatively stable climate for thousands of years due to which we have practised agriculture and increased in population. Even small changes in climatic conditions may disturb agriculture that would lead to migration of animals including humans.

Anthropogenic (man-made) activities are upsetting the delicate balance that has established between various components of the environment. Green house gases are increasing in the atmosphere resulting in increase in the average global temperature.

This may upset the hydrological cycle, result in floods and droughts in different regions of the world, cause sea level rise, changes in agriculture productivity, famines and death of humans as well as live stock.

The global change in temperature will not be uniform everywhere and will fluctuate in different regions.

The places at higher latitudes will be warmed up more during late autumn and winter than the places in tropics. Poles may experience 2 to 3 times more warming than the global average, while warming in the tropics may be only 50 to 100% on an average.

The increased warming at poles will reduce the thermal gradient between the equator and high latitude regions decreasing the energy available to the heat engine that drives the global weather machine.

This will disturb the global pattern of winds and ocean currents as well as the timing and distribution of rainfall. Shifting of ocean currents may change the climate of Iceland and Britain and may result in cooling at a time when rest of the world warms.

By a temperature increase of 1.5 to 4.5°C the global hydrological cycle is expected to intensify by 5 to 10%. Disturbed rainfall will result in some areas becoming wetter and the others drier. Although rainfall may increase, higher temperatures will result in more evapo-transpiration leading to annual water deficit in crop fields.

Green house effect:

The progressive warming of earth surface due to blanketing effect of man made CO2 in the atmosphere.
Green house gases- causing global warming
CO2, Ch4, N2O, CFCs
Effect on global warming- effects on
1. sea level
2. agriculture and forestry
3. water resources
4. terrestrial ecosystems
5. human health

Measures
1. reducing CO2 emission
2. utilizing renewable resources
3. Plant more trees
4. Adopt sustainable agriculture

Troposphere, the lowermost layer of the atmosphere, traps heat by a natural process due to the presence of certain gases. This effect is called Green House Effect as it is similar to the warming effect observed in the horticultural green house made of glass.

The amount of heat trapped in the atmosphere depends mostly on the concentrations of heat trapping. or .green house. gases and the length of time they stay in the atmosphere.

The major green house gases are carbon dioxide, ozone, methane, nitrous oxide, chlorofluorocarbons (CFCs) and water vapours. The average global temperature is 15°C.

In the absence of green house gases this temperature would have been .18°C. Therefore, Green House Effect contributes a temperature rise to the tune of 33°C.

Heat trapped by green house gases in the atmosphere keeps the planet warm enough to allow us and other species to exist. The two predominant green house gases are water vapours, which are controlled by hydrological cycle, and carbon dioxide, which is controlled mostly by the global carbon cycle. While the levels of water vapour in the troposphere have relatively remained constant, the levels of carbon dioxide have increased.

Other gases whose levels have increased due to human activities are methane, nitrous oxide and chlorofluorocarbons. Deforestation has further resulted in elevated levels of carbon dioxide due to non-removal of carbon dioxide by plants through photosynthesis.

Warming or cooling by more than 2°C over the past few decades may prove to be disastrous for various ecosystems on the earth including humans, as it would alter the conditions faster than some species could adapt or migrate. Some areas will become inhabitable because of drought or floods following a rise in average sea level.

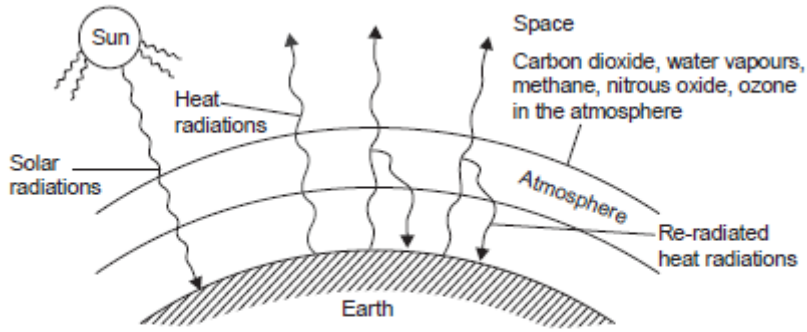


Fig. 6.2. The greenhouse effect.

GLOBAL WARMING

- The green house gases are collected in the environment due to the activities of human beings.
- The green house gases produce green house effect.
- The green house gases allow the solar radiant ion of short wavelengths to pass through them which are converted into long wavelength radiant ion.
- These radiations of long wavelengths do not escape away through the green house gases therefore they remain in the atmosphere and rise the temperature of the atmosphere. Due to which the global temperature is raising day by day.
- This event is called Global warming.
- Global warming is a great problem due to which the normal temperature of the earth has increased higher than before.

Causes of global warming

- Increase in the amount of carbon dioxide gas in the atmosphere due to excessive deforestation.
- Increase in the amount of oxides of carbon, oxides of nitrogen produced during the combustion of fossil fuel like coal and petroleum partially or completely.
- Collection of chlorofluorocarbon in atmosphere due to use of aerosols in refrigerator and air conditioners, use of foams and fire extinguishers.
- Nitrogen oxides gas is produced by chemical fertilizers used in agriculture and by the combustion of fuel used in automobile.
- Various biotic activities, agricultural activities and decay of organic wastes produce green house gases causing Global warming.
- Air pollution
- Depletion of ozone layer
- Volcanic eruptions
- Burning of fossil fuels
- Human activities

Effects of Global warming

- Rate of evaporation of water increases due to global warming creating shortage of water availability.
- Due to global warming, the polar snow will melt, flooding the rivers and oceans which will endanger the costal life.
- Due to global warming, the death of organisms (animals and plants) is possible.
- Water and air gets polluted rapidly.
- Global warming may cause erratic and untimely rainfall and droughts.
- Ecosystem failure
- Economic collapse
- Storm
- Effects of human health
- Extinction
- Increase in temperature

Preventive measures of Global warming

- By discouraging deforestation and efforcing a complete control on excessive cutting of forests.
- By encouraging plantation.
- Controlled and minimum use of fossil fuel with complete combustion.
- Complete ban over use of chlorofluorocarbons (aerosol).
- By replacing the use of fertilizers by biotic manure.
- By using alternative sources of energy in general.
- Use of bio-gas plants
- Use of nuclear power plants
- Installation of pollution controlling devices in automobiles (catalytic converter) and industries (Electro Static Precipitators, Bag filters, Wet scrubbers etc)

ACID RAIN:

The precipitation of CO_2 , SO_2, and NO_2 gases as pollutants in water.

Effects of acid rain

1. Human beings

Destroy life – nervous , respiratory and digestive system
Causes premature death from heart and lung disorders

2. On Buildings

Corrosion - Taj Mahal , houses, statues, bridges, metals

3. On terrestrial and lake ecosystem

Reduces rate of photosyenthesis, growth of crops, Fish population
And bio mass production

Control measures

1. Clean combustion technologies

2. using pollution control equipments
3. Replacement of coal by natural gas
4. Liming of lakes and soils

Acid Rains

- One of the major environmental issues facing human society at the National and International level is the problem of acid.
- The rainwater is always slightly acidic as CO_2 in the atmosphere gets dissolved in it.
- However during recent years, it has been noted a further lowering of pH of rainwater often as 2.4.
- This lowering of pH is due to the dissolution of acids in the rain water.
- Precipitation of oxides of sulphur and nitrogen with rain is termed acid rain.
- Acid rain is caused by air pollution.
- When atmospheric air contains sulphur dioxide (SO_2) and oxides of nitrogen such as nitrous oxide (N_2O) and nitric oxide (NO), they dissolve in rainwater forming sulphuric acid and nitric acid.
- The rain water falls as acid rain.
- The main source of oxides of sulphur and nitrogen is the burning of fossil fuels in power plants based on coal and oil contribute more than 60% of all sulphur oxides and 25 to 20% of nitrogen oxides in the atmosphere.
- Automobiles make a sustainable contribution in large cities.
- Ozone is now recognized as a major factor in the formation of acid rain.
- Acid rain affects both materials and organisms.
- It attacks building materials principally sandstone, limestone, marble, steel and nickel.
- In plants, it leads to Chlorosis (gradual yellowing in which the chlorophyll making mechanism is impeded) or depigmentation of leaves.
- Acid rain increases the acidity of lakes and rivers.
- Vast tracts of forests and lakes in Europe and North America have been destroyed by acid.
- Acidity kills fish, bacteria and algae and the aquatic ecosystem collapses into sterility leaving a crystal clear but ultimately a dead lake.

Oxides of sulfur and nitrogen originating from industrial operations and fossil fuel combustion are the major sources of acid forming gases. Acid forming gases are oxidised over several days by which time they travel several thousand kilometers. In the atmosphere these gases are ultimately converted into sulfuric and nitric acids. Hydrogen chloride emission forms hydrochloric acid. These acids cause acidic rain.

Effects of acid rain

Acid rain causes a number of harmful effects below pH 5.1. The effects are visible in the aquatic system even at pH less than 5.5. It causes deterioration of buildings especially made of marble

e.g. monuments like Taj Mahal. Crystals of calcium and magnesium sulphate are formed as a result of corrosion caused by acid rain.

1. It damages stone statues. Priceless stone statues in Greece and Italy have been partially dissolved by acid rain.
2. It damages metals and car finishes.
3. Aquatic life especially fish are badly affected by lake acidification.
4. Aquatic animals suffer from toxicity of metals such as aluminium, mercury, manganese, zinc and lead which leak from the surrounding rocks due to acid rain.
5. It results in reproductive failure, and killing of fish.
6. Many lakes of Sweden, Norway, Canada have become fishless due to acid rain.
7. It damages foliage and weakens trees.
8. It makes trees more susceptible to stresses like cold temperature, drought, etc. Many insects and fungi are more tolerant to acidic conditions and hence they can attack the susceptible trees and cause diseases.

Control of Acid Rain

- Emission of SO2 and NO2 from industries and power plants should be reduced by using pollution controequipments.
- Liming of lakes and soils should be done to correct the adverse effects of acid rain.
- A coating of protective layer of inert polymer should be given in the interior of water pipes for drinking water.

Ozone layer depletion:

Ozone is formed in the stratosphere by photo - chemical reaction

Ozone depleting chemicals:

Chloro Fluro carbon, Hydro chloro fluoro carbon, Bromo fluoroCarbon.

Effects

1. On human health – Skin cancer, cataracts, allergies etc.
2. On aquatic systems- phyto plankton, fish
3. On materials- paints, plastics
4. On climate – increasing the average temperature of the earth surface.

Control Measures
1. Replacing CFCs

2. Use of methyl bromide – crop fumigant. For the last 450 million years the earth has had a natural sunscreen in the stratosphere called the ozone layer. This layer filters out harmful ultraviolet radiations from the sunlight and thus protects various life forms on the earth.

3. Ozone is a form of oxygen.

Thinning of Ozone Layer

Chlorofluorocarbons (CFC) are mainly responsible for ozone depletion in the stratosphere.

Nitrous oxide emitted by supersonic aircrafts, during combustion of fossil fuel and use of nitrogen fertilizers breaks ozone molecules.

Chlorine liberated from chlorofluorocarbons also break ozone molecules.

Nitrogen dioxide combines with chlorine and stops further destruction of ozone.

Effects of Ozone Depletion

- Ozone depletion in the stratosphere wilresult in more UV radiation reaching the earth especially UV-B (290-320 nm).
- The UV-B radiations affect DNA and the photosynthetic chemicals. Any change in DNA can result in mutation and cancer. Cases of skin cancer (basaand squamous celcarcinoma) which do not cause death but cause disfigurement wilincrease.
- Easy absorption of UV rays by the lens and cornea of eye wilresult in increase in incidents of cataract.
- Melanin producing cells of the epidermis (important for human immune system) wilbe destroyed by UV-rays resulting in immuno-suppression.
- Fair people (can't produce enough melanin) wilbe at a greater risk of UV exposure.
- Phytoplanktons are sensitive to UV exposure. Ozone depletion wilresult in decrease in their population thereby affecting the population of zooplankton, fish, marine animals, in fact the whole aquatic food chain.

- Yield of vitacrops like corn, rice, soybean, cotton, bean, pea, sorghum and wheat wildecrease.
- Degradation of paints, plastics and other polymer materiawilresult in economic loss due to effects of UV radiation resulting from ozone depletion.

Nuclear accidents and Holocaust

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

Nuclear accidents can occur at any stage of the nuclear fuel cycle. However, the possibility of reactor accidents is viewed more seriously because the effects of reactor accidents are more drastic.

Many estimates of hypothetical accidents in a nuclear power station are made. Such estimates are made taking into consideration various parameters like reactor safety measures which if fail would release large amount of reactor contents, that is, radioactive debris affecting a substantial portion of human population within a particular site in a particular area.

The modern fusion bombs (nuclear bombs) are of the explosive force of 500 kilotons and 10 megatons. In case of a world war total nuclear exchange of more than 5,000 megatons can be expected. Nuclear bombardment will cause combustion of wood, plastics, petroleum, forests etc.

Large quantity of black soot will be carried to the stratosphere. Black soot will absorb solar radiations and won't allow the radiations to reach the earth. Therefore, cooling will result.

The infrared radiations which are re-radiated from the atmosphere to the earth will have very less water vapours and carbon dioxide to absorb them.

If they leave the lower atmosphere the green house effect will be disturbed and cooling will occur. Due to this cooling effect, water evaporation will also reduce.

Therefore, infra-red radiations absorbing water vapours will reduce in the atmosphere. This will also cause cooling.

In the stratosphere there won't be significant moisture to rainout the thick soot. So, due to nuclear explosions, a phenomenon opposite to global warming will occur.

This is called nuclear winter. It may result in lower global temperature. Even the summer time will experience freezing temperature. It will drastically affect crop production.

Crop productivity will reduce substantially causing famines and human sufferings.

The Chernobyl nuclear accident, 1986 has resulted in wide spread contamination by radioactive substances. (already mentioned in air pollution episodes). The devastation caused by nuclear bombs are not only immediate but may be long lasting.

Towards, the end of World War II, bombing of Dresden, Germany caused huge firestorms.

This caused particle ladden updrafts in the atmosphere.

Case study:

In Nuclear holocaust in Japan 1945, two nuclear bombs were dropped on Hiroshima and Nagasaki cities of Japan. One fission bomb was dropped on Hiroshima. This holocaust (large scale destruction of human lives by fire) killed about 100,000 people and destroyed the city. This forceful explosion emitted neutrons and gamma radiations. It had the force of 12 kilotons of trinitrotoluene (TNT). The radioactive strontium (Sr90) liberated in the explosion resembles calcium and has the property of replacing calcium of the bones. As a result large scale bone deformities occurred in the inhabitants of these cities. Even after more than 50 years the impacts of the nuclear fallout are still visible.

Waste land reclamation

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

Types of waste land:

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

Causes for waste land formation:

1. Soil Erosion, Deforestation, Water logging, Salinity
2. Excessive use of pesticides
3. Construction of dams
4. Over-exploitation of natural resources
5. Sewage and industrial wastes
6. Mining
7. Growing demands for fuel, fodder wood and food causes degradation and loss of soil productivity.

Objectives of waste land reclamation

1. To improve the physical structure and quality of the soil
2. To prevent soil erosion
3. To avoid over – exploitation of natural resources
4. To conserve the biological resources

Methods of waste land reclamation

1. Drainage
2. Leaching
3. Irrigation practices
4. Green manures and bio fertilizers

5. Application of Gypsum
6. Afforestation programmes
7. Social forestry programmes

Consumerisation of Waste products

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

Important informations to be known by buyers: - ingredients, manufacturing dates, expiry etc.

Economically unproductive lands suffering from environmental deterioration are known as wastelands. The wastelands include salt affected lands, sandy areas, gullied areas, undulating uplands, barren hill-ridge etc.

Wastelands are formed by natural processes, which include undulating uplands, snow-covered lands, coastal saline areas, sandy areas etc. or by anthropogenic (man-made) activities leading to eroded, saline or waterlogged lands.

The major anthropogenic activities leading to waste land formation are deforestation, overgrazing, mining and erroneous agricultural practices. Although deserts are wastelands formed by natural process, but there are many human activities which accelerate the spreading of desert as we have already discussed.

Wasteland Reclamation Practices

Wasteland reclamation and development in our country falls under the purview of Wasteland Development Board, which works to fulfill the following objectives:

- To improve the physical structure and quality of the marginal soils.
- To improve the availability of good quality water for irrigating these lands.
- To prevent soil erosion, flooding and landslides.
- To conserve the biological resources of the land for sustainable use.

Some important reclamation practices are discussed here.

(i) Land development and leaching: For reclamation of the salt affected soil, it is necessary to remove the salts from the root-zone which is usually achieved by leaching i.e. by applying excess amount of water to push down the salts.

(ii) Drainage: This is required for water-logged soil reclamation where excess water is removed by artificial drainage.

(a) Surface drainage: This is used in areas where water stands on the fields after heavy rains by providing ditches to runoff the excess water. Usually 30-45 cm deep ditches lying parallel to each other at 20-60 m distance are able to remove 5 cm of water within 24 hours.

(b) Sub-surface drainage: Horizontal sub-surface drainage is provided in the form of perforated corrugated PVC pipes or open-jointed pipes with an envelope of gravel 2-3 m below the land surface. Chances of evaporation of water leading to accumulation of salts almost become nil in this method. The World Bank has funded sub-surface drainage system at Sampla, Rohtak (Haryana) for reducing soil salinity by this method.

(iii) Irrigation Practices: Surface irrigation with precise land leveling, smoothening and efficient hydraulic design help to reduce water logging and salinity. High frequency irrigation with controlled amount of water helps to maintain better water availability in the upper root zone. Thin and frequent irrigations have been found to be more useful for better crop yield when the irrigation water is saline as compared to few heavy irrigations.

(iv) Selection of tolerant crops and crop rotations: Tolerance of crops to salts is found to range from sensitive, semi-tolerant, tolerant to highly tolerant.

(v) Gypsum amendment: Amendment of sodic soils with gypsum is recommended for reducing soil sodality as calcium of gypsum replaces sodium from the exchangeable sites.

(vi)Green-manures, fertilizers and biofertilizers: Application of farm yard manure or nitrogen fertilizers have been found to improve saline soils.

(vii) Afforestation Programmes: The National Commission on Agriculture (NCA) launched several afforestation schemes in the VIth plan to cope up with the problem of spreading wasteland. The National Wasteland Development Board, in the Ministry of Environment and

Forests has set a target of bringing 5 million ha of wasteland annually under firewood and fodder plantation.

(viii) Social Forestry Programmes: These programmes mostly involve strip plantation on road, rail and canal-sides, rehabilitation of degraded forest lands, farm-forestry, waste-land forest development etc.

CONSUMERISM AND WASTE PRODUCTS

Objectives of consumerisation:

1. Improves rights and power of the buyers
2. Making the manufacturer liable
3. Reuse and recycle the product
4. Reclaiming useful parts
5. Reusable packing materials
6. 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:
1. Dangerous to human life
2. degrade soil
3. Cadmium in chips, Cathode ray tube , PVC cause cancer and other respiratory problems.
4. Non biodegradable plastics reduce toxic gases.

Factors affecting consumerisation and generation of wastes:
1. People over – Population
2. Consumption over - Population

Consumerism refers to the consumption of resources by the people. While early human societies used to consume much less resources, with the dawn of industrial era, consumerism has shown an exponential rise.

It has been related both to the increase in the population size as well as increase in our demands due to change in life-style. Earlier we used to live a much simpler life and used to have fewer wants. In the modern society our needs have multiplied and so consumerism of resources has also multiplied.

Our population was less than 1 million for thousands of years ever since we evolved on this earth. Today we have crossed the six billion mark and are likely to reach 11 billion by 2045 as per World Bank estimates. Let us see how the changing population trends influence consumerism of natural resources and generation of wastes. Two types of conditions of population and consumerism exist.

(i) People over-population: It occurs when there are more people than available supplies of food, water and other important resources in the area. Excessive population pressure causes degradation of the limited resources, and there is absolute poverty, under-nourishment and premature deaths.

This occurs in less developed countries (LDCs). Here due to large number of people, adequate resources are not available for all. So there is less per capita consumption although overall consumption is high.

(ii) Consumption over-population: This occurs in the more developed countries (MDCs). Here population size is smaller while resources are in abundance and due to luxurious life-style per capita consumption of resources is very high.

More the consumption of resources more is the waste generation and greater is the degradation of the environment. Thus, consumerism varies with the country and USA is known for maximum consumerism.

The throw-away attitude and luxurious life-style of the west results in very high resource use as compared to less developed countries. With every unit of energy, mineral or any resource used there is waste generation and pollution in the environment.

Environmental legislation and laws – Important protection acts

1. Water Act 1974, 1978
2. Water amendment Act , 1987,
3. Air Act ,. 1981.
4. Wild life Act 1972
5. Forest Act 1980 and
6. Environment Act 1972.

Issues involved in Enforcement of Environmental legislation:

1. Drawbacks of wildlife protection Act
2. Drawbacks of Forest Act 1980 and
3. Drawbacks of Environment Act 1972.

ENVIRONMENT (PROTECTION) ACT, 1986

This act is to take action to protect and improve environment and set up the followings

1. Standard of quality of air, water or soil
2. Maximum permissible limits of concentration of pollutants (including noise pollutant)
3. procedures and safe guard for handling hazardous items
4. Prohibition of using hazardous items
5. Prohibition and restriction of certain industries in certain area
6. Procedure and safe guard for prevention of accidents

Environment (Protection) Rules, 1986

State Pollution control board is to follow the guidelines provided in schedule VI.

Some are as follows

- Advises industries for treating the waste water and gases – use of technology – achieve prescribed standard.
- Encourage recycling and reusing the wastes
- Encourage recovery of biogas, energy and reusable matter

- Discharge of effluents and emissions into environment is permitted by SPCB after taking into account capacity of the receiving water body.
- To emphasize clean technology to increase fuel efficiency and decrease environmental pollutants

The act provides for environmental Audit for checking complying with the environmental laws and regulations.

AIR (PREVENTION & CONTROL OF POLLUTION) ACT, 1981

Salient features

- Prevention, control and abatement of air pollution
- Air pollution has been defined as the presence of any solid, liquid or gaseous substance (including noise) in the atmosphere in such a concentration that may be or tend to be harmful to human being or any other living creature or plants or property or environment.
- Noise pollution – inserted in 1987
- Central Pollution Control Board (CPCB) & State Pollution Control Board (SPCB) similar to water pollution board
- Section 20 provides for emission std to auto mobile and air pollution control area in consultation with SPCB
- Direction of PCB can be appealed in the appellate authority.

THE AIR (PREVENTION AND CONTROL OF POLLUTION)

ACT, 1981

Salient features of the act are as follows:

(i) The Act provides for prevention, control and abatement of air pollution.

(ii) In the Act, air pollution has been defined as the presence of any solid, liquid or gaseous substance (including noise) in the atmosphere in such concentration as may be or tend to be harmful to human beings or any other living creatures or plants or property or environment.

(iii) Noise pollution has been inserted as pollution in the Act in 1987.

(iv) Pollution control boards at the central or state level have the regulatory authority to implement the Air Act. Just parallel to the functions related to Water (Prevention and Control of Pollution) Act, the boards performs similar functions related to improvement of air quality. The boards have to check whether or not the industry strictly follows the norms or standards laid down by the Board under section 17, regarding the discharge of emission of any air pollutant. Based upon analysis report consent is granted or refused to the industry.

(v) Just like the Water Act, the Air Act has provisions for defining the constitution, powers and function of Pollution Control Boards, funds, accounts, audit, penalties and procedures.

(vi) Section 20 of the Act has provision for ensuring emission standards from automobiles. Based upon it, the state govt. is empowered to issue instructions to the authority incharge of registration of motor vehicles (under Motor Vehicles Act, 1939) that is bound to comply with such instructions.

(vii) As per Section 19, in consultation with the State Pollution Control Board, the state government may declare an area within the state as .air pollution control area. and can prohibit the use of any fuel other than approved fuel in the area causing air pollution. No person shall, without prior consent of State Board operate or establish any industrial unit in the .air pollution control area.. The Water and Air Acts have also made special provisions for appeals. Under Section 28 of Water Act and Section 31 of Air Act, a provision for appeals has been made. An Appellate Authority consisting of a single person or three persons appointed by the Head of the State, Governor is constituted to hear such appeals as filed by some aggrieved party (industry) due to some order made by the State Board within 30 days of passing the orders.

WATER (PREVENTION AND CONTROL OF POLLUTION) ACT 1974:

- Maintaining and restoring the wholesomeness of water by preventing and controlling its pollution.

The salient features and provisions of Act are summed as follows.

- Maintenance and Restoration of Quality – surface and ground water
- Establishment of central PCB and state PCB
- Confers powers and functions to CPCB and SPCB
- The act provides for funds, budgets, accounts and audits of the CPCB & SPCB
- The act provides penalties for the defaulters and duties and powers

It provides for maintaining and restoring the wholesomeness of water

by preventing and controlling its pollution. Pollution is defined as such contamination of water, or such alteration of the physical, chemical or biological properties of water, or such discharge as is likely to cause a nuisance or render the water harmful or injurious to public health and safety or harmful for any other use or to aquatic plants and other organisms or animal life.

The definition of water pollution has thus encompassed the entire probable agents in water that may cause any harm or have a potential to harm any kind of life in any way.

The salient features and provisions of the Act are summed up as follows:

(i) It provides for maintenance and restoration of quality of all types of surface and ground water.

(ii) It provides for the establishment of Central and State Boards for pollution control.

(iii) It confers them with powers and functions to control pollution. The Central and State Pollution Control Boards are widely represented and are given comprehensive powers to advise, coordinate and provide technical assistance for prevention and control of pollution of water.

(iv) The Act has provisions for funds, budgets, accounts and audit of the Central and State Pollution Control Boards.

(v) The Act makes provisions for various penalties for the defaulters and procedure for the same.

The main regulatory bodies are the Pollution Control Boards, which have been, conferred the following duties and powers: Central Pollution Control Board (CPCB):

l It advises the central govt. in matters related to prevention and control of water pollution.

l Coordinates the activities of State Pollution Control Boards and provides them technical assistance and guidance. l Organizes training programs for prevention and control of pollution.

l Organizes comprehensive programs on pollution related issues through mass media.

l Collects, compiles and publishes technical and statistical data related to pollution.

l Prepares manuals for treatment and disposal of sewage and trade effluents.

l Lays down standards for water quality parameters.

l Plans nation-wide programs for prevention, control or abatement of pollution.

l Establishes and recognizes laboratories for analysis of water, sewage or trade effluent sample. The State Pollution Control Boards also have similar functions to be executed at state level and are governed by the directions of CPCB.

l The Board advises the state govt. with respect to the location of any industry that might pollute a stream or a well.

l It lays down standards for effluents and is empowered to take samples from any stream, well or trade effluent or sewage passing through an industry.

l The State Board is empowered to take legal samples of trade effluent in accordance with the procedure laid down in the Act. The sample taken in the presence of the occupier or his agent is divided into two parts, sealed, signed by both parties and sent for analysis to some recognized lab. If the samples do not conform to the prescribed water quality standards (crossing maximum permissible limits), then .consent. is refused to the unit.

l Every industry has to obtain consent from the Board (granted for a fixed duration) by applying on a prescribed Proforma providing all technical details, along with a prescribed fee following which analysis of the effluent is carried out.

l The Board suggests efficient methods for utilization, treatment and disposal of trade effluents. The Act has made detailed provisions regarding the power of the Boards to obtain information, take trade samples, restrict new outlets, restrict expansion, enter and inspect the units and sanction or refuse consent to the industry after effluent analysis. While development is necessary, it is all the more important to prevent pollution, which can jeopardize the lives of the people.

Installation and proper functioning of effluent treatment plants (ETP) in all polluting industries is a must for checking pollution of water and land. Despite certain weaknesses in the Act, the Water Act has ample provisions for preventing and controlling water pollution through legal measures.

WILDLIFE (PROTECTION) ACT, 1972

The act, a landmark in the history of wildlife legislation in our country, came into existence in 1972. Wildlife was transferred from State list to concurrent list in 1976, thus giving power to the Central Govt. to enact the legislation.

The Indian Board of Wildlife (IBWL) was created in 1952 in our country, which after the enactment of the Wildlife (Protection) Act actively took up the task of setting up wildlife National Parks and sanctuaries. The major activities and provisions in the act can be summed up as follows:

(i) It defines the wild-life related terminology.

(ii) It provides for the appointment of wildlife advisory Board, Wildlife warden, their powers, duties etc.

(iii) Under the Act, comprehensive listing of endangered wild life species was done for the first time and prohibition of hunting of the endangered species was mentioned.

(iv) Protection to some endangered plants like Beddome cycad, Blue Vanda, Ladies Slipper Orchid, Pitcher plant etc. is also provided under the Act.

(v) The Act provides for setting up of National Parks, Wildlife Sanctuaries etc.

(vi) The Act provides for the constitution of Central Zoo Authority.

(vii) There is provision for trade and commerce in some wildlife species with license for sale, possession, transfer etc.

(viii) The Act imposes a ban on the trade or commerce in scheduled animals.

(ix) It provides for legal powers to officers and punishment to offenders.

(x) It provides for captive breeding programme for endangered species. Several Conservation Projects for individual endangered species like lion (1972) Tiger (1973), Crocodile (1974) and Brown antlered Deer (1981) were started under this Act.

The Act is adopted by all states in India except J & K, which has it own Act. Some of the major drawbacks of the Act include mild penalty to offenders, illegal wild life trade in J & K, personal ownership certificate for animal articles like tiger and leopard skins, no coverage of foreign endangered wildlife, pitiable condition of wildlife in mobile zoos and little emphasis on protection of plant genetic resources.

Wildlife [protection] act, 1972:

- Land mark in the history of wildlife legislation.
- 1976 the powers are transferred from state to central government.
- Indian Board for Wild life (IB W L) was created in 1952 in our country which after WLA, 1972, took up the task of setting National parks and sanctuaries.

Wildlife [protection] Act

- Defines wild life related terminology.

- Provide appointments of advisory Board, wildlife warden, their powers & duties etc.
- Prohibition of hunting of endangered species [was first] mentioned.
- List of endangered species is provided.
- Guides central 200 authorities.
- Provides grants for setting up of national parks, wild life sanctuaries etc.
- The Act imposes ban on trade & commence of scheduled animals.
- Provides legal proves to officers to punish the offenders.
- Provide captive breeding programme for endangered species.

Many conservation projects for endangered species were started under this act.

- Lion 1972
- Tigers 1973
- Crocodile [1974]
- Deer 1981.

FOREST (CONSERVATION) ACT, 1980

It deals with conservation of forest and includes reserve forest, protected forest and any forest land irrespective of ownership.

Salient features

- State government can use forest only forestry purpose.
- Provision for conservation of all types of forests. Advisory committee appointed for funding conservation
- Illegal non-forest activity within a forest area can be immediately stopped under this act.
- Non forest activity means clearing land for cash-crop agriculture, mining etc.
- However construction in forest for wild life or forest management is exempted from non forestry activity.

1992 Amendment:

- This amendment allows transmission lines, seismic surveys, exploration drilling and hydro electric project in forest area without cutting trees or with limited cutting of trees – prior approval central government (CG) to be sought.
- Wild life sanctuaries, National parks etc. are prohibited from exploration except with CG prior approval.
- Cultivation of coffee, rubber, tea (cash crop), fruit bearing trees, oil yielding trees, trees of medicinal values are also prohibited in reserved forest area with out prior approval from CG. Has this may create imbalance to ecology of the forest.
- Tusser (a type of silk yielding insect) cultivation in forest area is allowed since it discourages monoculture practices in forests and improves biodiversity.
- Plantation of mulberry for rearing silk worm is prohibited.
- Proposal sent to CG for non-forestry activity must have a cost benefit analysis and environmental impact statement (EIS).

RIO EARTH SUMMIT (RIO Summit)

- Five years after the Brundtland Report, the UN General Assembly asked for a report on progress made towards sustainable development and convened the United Nations Conference on Environment and Development (UNCED)
- UNCED was held in June 1992 at Rio de Janeiro in Brazil
- The Rio Earth Summit as it became known was the largest environmental conference ever held, attracting over 30,000 people including more than 100 heads of state.
- The objectives of the conference were to build upon the hopes and achievements of the Brundtland Report, in order to respond to pressing global environmental problems and to agree major treaties on biodiversity, climate change and forest management.
- Perhaps for the first time, a major environmental conference adopted a more nature-centered approach towards environmental problems.
- Despite its environmental focus, the biggest arguments at the Earth Summit concerned finance, consumption rates and population growth.
- The developed nations were calling for environmental sustainability, but the less industrialized developing nations were demanding a chance to allow their economies to catch up with the developed world.

The Earth Summit produced a number of outcomes including:

- The Convention on Biological Diversity;
- The Framework Convention on Climate Change;
- Principles of Forest Management;
- The Rio Declaration on Environment and Development; and
- Agenda 21.

Forests

- One of the key agreements reached at the 1992 Rio Earth Summit was the Principles of Forest Management.
- The Principles of Forest Management include a number of points.
- All nations should take part in "the greening of the world" through planting and conserving forests.
- Forests should be managed in order to meet the social, economic, ecological, cultural and spiritual needs of present and future generations.
- Unique examples of forest should be protected, for example ancient forests and forests with cultural, historical, spiritual and religious importance.
- Pollutants that harm forests should be controlled.

- Forestry plans should consider the non-economic values of forests and the environmental consequences of their management.
- Forest degradation should be avoided.

Public Awareness:

Our environment is presently degrading due to many activities like pollution, deforestation, overgrazing, rapid industrialization and urbanization.

Objectives of public awareness

1. Create awareness among people of rural and city about ecological imbalances, local environment, technological development and various development plants.
2. To organize meetings, group discussion on development, tree plantation programmes exhibitions.
3. To learn to live simple and eco-friendlily manner.

Methods to create environmental awareness

1. In schools and colleges
2. Through mass – media
3. Cinema
4. Newspapers
5. Audio - Visual media
6. Voluntary organizations
7. Traditional techniques
8. Arranging competitions
9. Leaders appeal
10. Non – government organizations.

Conclusions:

There is a need to interlink the social aspects to develop and modernize the technologies without losing traditional and human oriented social issues related to the environment.

PUBLIC ENVIRONMENTAL AWARENESS

Public awareness about environment is at a stage of infancy. Of late, some awareness has taken place related to environmental degradation, pollution etc. but incomplete knowledge and information and ignorance about many aspects has often led to misconceptions. Development has paved the path for rise in the levels or standards of living but it has simultaneously led to serious environmental disasters.

Issues related to environment have often been branded as antidevelopment. The wisdom lies in maintaining a balance between our needs and supplies so that the delicate ecological balance is not disrupted.

Some of the main reasons responsible for widespread environmental ignorance can be summed up as follows:

(i) Our courses in Science, technology, economics etc. have so far failed to integrate the knowledge in environmental aspects as an essential component of the curriculum.

(ii) Our planners, decision-makers, politicians and administrators have not been trained so as to consider the environmental aspects associated with their plans.

(iii) In a zeal to go ahead with some ambitious development projects, quite often there is purposeful concealment of information about environmental aspects.

(iv) There is greater consideration of economic gains and issues related to eliminating poverty by providing employment that overshadows the basic environmental issues.

Methods to Propagate Environmental Awareness

Environmental awareness needs to be created through formal and informal education to all sections of the society. Everyone needs to understand it because .environment belongs to all. and .every individual matters. when it comes to conservation and protection of environment.. Various stages and methods that can be useful for raising environmental awareness in different sections of the society are as follows:

(i) Among students through education: Environmental education must be imparted to the students right from the childhood stage. It is a welcome step that now all over the country we are introducing environmental studies as a subject at all stages including school and college level, following the directives of the Supreme Court.

(ii) Among the Masses through mass-media: Media can play an important role to educate the masses on environmental issues through articles, environmental rallies, plantation campaigns, street plays, real eco-disaster stories and success stories of conservation efforts. TV serials like Virasat, Race to save the Planet, Heads and Tails, Terra-view, Captain planet and the like have been effective in propagating the seeds of environmental awareness amongst the viewers of all age groups. (Plate VI, VII).

(iii) Among the planners, decision-makers and leaders: Since this elite section of the society plays the most important role in shaping the future of the society, it is very important to give them the necessary orientation and training through specially organized workshops and training programmes. Publication of environment - related resource material in the form of pamphlets or booklets published by Ministry of Environment & Forests can also help in keeping this section abreast of the latest developments in the field.

Objective:

To get a knowledge on human population and human rights
To educate the students on value education
To equip the students towards the modern technology with respect to environment and human health.

Population density:

Number of individuals of the population per unit area or per unit volume.
Parameters affecting population size:
1. Birth rate or Natality
2. Death rate or Mortality
3. Immigration
4. Emigration

Population Growth

The rapid growth of the global's population for the past 100 years from the difference between the rate of birth and death.
Causes of rapid population growth:
1. The rapid population growth is due to decrease in death rate and increase in birth rate
2. Availability of antibiotics, immunization, increased food production, clean water and air decreases the famine-related deaths
3. In agricultural based countries, children are required to help parents in the field that is why population increases in the developing countries.

Characteristics of population growth:

1. Exponential growth
2. Doubling time
3. Infant mortality rate
4. total fertility rate
5. Replacement level
6. Male/female ratio
7. Demographic transition

Variation of population based on age structure

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

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. But, 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. Population growth takes place exponentially and that explains the dramatic increase in global population in the past 150 years.

Doubling time: The time needed for a population to double its size at a constant annual rate is known as doubling time

Total Fertility rates (TFR) : It is one of the key measures of a nation .s population growth. TFR is defined as the average number of children that would be born to a woman in her lifetime if the age specific birth rates remain constant.

Infant mortality rate: It is an important parameter affecting future growth of a population. It is the percentage of infants died out of those born in a year.

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.

Age Structure: Age structure of population of a nation can be represented by age pyramids, 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). We get three types of age pyramids:

(a) Pyramid shaped: Here the very young population is more, making a broad base and old people are less.

(b) Bell shaped: It occurs 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 (Fig 7.2(b)).

(c) Urn shaped: Here number of individuals in very young class is smaller than the middle reproductive age class. It is associated with ubranisation and growth and occurs in four phases:

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.

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.

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. In Japan and Sweden, life expectancy is quite higher, being 82.1-84.2 for females and 77-77.4 for males, respectively.

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.

Population Explosion

The enormous increase in population due to low death rate and high birth rate.

Causes:

Modern medical facilities, life expectancy, illiteracy,

Effects:

Poverty, Environmental degradation, Over –exploitation of natural resources
,Treat, Communal war
Remedy:- Through birth control programmes.

There has been a dramatic reduction in the doubling time of the global human population, as we have already discussed. In the 20th century, human population has grown much faster than ever before. Between 1950-1990, in just 40 years the population crossed 5 billion mark with current addition of about 92 million every year, or so to say, adding a new Mexico every year. In the year 2000, the world population was 6.3 billion and it is predicted to grow four times in the next 100 years. This unprecedented growth of human population at an alarming rate is referred to as population explosion.

The Indian Scenario: India is the second most populous country of the world with 1 billion people. If the current growth rates continue, it will have 1.63 billion people by 2050 and will become the most populous country surpassing China.

So we are heading for very serious ramifications of the population explosion problem. Do we have the resources and provisions for feeding, housing, educating and employing all those people being added every year? If we look at the population statistics of our country we find that in just 35 years after independence we added another India in terms of population.

On 11th May, 2000 we became 1 billion and now we can say that every 6th person in this world is an Indian.

The Population Clock

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

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. There is a fierce debate on this issue as to whether we should immediately reduce fertility rates through worldwide birth control programs in order to stabilize or even shrink the population or whether human beings will devise new technologies for alternate resources, so that the problem of crossing the carrying capacity of the earth will never actually come.

There are two very important views on population growth which need a mention here:

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.

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. A compromise between the two views is required because all these factors seem to be interdependent and interrelated. Equity and social justice to all, allowing everyone to enjoy a good standard of living is the need of the hour that can voluntarily help in achieving a stabilized global population.

Family welfare programme:

Objectives:

Slowing down the population explosion
Over exploitation of natural resources
Family planning programme:
Objectives;
Reduce infant mortality rate
Encourage late marriages
Improve women's health
Control of communal diseases…

Environment and human health:

1. Physical Hazards – Radioactive and UV radiations, Global warming, Chlorofluro carbons, Noise etc.
2. Chemical Hazards – Combustion of Fossil fuels, industrial effluence, pesticides, heavy metals,
3. Biological Hazards- Bacteria, Viruses, Parasites

Family Welfare Programmes Population explosion is like a time bomb that must be diffused well in time. The population must be kept much below the carrying capacity and stabilized, so that the aftermath of explosion could be avoided. It is not precisely known as to how long can we continue our exponential growth in population and resource use without suffering overshoot or dieback. We are getting warning signals that if not controlled, the increasing population is going to deplete all the resources beyond their regeneration capacity. A catastrophic doomsday model warns us that the earth cannot sustain more than two more doublings i.e. 25 billion.

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 2025. Stabilization in developing nations is possible only through various family welfare programmes.

The Kerala Model (A case study) Kerala has earned the distinction of having lowest birth rates among all the states of India.

ENVIRONMENT AND HUMAN HEALTH

Human rights:

1. Human right to freedom
2. Human right to property

3. Human right to freedom of religion
4. Human right to culture and education
5. Human right to constitutional remedies
6. Human right to equality
7. Human right against exploitation
8. Human right to food and environment
9. Human right to good health.

In general terms a physically fit person not suffering from any disease is called a healthy person. However, there are many other dimensions associated with the state of being healthy. According to World Health Organisation (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.

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 bioaccumulate 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. The adverse effects of some of these have already been discussed in Unit 5. 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.

The details of effects of air pollution on human health have already been given in Unit 5. 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. Besides hearing damage various types of physiological and psychological changes are induced by noise pollution.

Radiations: Radiations are known to cause short-term and longterm changes in various organs. Cosmic rays and ultra-violet rays cause harmful effects on human health which may include cancer. The details of ill effects of radiations on human health are given in Unit 5.

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. Likewise various adulterated pulses, condiments, oils etc. sold in the market to earn profit affect human health.

Settlement: Proper environment, availability of basic necessities of life like, water, sanitation etc. are essential for healthy living. Housing is very important from security point of view. Improper settlement and poor physical environment may cause various psychological problems which affect various vital physiological processes in the body.

HUMAN RIGHTS

- Human right means that a human being must enjoy on this earth.
- Foundation of human was laid in 13th century. But positive hopes for all people for a happy, dignified and secured living condition wee raised only after "Universal Declaration of Human Rights (UNDHR) by UNO on 1012.1948.
- It highlights on protection to all individuals against injustice and human right violation.
- 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.
- Universal declaration rights are universal but disparity between developing and developed countries.
- 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.
- Acute scarcity of employment.
- Merit of universal education and child labour prevention is of much less importance than his struggle for existence.
- Developed and developing country give importance only to 'respect to human rights' and 'non social – economic rights' respectively.

HUMAN RIGHTS

Human rights are the rights that a human being must enjoy on this earth since he/she is a human being. Although the foundation of human rights was laid in the 13th century when resistance to religious intolerance, socio-economic restraints and scientific dogmas resulted in some revolts mainly due to the liberal thoughts of some philosophers. However, true hopes for all people for happy, dignified and secure living conditions were raised with the Universal Declaration of Human Rights (UNDHR) by the UNO on December 10, 1948.

This declaration provided comprehensive protection to all individuals against all forms of injustice and human rights violations. The UNDHR defines specific rights, civil, political, economic, social as well as cultural. It defines the rights to life, liberty, security, fair trial by law, freedom of thought, expression, conscience, association and freedom of movement. It

emphasizes right to equal pay for equal work, right to form and join trade unions, right to health care, education, adequate rest etc.

Although the human rights are considered to be universal, there is a wide disparity between the developing and the developed countries. Population and poverty are often found to be the most important causes of violation of human rights in the third world countries. Poverty often undermines human dignity and without dignity there is no meaning of human right. In fact, talks of human rights seem justified only when one can just manage to live on.

The World Health Organisation estimates indicate that one out of every five persons in this world is malnourished, lacks clean drinking water, lacks proper hygienic conditions and adequate health facilities; one out of three persons does not have enough fuel to cook or keep warm and one out of five persons is desperately poor for whom life is nothing but struggle for survival. Every year 40 million people are dying due to consumption of contaminated drinking water.

There is acute scarcity of employment in the third world countries. Under such conditions, a poor man feels that perhaps his child can earn something for himself or the family. For him, the merit of universal education and child labour prevention is of much less importance than his grim struggle for existence. For the developed countries, which have already attained a high stage of development in material and economic resources, the social and economic rights are not that important as civil and political rights.

Whereas, the reverse is true for the developing countries which are struggling for life under conditions of extreme poverty, ignorance, illiteracy, malnutrition and diseases. For them the civil and political rights carry little meaning. In June 1993, during the Vienna World Conference on Human Rights the need for economic and social rights were considered as equal to the west.s political and civil rights.

Respect towards human rights is now considered to be one of the important criteria for giving development assistance to a country. In 1992, the Burton Bill passed in USA slashed 24 million dollars of development assistance to some developing countries including India on the grounds of showing poor human rights records. In India, human right issues have mostly centered around slavery, bonded labour, women subordination, custodial deaths, violence against women and minorities, child abuse, dowry deaths, mass killings of dalits, torture, arbitrary detentions etc. The constitution of India contains a long list of people.s civil, political, economic and social rights for improving their life. Yet, it is an irony that violation of human rights takes place rather too often in our country.

Social discriminations, untouchability, patriarchal society with male domination etc. still prevail in the society which hinder the honour of human rights. Civil liberties and fundamental freedom are also often violated by those who have money power. Communal violence against minorities has become quite prevalent in our country. There is a need to respect the human rights of all people in every nation for overall development and peace.

As the right to development was defined, another aspect of human right related to environment emerged. After the Earth Summit 1992, the need for sustainable development was recognized.

Soon after on May 16, 1994 at Geneva, the United Nations drafted the first ever Declaration of Human Rights and Environment, which embodies the right of every human being to a healthy, secure and ecologically sound environment.

A sustainable society affirms, equity, security, attainment of basic human needs and environmental justice to all. It is quite disheartening to look at the environmental inequities.

The developed nations utilizing most of the natural resources and reaping the benefits of industrial development are not bearing the burden of their hazardous wastes, as they export such wastes to many developing countries who have to face the toxic impacts of the hazardous wastes.

The worker class and the poor are the main victims and sufferers of adverse effects of industrial toxins, foul smelling polluted air, unclean and unsafe drinking water, unhealthy working conditions, occupational health hazards etc. The indigenous people and tribal people are the worst victims of development who lose their homes and lands to dams and reservoirs and are deprived of their human rights to native homes.

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:

Types:
1. Formal education
2. Value education
3. Value - based environmental education

Objectives
1. To improve the integral growth of human beign
2. To create attitudes and improvement towards sustainable lifestyle.
3. To increase awareness about our national history our cultural heritage, constitutional rights, national integration, community develo9pment and environment.
4. To create and develop awareness about the values and their significance and role
5. To know about various living and non- living organisms and their interaction with environment.

Types of values:
1. Universal values
2. Cultural values
3. Individual values
4. global values
5. Spiritual values

VALUE EDUCATION

- Education is one of the most important tools in bringing about socioeconomic and cultural progress of a country.
- The objective of education should not be merely coaching the students to get through the exams with good results and get some good job.
- Education does not simply mean acquiring information but using the resources within the limits of ethical value.
- The scientific and technological advancements have shrunk the world into a village.
- But in the drive to development man has become too materialistic, self centered and over ambitious.

- Value based education has a very significant role in providing proper direction to youth to inculcate positive attitude and to teach them the distinction between right and wrong.
- It teaches them to be compassionate, peace loving, helpful, generous and tolerant so that they can move towards more harmonious, peaceful, enjoyable and sustainable future.
- Value education help in arriving value based judgements based on practical understanding of various natural principles.
- Value education increases awareness about our national history, our cultural heritage, national pride, constitutional rights and duties, national integration, community development and environment.
- It is crucial to the retention of national identity, peaceful and harmonious society.
- Education should give overall development of the student personality.
- The main of education is to produce citizens with sound character and health.
- Good citizens are the only hope for the progress and prosperity of the country.
- Life based upon good principles is an essential requisite.
- Therefore moral education should be included in the school curriculum.
- The curriculum should provide enough opportunity for pupils to acquire a considerable amount of knowledge that is essential for morally responsible living in our democratic society.
- Value education shall prepare individuals for participation in social life and acceptance of social rules.
- Schools should provide a healthy environment for sharing responsibilities of community life and relationships.

Value based environmental education

- Environmental education is something that every person should be well versed with.
- The principles of ecology and fundamentals of environment help to create a sense of earth citizenship and a sense of care for the earth and its resources - a sense of commitment towards the management of the resources in a sustainable way so that our children and grand children too have a safe and clean planet.
- Following the Supreme Court directives 1998 environmental education has been included in the curriculum right from the school stage to university level.
- The objective of it is to make everyone environment literate.
- Let us see how environmental education can be made value based one.

    - Preparation of text books materials on environmental education – to built a positive attitude towards environmental factors.
    - Social values like love, tolerance, compassion can be woven into environment education. This will help to nurture all forms of life and biodiversity.

Cultural and religious values

- Our culture and religions teach us not to exploit nature –but to perform such functions which project and sacred nature.
- Therefore these values can be added up with environment education.

- Environment Education should stress on earth centric views rather than human centric view such that it include the ethical values.

Global values

- Stress on the concept human is part of nature and all natural processes are inter linked and they are in harmony.
- If this harmony is disturbed it may lead to imbalance in ecology and catastrophic results.

Spiritual values

- Highlights on self contentment, discipline, reduction of wants etc.
- This will reduce our consumerist approach.
- If the mentioned values are incorporated in environment education, the goal of sustainable development and environment conservation can be easily attained.
- Value based environment education can bring about a total transformation of our mind set, our attitudes and life style to protect nature.

HIV /AIDS

AIDS is the abbreviated form for Acquired Immuno Deficiency Syndrome caused by a virus called HIV.

Effects;

1. Death
2. Loss of labor
3. Inability to work
4. Lack of energy

Woman and child welfare:

Objectives:

1. to provide education
2. To impart vocational training
3. To generate awareness
4. To improve employment opportunities
5. To restore dignity, equality and respect.

Role of information technology in environment:

Remote sensing:

Component- A platform, aircraft, A balloon, rocket, and satellite.

Functions:

1. Origin of electro magnetic energy
2. Transmission of energy
3. Interaction of energy
4. Detection of energy
5. Preprocessing of data

6. Data analysis and interpretation
7. Integration and other applications.

Applications:

In agriculture, forestry, land cover, water resources
Data Base- Collection of inter related data on various subjects.
Applications:
1. Ministry of environment and forest
2. National management information system
3. Environmental information system

Geographical information system:

Application:
Thematic maps are super imposed using soft wares.
Interpretation of polluted zones
To check unplanned growth and related environmental problems

Satellite data:

1. Helps in providing reliable information and data about forest cover
2. Provide information about forecasting weather
3. Reserves of oil , minerals can be discovered.

WORLD WIDE WEB: Current data.
Applications:
1. Online learning
2. Digital files or photos, animations on environmental studies.

Role of information technology in human health:
The health service technology involves three systems
1. Finance and accounting
2. Pathology
3. Patient Administration – clinical system.

Applications:
1. Data regarding birth and death rates
2. To monitor the health of the people effectively
3. The information regarding the outbreak of epidemic diseases.
4. Online Consultation
5. Drugs and its replacement..

Conclusion:
Gaining in-depth knowledge regarding human health, human rights and role
Played by modern technology to the environment.

ROLE OF INFORMATION TECHNOLOGY IN ENVIRONMENT

AND HUMAN HEALTH

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.

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.

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). With its headquarters in 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.

Remote Sensing and Geographical Information System (GIS)

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.

Geographical Information System (GIS) 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. Several useful soft-wares have been developed for working in the field of GIS.

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.

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

Our satellite data also 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.

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.

World Wide Web: A vast quantum of current data is available on World Wide Web. One of the most important on-line learning center with power web is www.mhhe.com/environmental science and 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.

The role of online learning center website has the following features:

(a) Student friendly features: These include practice quiz, how-to study tips, 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.

(b) Teacher-friendly features include in addition to above 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. 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.

POSSIBLE QUESTIONS

Part-A(20*1=20Marks)

ONLINE EXAMINATION

Part- B (5*2=10Marks)

1. What are types of disaster?
2. What is meant by environmental education?
3. Write a note on EP Act.
4. Define global warming.
5. Write short notes on RIO-summit.
6. What is green house effect?
7. Write short notes on deforestation.
8. Brief out energy policy act.
9. What are the causes of earthquake?
10. How will you reduce the risks of disaster management?
11. What is meant by hazard?
12. Define vulnerability and risk.
13. What are the causal factors of disaster?
14. Define disaster.
15. What is meant by vulnerability?
16. Write any four mitigation measures of man-made disaster.
17. Define mitigation.
18. List out any five consequences of man-made disaster.
19. What are the control measures of earthquake?
20. List out the effect of landslides.
21. Write types of hazard.
22. Write short notes on response phase.
23. What is mean by disaster risk reduction?

Part – C (5*6=30 Marks)

1. Elaborate the causes, consequence and mitigation measures of man-made disaster.
2. Define disaster management. Explain the disaster management cycle.
3. Explain manmade disaster and its consequences with suitable example.
4. Write any two natural disaster and explain its consequences.
5. Explain in detail the disaster management cycle.
6. What are the causes, consequences and mitigation measures of natural disaster? Explain.
7. Write in detail the causes of earthquake and its disaster and rehabilitation management.
8. Give an detailed account on global warming and its causes
9. Discuss in detail about disaster and rehabilitation management for floods.
10. Give a detailed account on global warming and its causes.

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I B.Sc CS (Batch 2017-2020)

ENVIRONMENTAL STUDIE

PART - A OBJECTIVE TYPE/MULTIPLE CH

ONLINE EXAMINATIONS ONE MAR

UNIT 5

S.NO	Question	Option 1	Option 2
1	The process of extraction, refinement,fabrication and delivery are all energy consuming and add to pollution of earth,air and water.	embodied energy	kinetic energy
2	_____depends on energy mainly from fossil fuels.	rural transport	Urban transport
3	As _____and _____spreads due to extensive changes in land use the once perennial rivers are becoming increasingly seasonal.	deforestation and desertification	afforestation and asertification
4	Urban residential and commercial facilities are responsible for approximately____	25%	35%
5	_____ controls erosion and conserves moisture.	Medhbandi	chak
6	The _____is well-known for its built reservoirs (talabs).	chak	talab
7	A small reservoir of less than five bighas is called _____	samand	saqar
8	A medium sized lake is called_____	bandh or talab	saqar
9	A bigger lake is called_____	sagar	sagar or samand
10	_____ begins by taking control over a degraded site through local participation.	pollution	energy
11	_____ such degraded areas is an important aspect of watershed management.	afforestation	Afforesting
12	There are _____ aspects that are closely connected with ethical issues that are related to our environment.	2	3
13	The concept of _____ is based on a thinking that the soul moves from man to animal and in reverse depending on ones actions.	karma	ahimsa

14	_____ goddesses have been associated with specific plant species.	tree	plant
15	The _____ plant is grown on the doorstep outside every home.	tulsi	moneyplant
16	Certain species of trees have been protected as they are valued for their _____or _____	fruit or flowers	flowers or trees
17	The _____ is protected for its fruit around most farms even when wood becomes scarce.	banyan tree	coconut tree
18	The _____is protected by tribal people as it provides edible flowers, oil from its seeds and is used to make a potent alcohol.	Mohua tree	Madhuca indica
19	About _____ of the solar energy reaching the Earth is absorbed on the earth's surface whichincreases its temperature.	85%	75%
20	The _____ affects plant and animal life in aquatic ecosystems.	fossil fuel	oil refining
21	The destruction of the _____ is seen to cause increased cases of skin cancer and cataracts.	toposphere	stratosphere
22	After _____, the ozone layer is expected to recover slowly over a period of about 50 years.	1990	1000
23	The signing of the Montreal Protocol in _____	1985	1986
24	Wasteland can be reclaimed for_____ by reducing the salt content which can be done by leaching and flushing.	agriculture	forestry
25	_____implies integration of trees with agricultural crops or livestock management simultaneously.	afforestation	agro forestry
26	Wasteland can be classified into _____forms	2	3
27	NGO stands for _____	non-governmental organization	non govern opportunities
28	_____items greatly increase this waste.	dispose	Disposable
29	_____ was the first State in India to regulate the manufacture and use of plastics.	tamil nadu	andhra pradesh
30	_____is one of the end results of consumerism.	Materialism	consumer
31	_____is driven by huge sums spent on advertising designed to create both a desire to follow trends, and a personal feeling of satisfaction based on acquisition.	matreials	Consumerism

32	Reduce, Reuse, Recycle, or the____ principle, is the new concept in waste management.	3P	3Rs
33	_____and_____is used to make new metal products.	Metal scrap and broken glass	metal and glass
34	Using sewage in a _____plant to make fuel.	gas	biogas
35	The spirit of the proclamation adopted by the United Nations Conference on Human Environment which took place in Stockholm in June _____	1972	1872
36	The Government passed this Act in _____ to clean up our air by controlling pollution.	1991	1981
37	VOC stands_____	volatile organic compounds	volatile of compounds
38	(PCBs) stands for_____	popular control board	Pollution Control Boards
39	RTO_____	road transport office	railway transport office
40	The Government has formulated this Act in _____to be able to prevent pollution of water by industrial, agricultural and household wastewater that can contaminate our water sources.	1975	1974
41	The main objectives of the Water Act are to provide for _____,_____ and abatement of water pollution and the maintenance or restoration of the wholesomeness of water.	prevention	control
42	The Forest Conservation Act of _____	1982	1980
43	India's first Forest Policy was enunciated in _____	1951	1952
44	The Forest Conservation Act of 1980 was enacted to control _____	afforestation	deforestation
45	_____are not permitted to trespass into the Reserved Forest.	cattle	kinetic energy
46	MoEF stands for_____	ministry of ecosystem and foundation	Ministry of Environment and Forests
47	New projects are called _____	green projects	green field projects
48	Project that already exist but require expansion must also apply for clearance_____	green field projects	field projects

49	An _____ is not intended to stop all types of development.	EIA	AMI
50	march 21_____	world forestry day	world health day
51	april 07_____	world forestry day	world health day
52	april 18_____	world forestry day	world health day
53	april 22_____	world forestry day	world health day
54	june 05 _____	world forestry day	world heritage day
55	june 11_____	earth day	world health day
56	february 2 _____	world wetland day	world health day
57	august 6_____	hiroshima day	world ozone day
58	september 16 _____	hiroshima day	world ozone day
59	september 28_____	hiroshima day	world ozone day
60	october 1-7_____	hiroshima day	world ozone day

EDUCATION

CIENCE

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OICE QUESTIONS

RKS QUESTIONS

Option 3	Option 4	Option 5	Option 6	Answer
potential energy	all the above			**embodied energy**
urbanization	urban and rural			**Urban transport**
deforestation and afforestation	desertification			**deforestation and desertification**
45%	65%			**35%**
naanda	talab			**Medhbandi**
Mewar region	medhbandi			**Mewar region**
talab	talai			**talai**
talai	samand			**bandh or talab**
talab	chak			**sagar or samand**
Watershed management	potential energy			**Watershed management**
deforestation	desertification			**Afforesting**
4	5			**2**
life	wilderness			**karma**

animals	trees and plants			**tree**
green leaves	all the above			**tulsi**
trees or fruits	trees or plants			**fruit or flowers**
mango tree	peach tree			**mango tree**
mango tree	both a and b			**both a and b**
65%	95%			**75%**
acid rain	acidic raining			**acid rain**
ozone layer	mesosphere			**ozone layer**
2000	3000			**2000**
1987	1990			**1987**
agro	agroforestry			**agriculture**
agriculture	forest			**agro forestry**
4	5			**2**
not good organization	non government organization			**non-governmental organization**
delegation	garbage			**Disposable**
karnataka	Himachal Pradesh			**Himachal Pradesh**
consumerlism	consumer			**Materialism**
materialism	consumer			**Consumerism**

4Rs	3Ps			**3Rs**
metal scrap and new glass	new glass and broken glass			**Metal scrap and broken glass**
bio	biochemical			**biogas**
1772	2002			**1972**
1852	1952			**1981**
vague of compounds	non volatile if inorganic compounds			**volatile organic compounds**
population control board	all the above			**Pollution Control Boards**
road trans office	railway transport origin			**road transport office**
1973	1972			**1974**
protect and prevention	prevention and control			**prevention and control**
1981	1985			**1980**
1953	1954			**1952**
afforestation	prevention and control			**deforestation**
bus	train			**cattle**
ministry of environmental and foundation	ministry of ecosystem and forest			**Ministry of Environment and Forests**
field projects	green field			**green field projects**
green projects	brown field projects			**brown field projects**

EMI	MMI			**EIA**
world heritage day	earth day			**world forestry day**
world heritage day	earth day			**world health day**
world heritage day	earth day			**world heritage day**
world heritage day	earth day			**earth day**
world environment day	world population day			**world environment day**
world environment day	world population day			**world population day**
world environment day	world population day			**world wetland day**
green consumer day	wildlife week			**hiroshima day**
green consumer day	wildlife week			**world ozone day**
green consumer day	wildlife week			**green consumer day**
green consumer day	wildlife week			**wildlife week**

Reg. No. .....

[11VAE201]

KARPAGAM UNIVERSITY
(Under Section 3 of UGC Act 1956)
COIMBATORE – 641 021
(For the candidates admitted from 2011 onwards)

B.Com, B.Com (CA), BBM (CA), BCA, B.Sc. DEGREE EXAMINATION, NOVEMBER 2014

Second Semester

ENVIRONMENTAL STUDIES

Time : 3 hours Maximum : 100 marks

PART A (15 x 2 = 30 Marks)
Answer ALL the Questions

1. Define environment.
2. Write a note on the importance of environment studies.
3. Write a note on physical environment.
4. List out any four reasons for Air pollution
5. What do you mean by Ecosystem?
6. Write short notes on Energy Flow
7. What are Gene banks?
8. What is poaching of wild life?
9. Write a note on habitat loss.
10. Bring out the advantages of Rainwater Harvesting System?
11. Write short note on Rehabilitation and resettlement of Tehri project.
12. Define Gutters.
13. List out the effects of ozone depletion.
14. What are the principles of physical activity?
15. What are the consequences of acid rain?

PART B (5 x 14 = 70 Marks)
Answer ALL the Questions

16. a) Discuss the various types of environment.
Or
b) Describe in detail about Environment Education

17. a) Explain the causes, effects and preventive measures of thermal pollution
Or
b) List out and explain the factors that affect the environment in detail

18. a) Explain in detail about food chain, food web
Or
b) Discuss in detail about conservation of biodiversity

19. a) Explain in detail about water conservation
Or
b) Discuss about World Bank's policy objectives for Resettlement and Rehabilitation

20. a) What are the components of physical fitness? How to develop it?
Or
b) Write a detail on laws of environment?

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B.Com, B.Com (CA), BBA, BCA, B.Sc. DEGREE EXAMINATION, AUGUST 2014

Second Semester

ENVIRONMENTAL STUDIES

Time: 3 hours

Maximum: 100 marks

PART – A (15 x 2 = 30 Marks)
Answer ALL the Questions

1. Mention the scope of environment.
2. Write any two needs of public awareness.
3. What do you understand by the term Social environment?
4. Write short notes on ecosystem
5. List out any four preventive measures of water pollution
6. What do you mean by thermal Pollution?
7. Define Exotic species.
8. What are biosphere reserves?
9. Differentiate between *in situ* and *ex situ* conservation.
10. What are the harmful effects of Urbanization?
11. What is Charcoal water filter?
12. What is First Flushing?
13. How is acid rain caused?
14. What is waste land?
15. What are the basic requirements for wasteland development?

PART – B (5 x 14 = 70 Marks)
Answer ALL the Questions

16. a) Describe in detail about Environment Education.
    Or
    b) Write a short note on Natural and Manmade Environments.

17. a) Explain the scope, importance and structure of Ecosystem
    Or
    b) Explain the causes and preventive measures of Air pollution

18. a) Discuss in brief about the benefits of biodiversity.
    Or
    b) How is India biogeographically classified?

19. a) Describe natural resources and their associated problems
    Or
    b) i) List out the advantages and disadvantages of Rainwater Harvesting
    ii) Discuss in detail about Rehabilitation and resettlement of the Tehri Dam

20. a) Write a detailed note on solid waste management.
    Or
    b) What is the role of value education for the total well being? Explain.

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B.Com, B.Com (CA), BBA, BCA, B.Sc. DEGREE EXAMINATION, NOVEMBER 2013

Second Semester

ENVIRONMENTAL STUDIES

Time: 3 hours

Maximum: 100 marks

PART – A (15 x 2 = 30 Marks)
Answer ALL the Questions

1. Discuss the scope of environment.
2. Write a note on the need of public awareness about environment.
3. Write a note on biological environment.
4. Write short notes on the concept of ecosystem
5. What are the main reasons for water pollution?
6. Write short notes on food webs
7. Mention the names of hot spots in India.
8. Differentiate between a National park and Sanctuary.
9. Name the most rich biodiversity zones in India.
10. Define Sustainable Development
11. Explain how Urbanization can lead to environmental degradation.
12. What are the components of Rainwater Harvesting System?
13. List out the effects of ozone depletion.
14. What are the principles of physical activity?
15. What are the consequences of acid rain?

PART – B (5 x 14 = 70 Marks)
Answer ALL the Questions

16. a. Describe the importance of environment studies.

Or

b. Discuss the various types of environment.

17. a. Explain food chains and food webs in detail.

Or

b. Explain the causes, effects and preventive measures of Water pollution.

18. a. Write about Genetic, Species and Ecosystem diversity.

Or

b. Describe about Threats to Biodiversity.

19. a. Explain in detail about the components of Rainwater Harvesting System.

Or

b. Discuss about Urban problems related to energy.

20. a. Explain in detail about causes and effects of global warming.

Or

b. what are the environmental ethics? Explain.

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