KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University Established under section 3 of UGC Act 1956)
Coimbatore-641021
Department of Management

Semester – II

17AEC201	ENVIRONMENTAL STUDIES	L	T	P	C
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SCOPE

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.

OBJECTIVES

- 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 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.

SUGGESTED READINGS:

TEXT BOOKS

1. Tripathy, S.N., & Sunakar Panda. (2004). *Fundamentals of Environmental Studies* (2nd ed.). New Delhi: Vrianda Publications Private Ltd.

2. Arvind Kumar. (2004). *A Textbook of Environmental Science*. New Delhi: APH Publishing Corporation.

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

4. Anubha Kaushik & Kaushik, C.P. (2004). *Perspectives in Environmental Studies*. New Delhi:

New Age International Pvt. Ltd. Publications.

REFERENCES

1. Singh, M.P., Singh, B.S., & Soma S., Dey. (2004). *Conservation of Biodiversity and Natural Resources.* New Delhi: Daya Publishing House.

2. Daniel B Botkin, & Edward A Keller. (1995). *Environmental Science* . New York: John Wiley and Sons, Inc.

3. Uberoi, N.K., (2005). *Environmental Studies.* New Delhi : Excel Books Publications of India.

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Department of Management

Name: **G HARIHARAN (Assistant Professor)**
Department: **Management**
Subject Code: **17AEC201** Semester: **II** Year: **2017-20 Batch**
Subject: **Environmental Studies- Lesson Plan**

UNIT 1			
SI.No	**Lecture Hours**	**Contents**	**References**
1	1	Introduction to Environment , Definition and Scope-Environment	R_2: Page No: 2-5
2	1	Importance of Environment	R_2: Page No: 50-51
3	1	Components of Environment	R_2: Page No: 50-51
4	1	Types of Environment	R_3 : Page No: 10-11
5	1	Eco System- Definition, Concept, Scope and Importance	R_2: Page No: 50-51
6	1	Structure of Eco System	R_2: Page No: 50-51
7	1	Functions of Eco System	R_2: Page No: 50-51
8	1	Energy Flow	R_2: Page No: 51-53
9	1	Ecological Succession	R_2: Page No: 51-53
10	1	Food Chains, Food webs	R_2: Page No: 53
11	1	Classification of Eco- System	R_2: Page No: 55-61
12	1	Recapitulation and discussion of Important questions	
Total Number of hours planned for Unit 1			**12**
UNIT 2			
1	1	Introduction to natural Resources Renewable Resources Non Renewable Resources	R_2: Page No: 12
2	1	Forest Resources	R_2: Page No: 12-21
3	1	Uses of Forest Resources	R_2: Page No: 12-21
4	1	Water Resources and its uses	R_2: Page No: 22-27
5	1	Mineral Resources and its uses	R_2: Page No: 28-30
6	1	Food Resources	R_2: Page No: 30-36

7	1	Energy Resources	R_2: Page No: 36-42
8	1	Land Resources	R_2: Page No: 42-46
9	1	Role of individuals in conservation of Natural Resources	R_2: Page No: 46-47
10	1	Equitable use of resources for sustainable life styles	R_2: Page No: 46-47
11	1	Ill effects of Fire works	W_1
12	1	Recapitulation and discussion of Important questions	
Total Number of hours planned for Unit 2			**12**
UNIT 3			
1	1	Introduction to Biodiversity and its conservation • Definition • Genetic • Species	R_1: Page No: 01-10
2	1	Eco-System Diversity	R_1: Page No: 01-10
3	1	Bio geographical Classification of India	W_2
4	1	Value of Biodiversity • Consumptive • Productive uses	T: Page No: 16-18
5	1	Value of Biodiversity -Social, Ethical, Aesthetic and option values	T: Page No: 16-18
6	1	Biodiversity at Global, National and Local	R_2: Page No: 68-69
7	1	India – The Mega Diversity and Hotspot of Biodiversity	R_2: Page No: 69-71
8	1	Threats to Bio Diversity • Habitat Loss • Poaching of Wildlife	R_1: Page No: 158-164
9	1	Man-Wildlife Conflict	W_3
10	1	Endangered and Endemic species of India	R_2: Page No: 75-77
11	1	Insitu, Exsitu -Conservation of Biodiversity-	R_2: Page No: 77-82
12	1	Recapitulation and discussion of Important questions	
Total Number of hours planned for Unit 3			**12**
UNIT 4			
1	1	Environmental Pollution • Meaning • Cause and Effects	R_2: Page No: 90-91
2	1	Control Measures • Air Pollution, Causes and Effects	R_2: Page No: 91-101

3	1	Water Pollution	R_2: Page No: 91
4		Soil Pollution	R_2: Page No: 91
5	1	Control Measures-Marine Pollution	R_2: Page No: 16 R_2: Page No: 101-102
6	1	Noise Pollution	R_2: Page No: 101-102
7	1	Control Measures-Thermal Pollution, Nuclear Hazards Pollution	R_2: Page No: 102-104
8	1	Solid Waste Management	R_2: Page No: 106-113
9	1	Role of an individual in prevention of pollution	R_3 : Page No: 106-107
10	1	Pollution Case Studies- Environment Movement in Karnataka, New Delhi	R_3 : Page No: 108-109 W_4
11	1	Disaster Management Floods, Earthquake, Cyclones, Natural Disaster	R_2: Page No: 115-118
12	1	Recapitulation and discussion of Important questions	
Total Number of hours planned for Unit 4			**12**
UNIT 5			
1	1	From Un sustainable to Sustainable Development Urban Problem Related to Energy, Water Conservation and Management, Rain Water Harvesting, Water Shed Management	R_2: Page No: 123-128
2	1	Resettlement and Rehabitilisation of people, Environmental Ethics- Issues and solutions Climate Change Global Warming, Acid Rain, Ozone Layer Depletion, Nuclear Accident and Holocaust	R_2: Page No: 130-148
3	1	Waste Land Reclamation, Consumerism and Waste products	R_2: Page No: 148-151
4	1	Environment Protection Act 1986, Air (Prevention and Control of Air pollution) Act, 1981, The water (Prevention and Control of Pollution) Act, 1974,	R_2: Page No: 151-160
5	1	Wildlife and its Protection Act, 1972, Forest Conservation Act	R_2: Page No: 160-172
6	1	Issues involved in the enforcement of Environmental Regulation, Public Awareness, Population Growth, Population Explosion and family welfare programme	R_2: Page No: 160-189
7	1	Environment and Human health, Value Education-HIV/AIDS, Women and Child Welfare.	R_2: Page No: 172-198
8	1	Role of Information Technology in Environment and Human health	R_2: Page No: 192-198
9	1	Recapitulation and discussion of Important questions	

Total Number of hours planned for Unit 5			**09**
10	1	Discussion of previous year ESE Question papers	
11	1	Discussion of previous year ESE Question papers	
12	1	Discussion of previous year ESE Question papers	
Total Number of hours planned for Unit 5 and discussion of previous year ESE Question papers			**09+03=12**

Suggested Readings:

Text books:

1. P C Kotwal and Sujoy Banerjee, Biodiversity Conservation in Managed Forests and Protected Areas, Published by Agro bios, Jodhpur, 2004, ISBN 10: 8177542133 / ISBN 13: 9788177542134.

References:

1. Singh M.P., B.S. Singh and Soma S. Dey. (2004).*Conservation of Biodiversity and Natural Resources*, Daya Publishing House, Delhi.
2. N.K. Uberoi. (2010). Environmental Studies, 2nd Edition, Published by Excel Books, New Delhi.
3. Prof. Ranganathan, (2005) Foundation Course B- Environmental Studies, Bharathiar University, Coimbatore.

Website:

W_1: http://www.robinage.com/environment/the-ill-effects-of-firecrackers.htm
W_2: https://en.wikipedia.org/wiki/Biogeographic_classification_of_India
W_3: http://wwf.panda.org/about_our_earth/species/problems/human_animal_conflict/
W_4: https://en.wikipedia.org/wiki/Environmental_issues_in_Delhi

UNIT-I

SYLLABUS

Introduction to Environment: 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

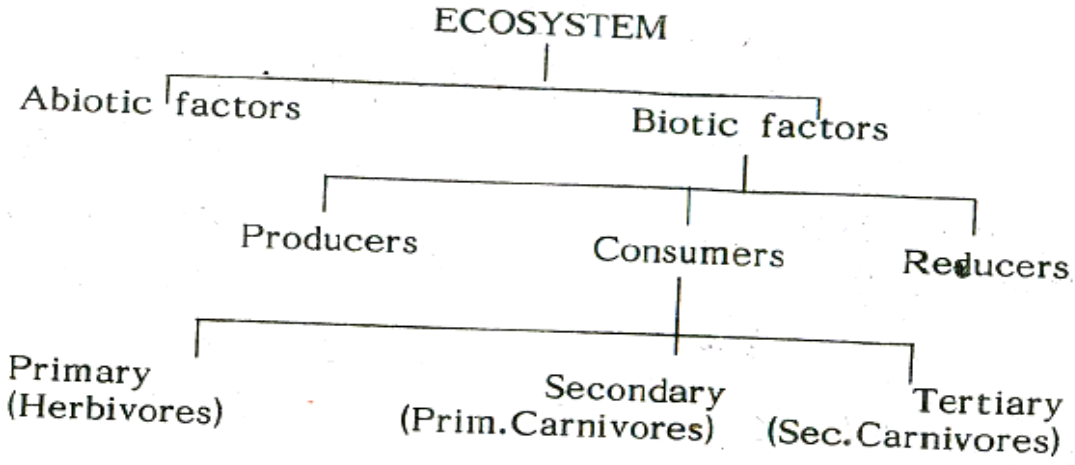
- Modern ecology focuses on the basic functional ecological unit the ecosystem.
- An ecosystem is any spatial or organizational unit which includes a community of living organisms and non-living substances of environment interacting to produce an exchange of materials between the living and non-living 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.

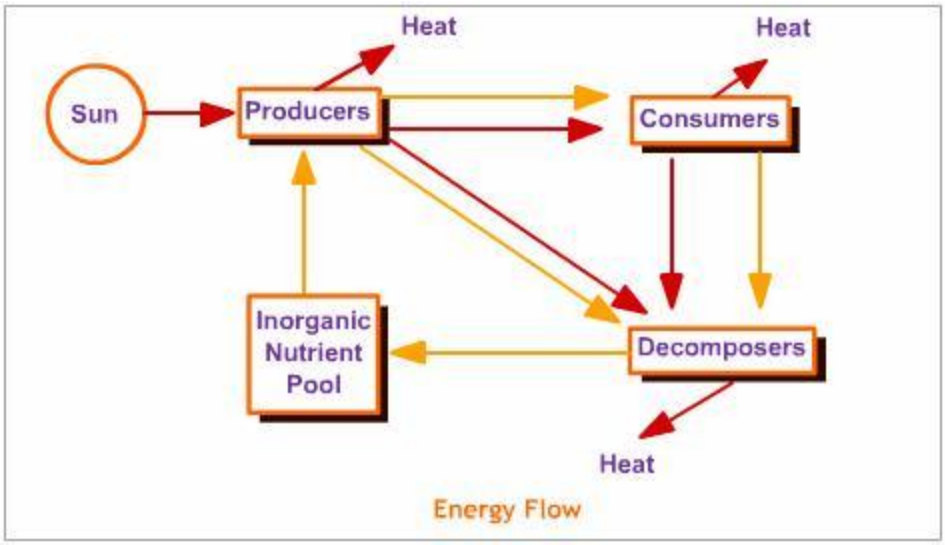
Reducers or Decomposers

- 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:

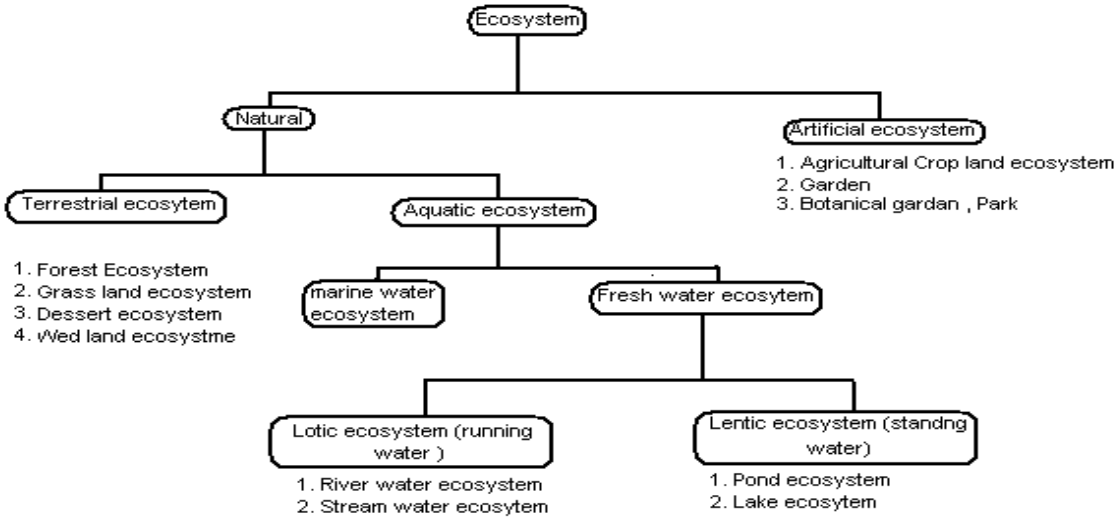
1. The ultimate source of energy (for most ecosystems) is the sun
2. The ultimate fate of energy in ecosystems is for it to be lost as heat.
3. Energy and nutrients are passed from organism to organism through the food chain as one organism eats another.
4. Decomposers remove the last energy from the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

ECOLOGICAL SUCCESSION

- The communities in any area are not stable.

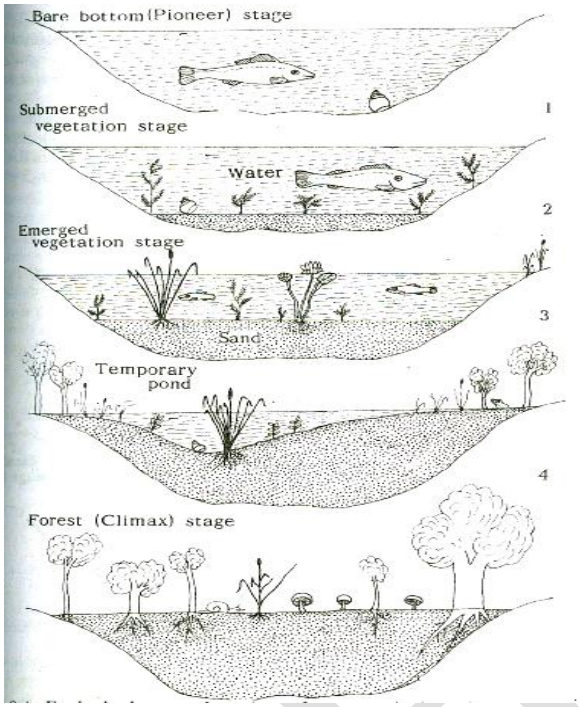
- They are changing into other forms of communities from time to time.
- Thus in a particular area one community may be replaced by another community or by a series of communities.

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

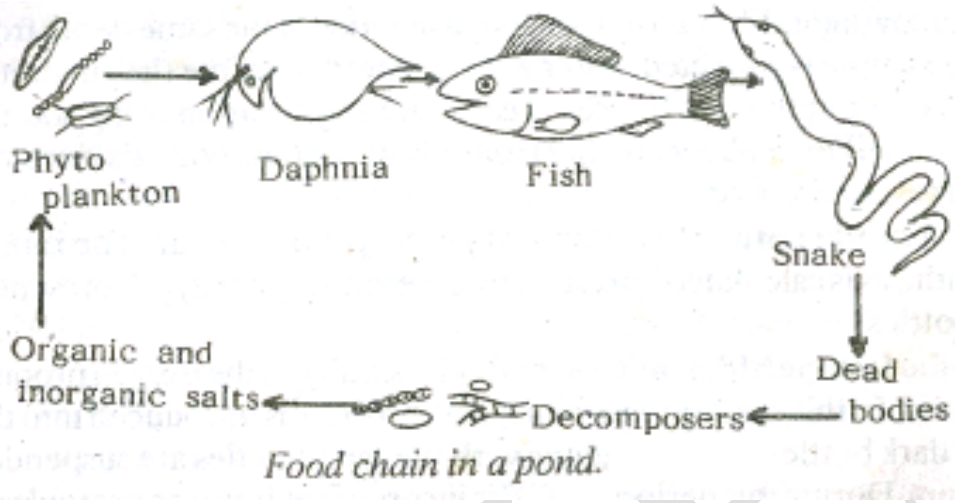
Phytoplankton ----------> Zooplankton ----------> Fishes ---------> Snakes

Grassland Ecosystem

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

Forest Ecosystems

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



Food chain in a pond.

Types of food chains

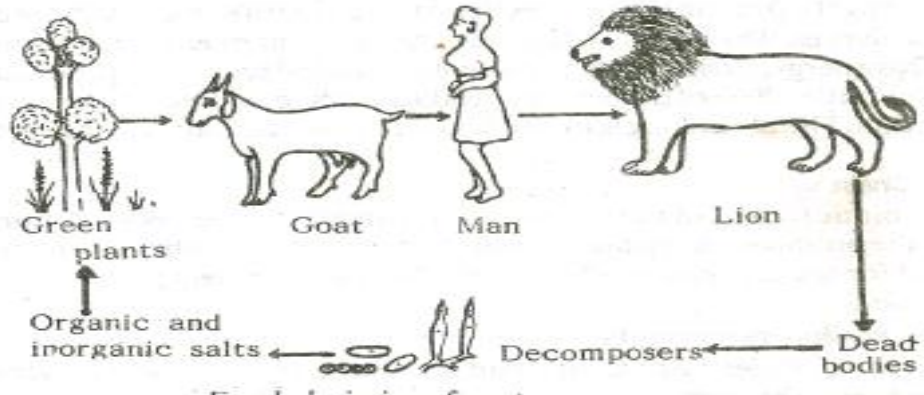
- The food chains are of two types, namely
  - Grazing food chain
  - Detritus food chain

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

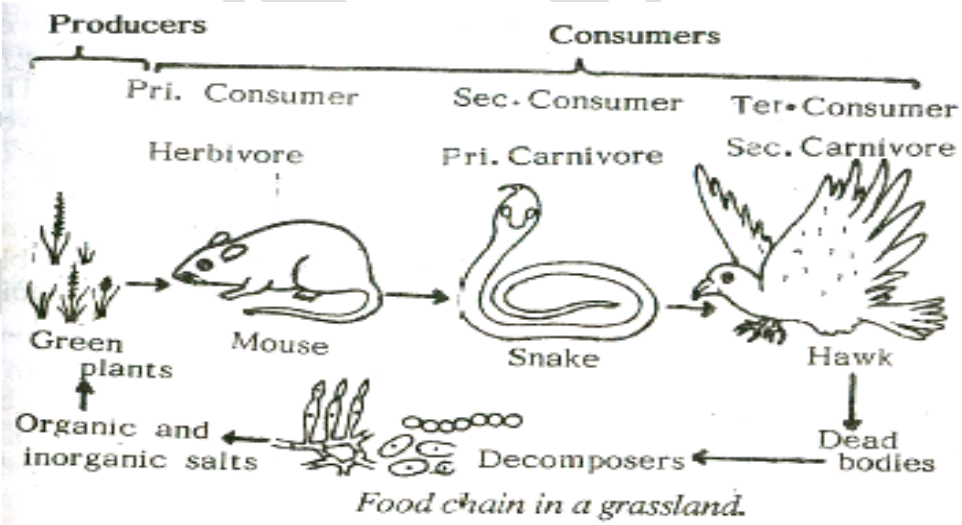
Grass --------> Mouse ----------> Snake ---------> Hawk

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

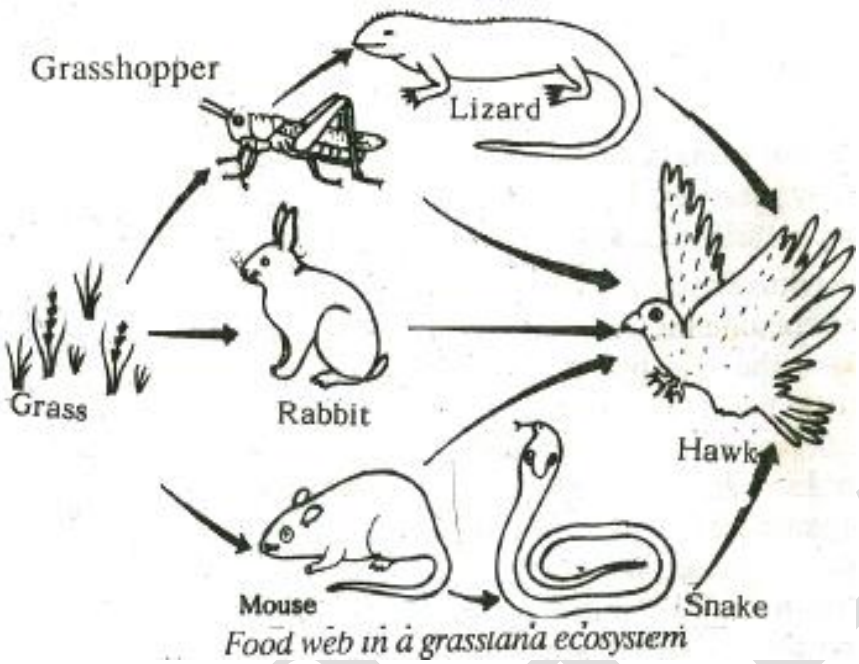
- The two main food chains cannot operate independently.
- They are interconnected at various levels.
- According to Wilson and Bossert (1971) the stability of the ecosystem directly proportional to the number of such links.
- The detritus feeders obtain energy form the dead bodies of animals and plants 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.

Unit 1

Part B- 2 Marks

1. What is an environment?
2. Define ecosystem.
3. List out the components of environment?
4. Depict an ecological pyramid.
5. What are the different types of energy?
6. What is biotic component?
7. What is abiotic component?
8. Define Lithosphere.
9. Define Biosphere.
10. Define Hydrosphere

Part C- 6 Marks

1. Explain the function of procedures, consumers and decomposers in the eco system.
2. Explain the types of environment.
3. Explain in detail the structure and function of the ecosystem?
4. Describe in detail the process of ecological succession?
5. Explain the energy network with suitable examples?
6. How would environmental awareness help to protect our environment?
7. Explain in detail about the different components of the environment?
8. Elucidate the classification of ecosystem.
9. Describe aquatic ecosystem in detail.
10. Explain the various components of the environment?
11. Explain the types of food chains and food web in eco system.

KARPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE						
DEPARTMENT OF MANAGEMENT						
UNIT 1 Introduction to Environment (Each Question Carries ONE Mark)						
S.No	**Questions**	**Opt 1**	**Opt 2**	**Opt 3**	**Opt 4**	**Answer**
1	The term environment literally means……..	The surroundings	The structures	The system	The climate	The surroundings
2	Valuable, practical services that help to preserve ecosystem performed by nature are called_____	ecosystem service	biological control	the green house effect	biosphere balancing	ecosystem service
3	The surrounding physical and biological factor with which organisms closely interact and remain adapted is known as _____	nature	ecology	forest	environment	environment
4	The organic matter produced by the Photosynthetic activity of green plants is called as _____	light energy	cellular process	energy flow	primary productivity	primary productivity
5	_____ is diffused into the ground by gravitational force	Rain water	Ocean	River water	sea	Rain water
6	Solar energy stored in material such as wood, grain, sugar, and municipal waste is called _____	fossil fuels	biomass	geothermal energy	natural gas	biomass

7	Decomposers are otherwise called as _____	detritivores	primary consumers	organic matter	secondary consumers	detritivores
8	Light energy is transformed into chemical energy by _____	photosynthesis	respiration	recycling	productivity	photosynthesis
9	All food chains starts with _____ and ends with decay	environment	organisms	photosynthesis	fungi	photosynthesis
10	In grazer food chain the living plants are directly_____	destroy	consume	decay	grown	consume
11	Energy transformation through the food chain is _____	regular	comfortable	propose	inefficient	inefficient
12	_____ is the most populated city in India	Mumbai	Calcutt	Delhi	Chennai	Mumbai
13	Any unit that includes all the organisms that interact with the physical environment is called _____	community	population	biosphere	ecosystem	ecosystem

14	A pond, serves as a good example for a _____ water ecosystem	fresh	brackish	marine	se	fresh
15	The type of ecosystem with the highest mean plant productivity is_____	tropical rain forest	temperate grasslan	desert	tundr	tropical rain forest
16	In an aquatic ecosystem, the tropic level equivalent to cows in grasslands is_____	nekton	zooplankton	phytoplankton	benthos	zooplankton
17	Bhopal disaster occur on _____	Dec 4, 1982	Dec 3, 1984	Dec 8, 1986	Dec 9, 1980	Dec 3, 1984
18	Which gas was liberated in Bhopal gas tragedy?	Ethyl isothiocyanate	Sodium isothiocyanate	Methyl isocyanate	Phenyl isocyanate and phosgene	Methyl isocyanate
19	Smog is a combination of_____	air and water vapour	water and smoke	smoke and fog	fire and water	smoke and fog
20	The most serious pollutant to rubber tyres is _____	CO2	CO	O3	NO2	O3

21	All species on earth together with their environments collectively comprise_____	lithosphere	hydrosphere	atmosphere	biosphere	biosphere
22	_____ is the study that deals with the interaction of organisms with their environment	Etiology	Ecology	Botany	Biology	Ecology
23	Organisms that feed upon other living organisms as a source of energy and nutrients are called as_____	producers	consumers	pests	decomposers	consumers
24	A food web is _____	like a food chain	a set of interconnected food chains, illustrating the tropic relationships among species	the set of prey species that are consumed by animals in an ecosystem	the tropic (feeding) levels that can be observed in an ecosystem	a set of interconnected food chains, illustrating the tropic relationships among species
25	The first tropic level refers to _____	all herbivores	all green plants	sunlight	all animals	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	the biomass of all organisms at each tropic level in a system	the number of tropic levels in a system	the number of tropic levels in a system
27	Fungi is/are _____	single-celled prokaryotes	Phototrophic eukaryotes	eukaryotes single-celled and primitive multi-celled organisms	heterotrophic eukaryotes	heterotrophic eukaryotes

28	Basidiospores are considered to be a major source of _____	airborne allergens	water borne allergens	animal faeces	bioweapon	airborne allergens
29	Man and biosphere programme is affiliated with _____	UNESCO	IUCN	WWF	WIPO	UNESCO
30	_____ gases has an important role in maintaining atmospheric temperature	Nitrogen	Oxygen	Argon	Carbon dioxide	Carbon dioxide
31	Trichodermaharzianum has proved a useful microorganism for _____	reclamation of wastelands	bioremediation of contaminated soils	biological control of soil-borne plant pathogens	gene transfer in higher plants	bioremediation of contaminated soils
32	Non-Ionizing radiations with specific biological effects are_____	Gamma rays	Beta-rays	UV radiations	X-rays	UV radiations
33	Radiations are harmful as it_____	causes skin cancer	causes anemi	alters body tissues	is unstable	causes skin cancer
34	Ozone depletion in the stratosphere will cause _____	increased incidence of skin cancer	forest tires	global warming	hole	hole

35	The percentage of water in our planet earth……	29%	71%	50%	10%	71%
36	Most harmful environmental pollutants are _____	natural nutrients in excess	human organic wastes	non-biodegradable chemicals	waste animal fee	non-biodegradable chemicals
37	There would be no life in the oceans without organisms called _____ and _____.	decomposers, phytoplankton	zooplankton, consumers	phytoplankton, zooplankton	zooplankton, scavengers	phytoplankton, zooplankton
38	Nuclear accidents mostly release radioactive _____ into the atmosphere	carbon	iodine	phosphorus	sulphur	iodine
39	The predominant gas in the atmosphere is……..	Oxygen	Argon	Hydrogen	Nitrogen	Nitrogen
40	Low level ozone is referred to as _____ ozone	tropospheri	stratospheri	ionosperi	exospheri	tropospheri
41	The ozone at ground level is primarily from _____ precursors	fossil fuel	CFCs	oxygen	methane	fossil fuel

42	The most serious environmental effect posed by hazardous wastes is _____	air pollution	contamination of groundwater	increased use of land for landfills	destruction of habitat	contamination of groundwater
43	EEAT scheme was launched during _____ Five Year Plan	5th	6th	7th	8th	6th
44	Black lung disease is associated with _____	farmers	coal miners	textile industry workers	sweepers	coal miners
45	Pottery workers are at high risk of _____ lung disease	asbestosis	asthm	silicosis	bronchitis	silicosis
46	_____ water is otherwise known as potable water	Raw	Irrigation	Drinking	Surface	Irrigation
47	_____ is the totality of genes, species and ecosystems in a region	Habit	Habitat	Biodiversity	Food chain	Biodiversity
48	_____ is the primary effect of excess phosphorous in the aquatic environment	Fixation	Nitrification	Eutrophication	Radiation	Eutrophication

49	A food chain starts with a…….	consumers	scavengers	producer	decomposer	producer
50	The main source of water in India is_____	rain water	ground water	surface water	sea water	rain water
51	_____ are organisms consuming other living organisms	Carnivorous	Saprophages	Herbivorous	Biophages	Biophages
52	The unit of ecosystem is……	Kelvin	Biosphere	Calories	Animals	Biosphere
53	An increase in altitude is similar to an increase in latitude in that_____	it becomes more sunny	it becomes warmer	precipitation increases	it becomes colder	it becomes colder
54	In parasitism, _____	both species benefit	neither species benefits	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
55	The Solar energy is…….	Energy from the sun	Heat of the interior of earth	Energy released during Nuclear Reaction	Conversion of heat energy	Energy from the sun

56	The method of Generating electricity by using water is……	Solar Energy	Geothermal Energy	Nuclear Energy	Hydroelectrical Energy	Hydroelectrical Energy
57	_____ limits the mixing between troposphere and the other upper zones	Ozone	Stratospause	Tropause	UV radiation	Ozone
58	Water vapor contains a huge amount of stored energy known as _____	latent heat	solar energy	stored heat	mechanical energy	latent heat
59	The source of energy of the sun is _____	nuclear fission	chemical reaction	nuclear fusion	photoelectric effect	nuclear fusion
60	The outer layer of earth is consists of rock and soil …….	Biosphere	Hydrosphere	Atmosphere	Lithosphere	Lithosphere

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 fire works.

Earth is the only planet in our solar system which possesses life. Life grows only in a congenial environment. Life and environment are inseparable and interlinked. All life forms together with the environment in a given area constitute an ecosystem. Every plant, animal and human being is part and parcel of the ecosystem. Many elements of the environment or ecosystem are utilized by human beings for their survival, comfort and betterment. Some of the useful elements are the gifts of nature and cannot be produced by man. These gifts are known as natural resources. Other components are called as potential resources. Natural vegetation, animal life, land, water and minerals constitute the natural resources of our country.

Classification of Natural resources

Renewable are Inexhaustible because they are regenerated

1. Forest
2. Water
3. Wild life

Non Renewable are Exhaustible they are formed once in millions of years and do not regenerated

1. Minerals
2. Coal
3. Petroleum
4. Soil

FOREST RESOURCES

The word forest is derived from the Latin word foris which meant outside. It was used to include all vegetation on cultivated and uncultivated lands. The present day meaning however relates to land managed for the resources from trees shrubs, herbs etc.In an ideal ecosystem there should be 33% forest, 33% animals and 33% human beings. At the time of independence M.P. had 33% forest but now it has been reduced to only 12 to 16 %. Meghalaya has a forest cover of 25% rest of all the states are very poor in forest cover. In 1982 about 14% of the geographic area of India was covered with forest.

Benefits of Forest:-According to Hon'ble K.M. Munshi, the first agriculture Minister of India "tree means water, water means agriculture, agriculture means food grains and food grains mean life" . Thus forests are connected with human life. It is with this idea that the minister had started Van Mahotsava. Forest has the following benefits:

A - Directed benefits

1. Fuel wood: - Even to day villagers depend upon fuel wood for cooking because LPG is not available to villagers.

2. Fodder: - Grass and leaves of forest trees are used as fodder for animals.

3. Minor Products:- Gum, Catechu, Honey, Lac, Bamboo, Spices, Oil of turpentine, Medicine, hides horns , bones

4. Raw material for industries: - Matchbox industries, Bidi industries.

5. Foreign exchange earning: - Foreign tourists are attracted to forest excursions. This has become source of foreign exchange.

6. Useful in transport: - Railway sleepers, railway compartments, body of bus, truck and ship is made from wood which is a forest product.

7. Sericulture: - Silk moth and kosa moth are reared upon forts trees.

8. Apiculture:- Honey bee prefer bee hives on forest trees.

B- Indirect advantages of Forest

1. To check soil erosion: - Roots of plants bind themselves with soil particles therefore soil erosion is checked.

2. Temperature Control: - Leaves of trees form an Umbrella like canopy. Due to transpiration water vapor collected under the trees and temperature is controlled.

3. Control over desertification: - Trees prevent sand from being blown away because sand binding takes place by roots of trees their fore the formation of sand dunes is checked.

4. Increase in soil fertility:- Dry fallen leaves of trees are called litter. The litter undergoes decay on soil and form humus. Humus adds to the fertility of soil. These forest acts as soil bank.

5. Increase in the level of underground water:- Roots of the trees absorb rain water during rainy season and maintain the level of underground waters. They also maintain the moisture in surface soil by acting as water shed.

6. Purification of air:- Trees absorb carbon dioxide and give only oxygen. Oxygen is vital to air. It is estimated that fully grown trees can meet the oxygen requirement of 36 people. Shri Sunderlal Bahuguna the leading Indian naturalist and leads of Chipko movement has pointed out that we estimate the utility of a tree on the basis of wood, fruits and minor products but we over look the aspect of oxygen produced by it. This will run into millions of rupees for a single Peepal tree or Neem tree.

7. Protection from enemy attack:- Due to thick forest it becomes difficult for the enemy army to attack another country. Thus forest acts as protective cover.

8. Market use: - A dwelling on forest person sell fuel wood, honey, gum, fruit (chiraunji) baskets (preferred from bamboo or cane) in the market and make money out of it.

9. Gene bank:- Forest plants and forest animals possess several useful genes which can be used for the benefit of mankind. Blue print of aspirin was obtain from Salix plant while that of quinine from cinchona. The very first antibiotic of the world penicillin was discovered from the fungus penicillinium notatum.

Forest Area in India

Type of Forest		
Dense forest	416869 (Area in Sq.km)	12.68 (% Of Earth surface)
Less dense forest	258725	7.87
TOTAL	675538	20.55

Forest Types of India

1 Tropical wet evergreen: Western ghats- Mahabaleshwer, Khandala, Lonawala

2 Tropical moist semi evergreen: Karnataka, Kerala, Western region of Orrisa.

3 Tropical moist deciduous: Maharastra and western Tamilnadu

4 Tidal: Delta region Bengal

5 Tropical dry deciduous: U.P., M.P., northern Bihar

6 Tropical dry evergreen: Eastern Tamilnadu

7 Tropical Thorn: Delhi, Rajasthan, western gujrat

8 Sub tropical wet hills: Nilgiri hills

9 Sub tropical Pine: Jammu Kashmir

10 Sub tropical dry evergreen: Himalayan foot hills

11 Temperate wet & moist: Himanchal, Nortern assam

12 Temperate Dry: Central Eastern, Kashmir leh

13 Alpine: Laddakh, Sikkim & Bhutan

Forest Policy of India

During the British rule the govt. didn't show any concern about the protection of forest. In 1952 Govt. of India framed a policy that one third of area of India should have forest cover. Up to 1988 this very policy was repeated again but this goal could not be achieved. The result is that forest area has depleted almost 18%.

Deforestation

Unplanned and uncontrolled felling of trees leads to deforestation. We cut trees and grow plants. This does not make a dense forest. More over a forest is an ecosystem with its own producers, consumers and decomposers. Man grown plants can not make an ecosystem. Ecosystem is a creation of nature and takes centuries for its formation. The civilization which have used forest and forest products with caution have prospered well while those where deforestation took place have become impoverished.

Causes of Deforestation

1. FUEL WOOD:- Village population depends upon fuel wood for cooking therefore they cut trees.

2. OVER GRAZING:- Due to overgrazing the soil becomes loose and forest soil of top layers undergoes erosion.

3. AGRICULTURE:- Due to increasing demand of food grain forest trees are cut and converted to agricultural land.

4. Construction of Dams: Dams are constructed on rivers and huge forest area gets submerged. This is progress at the cost of destruction.

5. Cash Crops: Tea, Coffee, Coco, Rubber and Coconut are commercial crops, which are raised on soil by cutting the forest.

6. Attack of Insects: Leaf borer in Bastar area destroy several thousand Sal trees.

7. Industrial Products: Furniture, Match box, Paper and Railway Sleepers are prepared from wood hence trees are cut at large scale.

8.Jhum Cultivation: Tribals of Assam cut the forest and set the trees on fire so that soil becomes rich in minerals. They cultivate rice in that area for 4-5 years and shift to another place and repeat the same there also. This is called Jhum cultivation or shifting cultivation or shift cultivation, which results in desertification.

9. Diseases: Several fungal diseases attach forest trees, for example chestnut blight or blister disease. This causes great damage to forests.

10. Forest Fires

Measures to Check Deforestation:-

- Use of paper should be minimized at school level by encouraging the use of slates.
- -Jhum Cultivation should be banned and tribal be trained for normal cultivation.
- -Only mature and old or diseased trees should be cut and new saplings be planted immediately.
- -Used paper should be recycled.
- -Plants like plantain should be used to prepare paper pulp because these plants, being monocarpic, become useless after one year.
- -Forest research institutes should be started in every state, on the lines of FRI, Dehradun. Madhya Pradesh has State Forest Research Institute at Jabalpur and Forest Management Institute in Bhopal.

- -Plantation be observed as festival. India observes "Van Mahotsava', Japan observes "Green Week", Israel celebrates "New Years Day of Tree", while America celebrates "Arbor Day".
- Timber extraction, mining and dams are the need of developing countries and forests are also located in such areas. Thus there is constant conflict between development and deforestation. Harsood in MP is an example where thousands of people became homeless due to Narmada Sagar Dam. Timber extraction is the main cause of deforestation out of the total timber obtained by falling trees 40% is used for furniture, 35% as fuel wood, 15% for industrial use and 10% for miscellaneous purpose. Tropical countries like Malaysia, Myanmar (Burma), Thailand, Indonesia, Congo, Brazil are involved in exporting wood to other countries. Brazil once was popular as Forest Empire but has become a tree less country due to the falling of trees.

Production of timber at world level is as under:-

S.NO	COUNTRY	PRODUCTION IN MILLION cu.mts
1	Asia	1146.6
2	Northern America	689.7
3	Africa	393.5
4	South America	392.2
5	Central America	71.0
6	Oshania	50.1

Principal timber trees of India are Teak, Sal, Pine, deodar, Shisham, Sundari, etc. Teak and sal are found in the forest of M.P., Maharastra, Chhhatisgarh, Jharkand, Karnataka and Tamilnadu, Pine, Deodar in Himalayan region. The production of timber is gradually decreasing in India. With developing civilization mineral requirement has also increased hence mining is necessary. Mining activities involve explosion with dynamite. This causes air pollution. Soil becomes hallow and a lot of forest undergoes denudation.Dams are necessary for irrigation and hydel projects. Dams cover huge areas of several hundred km from where trees are to cut or undergo submergence. Irrigation canals are built which also becomes the cause of deforestation. Lot of

areas in the vicinity of dam becomes marshy and useless for crops. Incidences of malaria are increases. Thousand of people become displaced.Loss of habitat is the greatest punishment for an organism. Same applies to displace persons thus there is a constant conflict of interests between the protection of environment and the mining and irrigation activities. Long term ecological gains should not be sacrificed for short term economic gains which lead to deforestation. These forests where development projects are implemented can displace thousand of tribal people who become homeless. These results in suffering to old and young generation for which there is rarely a satisfactory answer.

Some Revolutionary Movements Regarding Forest Conservation

1. KHEJARLI MOVEMENT- This took place in 1730 in Khejarli village of Jodhpur, Rajasthan. The ruler wanted to cut green trees of Khejarli (white Acacia) for fuel wood but village ladies opposed it. They hugged the trees and Amrita Devi Vishnoi and her three daughters had to sacrifice their lives for protection of tress. Ultimately the ruler had to take back his decision. Even today, Person belonging to Vishnoi caste do not cut green trees. Government of Madhya Pradesh has declared Amrita Devi Vishnoi award for the organizations and individuals who have done commendable work in the field of conservation of forest and wild life.

2. UTTRAKHAND MOVEMENT – The villagers of Tehri Garwal realized that cutting of trees results in land slide and epidemic diseases. Here several organizations of villages are working for protection of the forest right from 19th century. Panchayats engaged paid forest guards to prevent felling of trees.

3. TILADI MOVEMENT – The villagers of Tiladi village of Uttaranchal organized a meeting on 30th may1930 in order to assert their claim on forests. They were attacked by the British Army, 17 persons died and the British Govt. was forced to withdraw its claim on forest property.

4. CHIPKO MOVEMENT – Started by Chandi Prasad Bhatt and followed by Sunderlal Bahuguna of Tehri Gharwal. Whenever the Govt. ordered the cutting of trees to build some Dam or any other building or factory the villagers hugged trees and saved the life of trees. On the basis of Chipko movement a social worker Pandurang Hegde started 'Appiko' movement in south India and Silent Valley of Kerala could be saved from destruction.

LAND AS A NATURAL RESOURCE

Land is one of the natural resources. Men depend on land to satisfy most of their needs. For instance, it provides for more than 95% of human food requirement, greater part of clothing and housing and all needs of woods for fuel and construction. The availability of land is limited. Land occupies only 30% of the total area of earth surface, rest is water. Even this 30% is not always habitable.

Inhabited Parts of Land

About 90% of the world population which is over 6 billion occupies only 30% the land area. The remaining 70% of the land is either sparsely inhabited or uninhabited. Sparse inhabitations means 10% of population occupies the land area. The reason is that, this land is either too rocky or the climate is too dry, too wet, too hot or too cold. The topography of the land such as rugged and steep slopes of the mountain and low lying areas which are susceptible to water logging and extreme climate impose restrictions on land for human use. Deserts and grasslands of Asia and Africa, tropical forests of South America, Africa and South East Asia and polar areas are sparsely populated areas. These areas are inhabited by people, whose survival is based on hunting, gathering, herding and growing some crops. Antarctica is uninhabited except for temporary occupation by scientists for research purposes. Fertile plains and valleys are suitable for agriculture. That is why these areas are densely populated.

Land Use in India

We use land for agriculture, cattle grazing, building houses, roads, mining and manufacturing etc. Land use varies from region to region. India has a total land area of about 328 million hectares. Over the past 8000 years our forefathers have succeeded in converting nearly 140 million hectare of land from the natural ecosystem to agriculture. Since independence we have added another 22 million hectares. As a result today we have 162 million hectares of land for agriculture. It forms a spectacular high percentage of 51%. Along with this agricultural land we have 4% of the land available for as Pasture land, 21% as forest land and the rest 24% as wasteland.

Degradation of Forests

Forests provide habitat to wildlife, minimize incidence of drought, conserve water and soil as well help in reducing the volume of flood water. The forest land in our country is far below scientific norms. For a self contained economy and proper ecological balance and for absorption of carbon dioxide at least a third of the total land area must be kept under forest and natural vegetation. Degradation of forests has led to a rise in atmospheric temperature at the global level. It may lead to melting of ice caps and a corresponding rise in sea level thus endangering low level thickly populated parts of the world.

Waste Land

Land which is not utilized is called waste land. This includes arid, rocky and sandy desserts. The high mountains and uneven lands also belong to this category. If forests are depleted and grasslands are overgrazed, the land becomes unproductive and eventually wastelands are formed. Judicious use of Land with proper planning. The growing population and higher standards of living have created an increasing demand for residential land in villages and cities. Today cities and towns are compelled to grow vertically rather than horizontally. Despite this some more land is required for expansion of industries, institutions, transport and recreational facilities. We should keep in mind that the total availability of land is a fixed asset. Therefore, proper planning and judicious use of land is absolutely necessary. Along with this suitable measures should be adopted to check soil erosion, desertification etc. The wasteland should be brought back to other

uses. With the help of modern and scientific methods of farming the productivity of land can also be increased.

Land Hunger

Because of exploding population we are required to produce sufficient quantities of food. This is known as land hunger which is creating a serious pressure on land. Farm land is under threat due to more and more intense utilization. When soil is used more intensively for farming, it is eroded even more rapidly by wind and rain. Over irrigation of farm land leads to Stalinization, because evaporation of water brings the salts to the surface of the soil because of which crops cannot grow . Indiscriminate use of chemical fertilizers poisons the soil and eventually the land becomes unproductive. Land is also polluted by industrial waste and rural and urban sewage. As the urban sector grows and industrial expansion takes place , agricultural land and forests shrink. In this way land hunger increases.

WATER RESOURCES

USE AND OVER UTILIZATION OF WATER – Water is the most precious resource because it is considered as the liquid of life. Animal body has 50 to 80% water while plant body has 60 to 90% water. In several chemical reactions water is either a medium in itself or acts as a catalyst. Water is also necessary to maintain the fertility of the soil. It is believed that $2/3^{rd}$ part of the earth is water but potable water is only 3% which can be used for drinking, cooking, bathing, washing clothes, hydroelectricity generation, irrigation and industrial purposes. Water flowing in the stream and rivers is 0.0001% that means 1 bucket in 10,000 buckets. Fresh water lakes contain 0.009% of total water. Groundwater up to the depth 150mts accounts for only 0.625%. Water found in frozen state on the poles and mountains and which cannot be used directly accounts for 2.15%. The map shows that Andhra Pradesh and Tamilnadu have the least quantity of usable groundwater. Since potable water is scarce, different water resources should be exploited with caution.

Water Cycle – The oceans are the main sources of water. The volume of water in ocean is about 12700 lac cubic kilometers. In the presence of sunlight, water evaporates in the form of vapor. The evaporation occurs in rivers, lakes, ponds, streams, and swampy areas. Plants also transpire water in the form of vapor. Water vapor forms clouds and ultimately, there is rainfall due to which water is returned to the soil, rivers and the oceans. Some water is found in frozen state on the poles and mountains in the form of glaciers. Glaciers melt and become a part of rivers. Thus, water evaporated from rivers and oceans is returned back. This is called the water cycle.

Various Uses Of Water

1. Domestic purposes and urban management: - Water is necessary for drinking, bathing, washing, gardening and animal husbandry needs. On an average 170 liters of potable water is necessary per person per day. As regards drinking water, it is 3 liters per day per person. Potable water should be colorless, odorless and transparent. In Indore a city of Madhya Pradesh potable water is brought from Mandleshwar through 75 kms. Long pipeline.In the state of California in U.S.A., potable water comes to the famous city of Los Angeles, from the distant mountains of Sierra Nevada through a 416 kms. Long pipeline. The Kalgoorie desert of Australia is connected with 560 kms. long pipeline for transporting potable water.River Valley Civilization flourished in the ancient world. Even today major cities of the world are situated along river banks:-

1. Kanpur and Varanasi are situated along the banks of river Ganga.
2. Agra and Delhi are situated along the banks of river Yamuna.
3. London is situated along the banks of Thames River.
4. Stalingrad is situated along the banks of Volga river

2. Industrial water supply: - Cement factories, textile industries, chemical industries, paper pulp industry and leather tanning industries need plenty of soft water. Hard water containing salts of calcium and magnesium is of no use because it spoils the machines and also corrodes the pipeline. Manchester is well known in the world for textile industry, but underground water being hard the washing & printing processes are carried out at Maine where soft water is available.

3. Agriculture: - Agriculture is the oldest occupation of the world. Most of the world's population lives in East Asia and South Asia where agriculture is the most common profession of the people. River water, rain water and water from dams is used for agriculture. It is believed that irrigation was started in India. Irrigation canals are dug out from rivers and dams. In South India ponds and lakes are the source of irrigation. Rice, wheat, cotton, sugarcane, pulses and oil seed crops are grown on rain fed as well as irrigated fields.

4. Navigation and shipping: - Heavy articles are transported by ships and steamers to different parts of the world.

5. Hydroelectricity: - Water from dams is allowed to fall on turbines and hydroelectricity is produced.

6. Minerals: - Sea water and Sambhar lake of Rajasthan are source of common salt. Pearls are also obtained from pearl oysters growing in water.

7. Mineral oil:- In the Gulf countries wells are dug in the sea to obtain mineral oil. In India,Bombay High and Ankleshwar in Gujrat are well known for mineral oil. India uses 90% of its water for agriculture, 7% for industry and 3% for domestic use.

CLASSIFICATION OF WATER RESOURCES:

Water resources are classified as under:

Terrestrial---------- Marine

*Upper Ground	* Underground	1. Ocean
1. Rains	1. Wells	2. Sea
2. Rivers	2. Hand Pumps & Tube wells	
3. Ponds		
4. Lakes		
5. Glaciers		
6. Springs		

QUANTITY OF WATER IN DIFFERENT SOURCES IS AS SHOWN:

S.No.	Source	Potable Water (cubic kms)
1.	Glaciers	240,00,000
2.	Lakes and Ponds	280,000
3.	Rivers and Waterfalls	1000
4.	Moisture in soil	85,000
5.	Underground Water	60,000
	TOTAL	2,44,26200

Overutilization of Surface and Groundwater

The problem of overutilization of potable water is no longer confined to a small territory or even a nation but has assumed gigantic proportions spanning the entire world. So much so that it is presumed that incase there is a 3rd world war, it will be for water. The reasons for scarcity of potable water are:

1) Population explosion - The population of India in 1981 was 68.Scrores. In 2000 it rose to 100 crores and in 2010 its about 125 crores. Availability of potable water in 1951 was 5117cu.mt per person per year. In 2000 it has reduced to 1869 cu.mt. per person per year.

2) Urbanization — Villages are gradually getting vacated and cities are facing population pressure. The result is agricultural and forest land near cities is getting converted to residential areas.

3) Water pollution — Fertilizers and pesticides are the basic requirements of modern agriculture. During rains and irrigation plenty of them flow into nearby rivers and lakes causing pollution of potable water. Industrial effluents containing toxic substances like mercury, lead fluorides and arsenic flow into nearby water bodies resulting in pollution of potable water.

4) Irregular rains — Due to climatic changes the rains have become irregular and scanty.

5) Deep tube wells - Hand pumps and tube wells arc dug to supply drinking water as well as water for industries and irrigation. The result is that underground water is getting exhausted and places like Sitamau (Mandsaur), Fanda (Bhopal), Depalpur (Indore), Badnagar (Ujjain), Susner (Shajapur), Manawar (Dhar)have almost no groundwater now.

6) Life style — Public pipelines at most of the places have no taps. Hence large quantity of

water is wasted. Flush latrines also increase the consumption of water. Tub bath and coolers also consume plenty of water.

7) Cheap rates of water — Drinking water and water for irrigation are supplied at subsidized rates. This encourages the tendency to misuse water.

FLOODS

Flood is a natural hazard caused due to excessive rainfall or the meandering route of the river. During floods the rivers swell, burst their banks and flood waters spread to engulf fields, farms, houses and even railway lines. Man is also responsible for encouraging floods due to the following reasons:

a. Felling trees along river banks

b. Soil erosion

c. Bursting dams

d. Deforestation in hilly areas

e. Construction of houses along river banks

3.5% area of the earth which supports 16.5% population is flood affected. In India the rivers Brahmaputra, Ganga, Kosi, Mahanadi and Narmada are well known for flood. In U.S.A. Mississippi and Missouri, in China Yangze and Yellow, in Myanmer (Burma) Iravadi, in Pakistan Sindhu river, in Nigeria Niger river, in Italy Po River are well known for causing floods. In September 2008 Kosi river in Bihar changed its course. Thousands of people became homeless, railway lines were damaged at several places and thousands of animals died. U.P., Bihar, West Bengal, Assam and Orissa suffer badly every year due to floods.

Control Measures for Floods

1. Plantations — Plantation along river banks should be encouraged because roots of trees act as soil hinder and check soil erosion.

2. Construction of darns — Fast flowing rivers should he provided with dams, which should he looked after properly.

3. Construction of walls — Walls should be constructed along river banks to check excess flow of water.

4. Flood control centers — Flood control centers should he established in sensitive areas. In India, the following centers are working in this direction:

a. Delhi - Yamuna river

b. Varanasi - Ganga river

c. Jalpaigudi — Teesta river

d. Patna — Ganga river

e. Bhuvaneshwar — Swarnarekha river

f. Hyderabad — Godavari river

g. Guwahati — Brahmaputra river

h. Rharuch — Narmada river

These centers inform people in the respective area in advance so that they can move to safer places. Administration also remains alert.

Drought

Drought is a major problem in India due to failure of one or more monsoons. Sometimes the failure is so acute that even drinking water becomes a problem. In 1990 potable water was supplied to Dewas in Madhya Pradesh by trains. Droughts effect homes, agriculture and industry. Drought prone areas are faced with irregular periods of famine. Government of Madhya Pradesh and other states start drought reLief programs in which people are given wages in bad years to build roads, minute irrigation works and plantations. According to Indian Meteorological Department a state or area is considered as draught hit if the rainfall is 75% less than the average. Drought is a natural hazard but several human activities arc also involved in its creation, specially the felling of trees. Therefore good environmental management can reduce its ill effects. Due to drought people of Rajasthan migrate for few months to nearby states along with their camels, sheep, goats, etc.

Reasons for drought:

1. Scanty rain fall
2. Surface runoff of water
3. Deforestation
4. Uncontrolled grazing

5. Desertification

Effects of drought:

1. Migration of animals and human beings as observed in Rajasthan, Gujrat, Maharashtra and Andhra Pradesh.
2. Famine conditions
3. Extinction of some species of animals.

Control measures:

1. Plantations
2. Starting dry farming
3. Conservation of groundwater
4. Judicious use of groundwater
5. Proper maintenance of conventional sources of water

Conflicts over Water

Water an important natural resource is the basic need of mankind. Due to technological advancement water is needed for irrigation, fishing industry, hydroelectricity and industries. The amount of potable water being limited, it creates conflicts at national level and state level. Every year about 8 crores new people assert their claim over water resulting in conflicts. There is conflict between Russia, Germany and Austria for the share of water from Danube River. Farakka water dispute between India and Bangladesh is related to distribution of water of Ganga river. There is dispute between India and Pakistan on the distribution of the water of Sindhu river. Government of India has appointed several tribunals to overcome the conflicts over water for example:

a) Kaveri Water Dispute Tribunal
b) Godavari Water Dispute Tribunal
c) Krishna Water Dispute Tribunal
d) Narmada Water Dispute Tribunal
e) Ravi- Vyas Water Dispute Tribunal

Dams: Benefits and Problems

There are about 45000 large dams around the world, out of which China and India, the world's two most populous countries, have 50% of the dams. Dams are built on rivers for irrigation and hydroelectricity. In India also, several large dams were built after freedom. Some of the important projects connected with large dams in India are:

• Damodar Valley Project — West Bengal
• Bhakra-Nangal Project - Punjab
• Hirakud Dam — Orrisa
• Gandhi Sagar Dam, M.P. — Rajasthan
• Kosi and Gandak Project — Bihar
• Sardar Sarovar Dam — Gujrat
• Mayurakshi Project — West Bengal
• Nagarjun Sagar Dam - Andhra Pradesh
• Narmada Sagar Dam — M.P.
• Tawa Project — M.P.
• Tehri Dam — Uttaranchal
• Tunga Bhadra Project — Karnataka & A.P.
• Almati Project — Karnataka

Benefits of Dams

1. Irrigation — It increases the yield of agricultural products because more than 1 crop can be taken in one year.

2. Hydroelectricity — Water of dams is allowed to fall on turbines and electricity is produced which is the basic requirement of present day life.

3. Development of Industries — Industries need plenty of water which is easily supplied by dams.

4. Underground water — The level of underground water rises.

5. Fisheries — Dams encourage fishing industry.

Problems

1. Fragmentation and physical transformation of rivers.

2. Disturbances of river ecosystems.

3. Displacement of people, as in the case of Nagarjun Sagar Dam and Sardar Sarovar Dam due to which around 2.5 lakh people were displaced.

4. Salinity of soil increases due to water logging.

5. Animal population gets dislodged because their habitat undergoes submergence.

6. Emission of green house gasses from reservoir due to decomposition of vegetation.

7. Earthquakes — Due to heavy weight of water the rocks become prone to earthquakes. In 1967, ICoyena Darn near Pune, resulted in earthquake in which 2000 people died. M.P. Jabalpur and Khandwa have also faced earthquakes.

8. Malaria — Due to stagnant water and muddy areas there is increase in mosquito population and chances of Malaria increases. It is therefore, advisable that small ponds should be constructed to supply water for irrigation with less investment of money.

MINERAL RESOURCES:

A ***Mineral*** is a naturally occurring substance having definite chemical composition, fixed internal atomic structural arrangement and formed by inorganic processes of nature. Both metallic and non-metallic minerals occur in nature. The natural assemblage of metallic minerals which can be exploited and extracted profitably and serve as the commercial source of one or more metal values, are called ***Ores.*** All the minerals are non renewable natural resources — it means that they are not replenishable. Once they are exhausted completely, they cannot get back. These mineral resources are associated with rocks of the earth crust and obtained by surface and underground mining operations. As far as metals are concerned, they are extracted from their ores. Primary deposits of precious metals such as Platinum, Gold, Silver etc. are limited. At present India is largest consumer of Gold in the world. Silver will be finished by 2020. That is why the precious metals are becoming costly day-by-day. Minerals and metals play important role in the progress, development and prosperity of man and country as well. From the primitive to the most sophisticated modern man, in all stages of human advancement, man had to look to minerals for his sustenance, decoration, festivities and even for his funeral rites. The primitive man in his efforts to hunt food as well as self protection started using hard

rocks and minerals which he found so abundantly all around him. Hard rocks like quartzite and hard minerals like quartz, jasper, flint, chert etc. had been commonly used by him, either in their natural shapes or after crudely chipping them to some pointed shapes. The first metals the man used would be relatively soft hence metal like copper, tin, zinc etc. were first utilized by him. These ages are known as the ***Copper Age*** and ***Bronze Age.*** Following the Bronze Age, the early man had learnt the use of Iron in its many forms, known as the ***Iron Age.*** The art and science of manufacture of Iron and Steel articles have developed in this country from pre-Vedic times and much faster than the other parts of the world. By the 3d or 4th century A.D. during the period of Chandragupta II, India had been able to manufacture that marvel of pillar of rust-less iron which can be seen near Qutab Minar in Delhi even today.

India is self-sufficient in about 35 minerals and mineral substances which are used as basic raw materials in various industries. We have enough deposits of Iron, Copper, Alumina, Coal, Limestone etc. in Bihar, Jharkhand, Rajasthan, Chhattisgarh, Madhya Pradesh, West Bengal, Gujarat, Goa, Karnataka, Andhra Pradesh, Kerala in our country.
Our onshore [Ankleshwar, Krishna-Godavary Basin, Assam, Jaisalmer] and offshore [Bombay High] regions are rich in petroleum and natural gas resources. Heavier minerals like Ilmenite, Monazite, Uraninite, Zircon, Rutile etc. are concentrated in the form of thick ***Placers*** in beach zones. These placers are extended towards sea. Such placers on beaches and estuaries are mined for metals like titanium, gold, platinum, thorium, zirconium and even for diamonds. The well-known beach placers of Kerala coast are of economic importance and contain rich concentration of Monazite [primary source for metal Thorium] along with ilmenite and rutile. Ex-president of India Dr. A.P.J. Abdul Kalam suggested the use of Thorium in place of Uranium. Accordingly, by making some changes in nuclear power plants thorium should be used to generate electricity because, thorium is available in plenty in India whereas for uranium we are dependent on other countries.

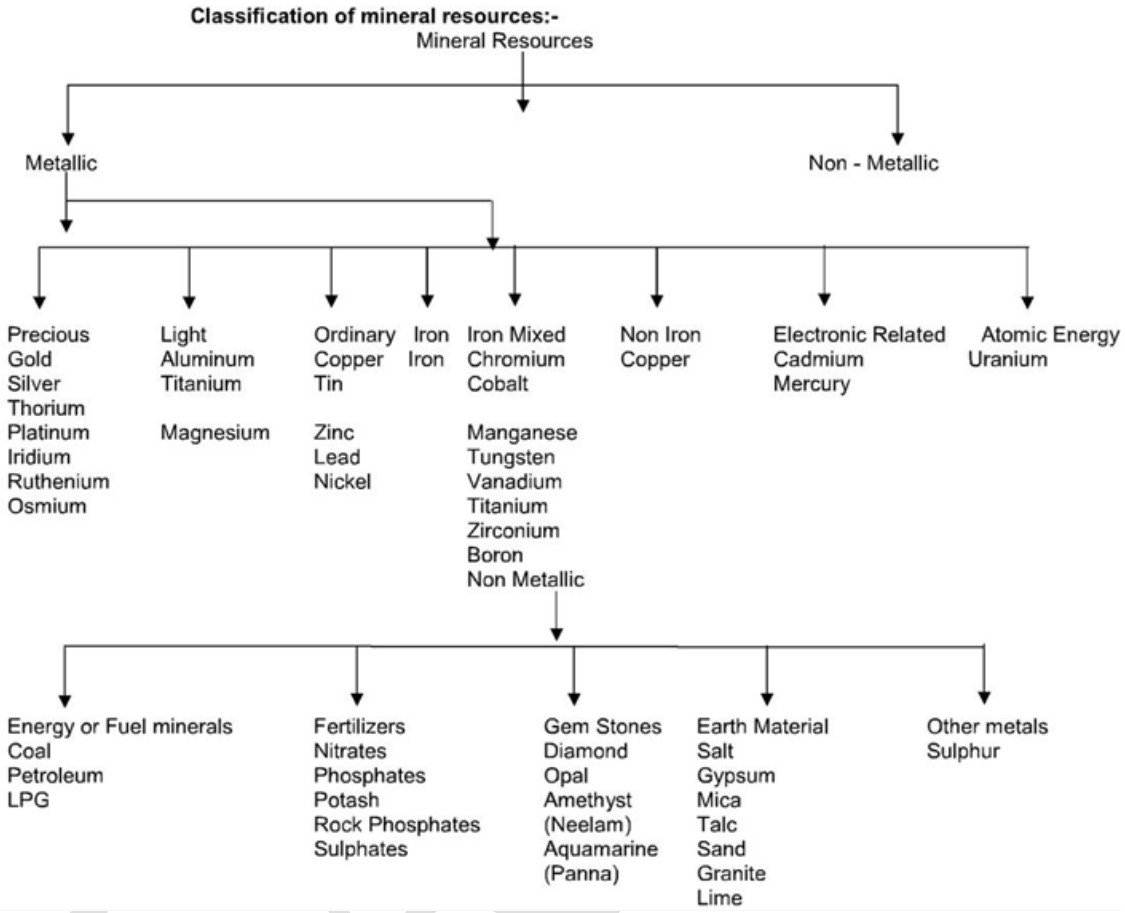
Special mention is necessary about the possibility of metal accumulation on the sea beds. Continental shelf and adjoining areas of Indian Ocean are the favorable sites for this natural resource. The most spectacular are the deep-sea pelagic ferro-manganese nodules formed by

various processes. Such nodules started to form during Cretaceous and attained maximum development during Pliocene and Recent period. Manganese content in these nodules is around 20 percent. In addition, they are known to contain valuable concentration of Copper, Nickel and Cobalt. Role of bacteria is considerable in nodule formation. In a report it is said that Manganese nodules in the Indian Ocean cover an area of over 10 million square kilometers and are next only to the Pacific Ocean.

Metallic and non-metallic mineral resources are to be extracted by surface mining as well as underground [both shallow and great depths] mining activities from earth's crust. Before mining any deposit, different activities are to be undertaken which complete in different steps. They are: 1. *Searching Stage* : Search of presence of minerals on the basis of various field and laboratory clues and guides etc.

2. *Exploration Stage:* It means all phases of investigation carried out for a near realistic delineation of the three dimensional configuration of the mineral/ore body and assessing its economic potential, both in terms of grade and reserve [i.e. quality and quantity] 3. *Exploitation Stage:* The bunch of operations commencing with the initial box-cut removal of the values to dispatching the produce from the pit to the utilization spot, comes under the purview of exploitation or mining stage.

4. Extraction Stage: After mining, the ore minerals are in association with unwanted minerals. The techniques of liberation of wanted particles [the values] from the unwanted particles, reduction of mineral assemblage to an appropriate size, effective concentration of valuable part and rejection of gangue portion etc. for any smelting operation, come under this stage. In India mineral search is done by Geologists, Geophysists, Geochemists etc. of various organizations of Government of India, Government of India Undertakings, Geology and Mining departments of State Governments, Corporations, Private sector companies etc. Some of the leading Geology and Mining organizations of India are:



Formation of Minerals:

Minerals are natural products in solid state and commonly formed by cooling, crystallization and solidification of hot, molten materials within the earth, called *magma.* When it erupts on the surface through volcanoes, weak planes etc., it is called *lava.* Solidification of hot gases near active volcanoes is rather a rare process of mineral formation. Metamorphism is another process inside the earth in which temperature-pressure play dominant role in recrystallization. Precipitation and Evaporation of mineral- forming solutions are also important process of mineralization in nature. These natural processes takes millions of years for mineral formation and we exploit these natural resources within few years. If this is the way of exploitation, some of the mineral deposits will exhaust very soon and will be in *endangered category.* Therefore, we must exploit and use these non-renewable resources judiciously in present industrial era. Very limited reserves of energy resources [such as Coal, Coal Bed Methane (CBM), Petroleum,

Natural Gas Atomic Minerals etc.], precious metals [Gold, Silver etc.] and precious minerals [Diamonds, Rubies, Sapphires, Aquamarines, Alexandrite etc.] are left for future. If we exploit irrationally for our interest and benefit, future generations will never excuse us. It is estimated that between 1750 to 1900, the population of the world became double while the exploitation activities have increased 13 times. It is also noted that developed countries like Japan, America, Italy, France, Germany etc., are using mineral resources of developing countries like India [by importing] for their progress and development and securing their own resources for future purposes.

The key to industrial progress of any nation is development of mineral resources, which play vital role in the economy of the country. Unfortunately, it is also observed that the countries which are rich in mineral resources, are poor in technology while those rich in technical knowhow, are poor in mineral wealth. Some Arabian countries are rich in petroleum reserves, but they do not have technology for their exploration, exploitation, refinement etc. hence other countries are doing these jobs.

India is one amongst the few countries in the world endowed with the rich mineral resources, which offer a tremendous scope for setting up various mineral based industries in the country. In India and world, there are large number of basic industrial products which require minerals as basic raw materials at primary or other stages.

With the establishment of many mineral based industries in the post- independent era, the demand for various mineral raw materials has increased several times and it has led to the intensive search for the mineral deposits in the known as well as virgin areas of the country. Low grade deposits which were earlier not useful, our country is now able to utilize these. For this, changes in National Mineral Inventory are being prepared and updated by IBM periodically. During the last fifty years, India has made tremendous growth in the industrial sector and at present it is self-sufficient in several industrial products and also able to export some mineral values. Fuel minerals [Coal, Lignite, Petroleum (crud), Natural Gas etc.], major metallic [Iron, Copper, Lead, Zinc, Aluminium etc.] and non-metallic [Baryte, Dolomite, Silica sand, Phosphorite, Wollastonite etc.] mineral are produced both in public and private sectors. Many mineral and rock based industries have their own captive mines to meet the requirements. Large number of mineral based industries related to Cement, Fertilizer,

Chemicals, Ceramics, Refractories, Glass, Iron and Steel, Ferrow-alloys, Non-ferrous metals etc. are located in the Maharashtra, Andhra Pradesh, Rajasthan, West Bengal, Madhya Pradesh, Chhattisgarh, Bihar, Jharkhand, Gujarat, Tamil Nadu, Uttar Pradesh, Uttaranchal, Orissa and Karnataka. Environmental effect of extraction and using mineral resources: Minerals are obtained by the process known as mining. Mines are of two types:

A. Strip-mine.

B. Deep or shaft mines.

Deep mining is hazardous because it involves risk of the life of workers and also disturbs the balance of environment. It involves rock and roof falls, flooding and inadequate ventilation. Coal mining is even more hazardous than metal mining we still remember the Chasnala disaster of Jharkhand coal mines where several hundred workers lost their lives due to flood. The adverse effects of mining on environment are as under: -

1. **Deforestation:-** Before digging a mine the trees or agriculture in that area is to be cleaned. Thus forest and agricultural land are affected.

2. Formation of deep pits: - Deep pits dug during mining results in gully erosion. **Tectonic *(check spelling)*** plates inside get disturbed resulting in earth quakes.

3. Dust pollution: - The dust produced during mining is injurious to health and causes a lung disease known as "block lung" or pneumoconiosis mining of slate pencil rocks is cause of "silicosis". The workers inhale the dust which gets deposited in their lungs. The lungs become heavy and persons die of silicoses. Marsh gas or methane coming out from coal mines is injurious to health. Radiation from uranium mines is a life threatening hazardous.

4. **Loss of Biodiversity:** - Due to felling of trees there is loss of habitat. Several species of animals have to migrate from that area and at the same time, many rare tree species are lost forever.

5. Land slide: - The mines generally have a smaller diameter on the surface and a much larger one in deeper layers. This makes the earth hollow eventually resulting in land slide.

6. Decrease in life span of the workers: - The workers are subjected to work in conditions of more heat and less oxygen due to which their normal life span decreases.

7. Soil erosion: - During digging the rocks are cracked open by dynamite. Therefore, the superficial layers of fertile top soil are lost and soil erosion also takes place. The soil at the place where mining operations are performed becomes less productive.

Control Measures: -

1. Search for mineral resources be carried out in deserts and Tundra areas so that normal fertile land is not disturbed. Bottom of the oceans and new planets are also important for the search of minerals.

2. The deep pits dug during mining should be filled with the waste and garbage from old mines.

3. Mining should be done only in such places which are marked by Geological survey of India or DNGC or GAIL.

4. Energy sources like coal and petroleum are in limited quantity and are non renewable. Therefore use of solar energy, wind energy and atomic energy should be increased.

5. Old mineral products should be recycled.

6. Plantation should be done near mining areas to restore the balance of environment.

FOOD RESOURCES

Objectives - After going through this lesson the students shall be able to learn about:

1. Importance of food resources and important sources of food i.e. rice, wheat and corn.
2. Population explosion as the main cause for the shortage of food in developing countries.
3. First green revolution could remain effective till the end of 20th century. 21st century needs second green revolution which has to encourage gene revolution, organic farming, integrated crop management, water shed management and drip irrigation.
4. Small farmers are leaving the villages and becoming labors in big cities. This has to be stopped.
5. The area of cultivable land is to be increased by using hill slopes for agriculture.

Introduction — Food is essential for the normal life, growth and development of every living organism. The plants and marine Algae manufacture their own food with the help of carbon dioxide and water in presence of sunlight as per he following equation:6 C02 + 12 H20 Sunlight C6H 1206 + 6H20 + **6 02**

(Carbon dioxide) (water) (glucose) (water) (Oxygen)
This equation is related to Photosynthesis but is also known as the equation of life because in this process oxygen is given out which is necessary for respiration and respiration is essential for life.

Man depends for food on agriculture, fish and animals.
Primitive man of Stone Age was a hunter and food gatherer. Gradually when he got afraid of some animals he started agriculture and animal husbandry. These days man depends upon 3 types of natural food resources as shown here :-
The most important source being cereals like Rice, Wheat, Maize Jawar and Bajra. Actually 80% of world population depends upon the agriculture as the source of food.
Traditional Agriculture :- Traditional agriculture does not yield the quantity that can meet out the demands of growing population of India. Therefore modern agriculture based on Green revolution was started in *1960* onwards by Norman Borlaug. Due to this India became self sufficient in food resources but modern agriculture is unsustainable and it pollutes our environment due to excess use of chemical fertilizers and pesticides.
According to FAQ (Food and Agricultural Organization) sustainable agriculture is that which does not degrade environment. It is economically viable and socially acceptable.
Most of our large farms grow single crop (monoculture). If this crop is attacked by a pest or by some natural calamity like snowfall or frost, the whole crop is ruined leaving the farmer with no income. Actually this year (2011) farmers at some places have committed suicide because of the failure of crop due to bad weather. If the farmer grows several different crops and carries on organic farming and uses bio insecticides like Neem, the chances of complete failure are lowered to a great extent. This is called integrated crop management .

World Food Problems :-

About 80% of the world population depends upon cereals as staple food. In many developing countries where populations are expanding rapidly the production of food is unable to keep pace with the growing demand. Long back the famous economist Maithus had warned by pointing out that population is increasing in geometrical ratio while the food is increasing in arithmetical ratio, hence a time will come when there shall be shortage of food. Today 64 of the 105

developing countries have less food production as compared to their population growth level. At world level about 80 crore population is facing the problem of scarcity of food out of which 20 crores are children.

It is estimated that 18 million people worldwide, most of whom are children, die each year due to starvation and malnutrition, and many others suffers a variety of dietary deficiencies. Every year about 8 to 10 crores are added to world population. The following chart gives an idea regarding the population growth at world level.

Quality of food :- When quantity of grains is increased the quality decreases. Quality food should contain carbohydrates, proteins, vitamins and minerals. According to world food survey every person should get food having calorie value 2550 — 2650 calories per day. In world about 12% population suffers from malnutrition. Deficiency of protein causes Kwashiorkor disease while deficiency of vitamin A causes vision defects whereas deficiency of iron causes anemia (loss of blood).

c. Unequal production :- Countries like America, Canada, Brazil and Argentina have more cultivable land available and the farmers are also progressive, therefore per hectare production is more as compared to India where the farmers are using classical methods of cultivation and land available is also less.

In India there is a shortage of cultivable productive land. Thus, farm sizes are too small to support a family on farm produced alone. With each generation, farms are being subdivided further. Poor environmental agriculture practices such as slash and burn, shifting cultivation, or rab (woodash) cultivation degrade the forests.

d. Natural hazards :- Natural calamities such as irregular rains, drought, frost and hail storm affect the production. In the year 2010-11 Madhya Pradesh had to face irregular rains and hail storm. The crops of Gram and vegetables were badly affected and few farmers had gone to the extent of committing suicide.

The chief minister of M.P. declared to go on fast in order to get proper subsidy for farmers to overcome these natural hazards.

e. Purchasing capacity :- Poverty is a curse for developing countries. Grains are available in government godowns but poor people have no money to purchase the same. Dr. Amritya Sen, Nobel laureate and learned economist had pointed out that government should frame such policies so that the persons below poverty line may be supplied food grains at subsidized rates. Government of India and some state governments are more actively working in this direction.

Food habits :- Most of the countries depend on cereals as staple **food. Only 2% of the world population uses fish as source of food.**

Fish is an important source of protein in many part of the world. This includes both marine and fresh water fish. While the supply of food from fishes is increased phenomenally between 1950 and 1990, in several parts of the world fish catch has since dropped due to overfishing. In 1995, FAQ reported that 44% of the world's fisheries are fully or heavily exploited — 16% are already overexploited, 6% are depleted, and only 3 % are gradually recovering. Canada had to virtually close down cod fishing in the 1 990s due the severe depletion of its fish reserves. Modern fishing technologies using mechanized trawlers and small meshed nets lead directly to overexploitation, which is not sustainable. It is evident that fish have to breed successfully and need to have time to grow If the yield has to be used sustainably. The small tradition fisherman, who are no match for organized trawlers, are the worst affected by these developments. Sea Algae is also a very good source of food. Japan is making use of sea Algae to the extent of 25% as the source of daily diet. Countries like India can also follow Japan.

f. Pollution :- Pollution is the burning problem for food production. Soil erosion, salinity and urbanization are also affecting food production.

Changes caused by modern agriculture and overgrazing :-

Due to increase in population modern methods are used in order to obtain maximum yield from minimum land area. New forest areas are converted into agricultural land and grazing grounds. This has lead to the following changes:

a. Decrease **in forest cover** :- To meet out the food grains demand of increasing population forests are cut and converted to agricultural land and grass land. Developed countries are carrying out dairy farming as an industry. For this purpose also forests are converted to grazing lands. Removal of forest cover disturbs the balance of nature because forest is an ecosystem. Destroying an ecosystem means playing with the nature. This can lead to catastrophe at any time. Developed countries like America are throwing tones of food grains in sea but they do not transfer surplus food grains to countries like Somalia, Bosnia and Ghana who are facing the problem of starvation.

b. United Nations has declared 16th October as "World Food Day" from 1979 onwards to create awareness regarding the proper distribution of food grains at world level.

c. **Soil Erosion** :- Due to overgrazing the surface soil becomes lose and is eroded by water and wind. According to Indian council of Agricultural research about 15 crore hectares of land have been eroded.

d. **Jhum cultivation** Tribals of Asam, cut forest and set it on fire so that minerals get mixed in the soil. For few years they grow cereal crops on this area and then shift to new place and repeat the same operation. This is called Jhum cultivation or shifting cultivation or Swidden cultivation. Even today the tribals are practicing this Jhum cultivation in 30 Lac hectare area of forest per year.

e. **Problem of fertilizers** :- Use of fertilizers is related to modern agriculture. Nitrogen, Phosphorus and Potassium are considered as critical elements. To meet out their demand "urea", "NP & K" and "Grow more" are added in plenty to the agricultural fields. After their use by the crops lot of fertilizers is left in soil therefore chemical structure of soil has changed. Earthworms, the friends of farmers have disappeared due to saturation of soil by chemical fertilizers.

Due to surface runoff plenty of fertilizers are flown to nearby lakes, rivers and other water bodies causing water pollution. Use of chemical fertilizers is called "Grey revolution" which has nullified the effects of Green revolution. The following table shows the use of chemical fertilizers in different seasons in thousand tons. From the above chart it is clear that consumption of fertilizer has been maximum in Punjab and degradation of land is also maximum in this state. Actually land degradation problem

exists in every state and even at world level but countries like India cannot afford it in view of more population and shortage of cultivable land. At world level about 5 to 7 million hectares of farm land is degraded every year.

Nitrate fertilizers through surface run off has reached deeper layers in soil in Rajasthan and has become part of drinking water. Nitrate in water get converted to nitride in our body. Nitrate mixes with blood resulting in methamoglobinema causing blue baby syndrome.

e. **Problems due to pesticides: -** Pesticides are synthetic chemical which include insecticides, fungicides, weedicides and rodenticides. High yielding varieties which are the basis of Green revolution are easily attacked by insects hence use of pesticides is necessary. D.D.T. (Dichlorodiphenyl trichloro thane) was the common insecticide used after 1960. D.D.T. causes air pollution, soil pollution as well as water pollution. Not only this, it is non biodegradable and persistent hence through food chain it reaches man. At each food level its concentration increases ten times. Suppose concentration of DDT sprayed over the crop is I ppm. Through surface run off it will enter in water bodies like lakes and ponds. From water it enters in Algae where its concentration shall be 10 ppm. Algae is eaten by fish, here its concentration shall be 100 ppm. Fish is eaten by man, therefore in man its concentration shall be 1000 ppm. This is called biological amplification.

CONSERVATION OF NATURAL RESOURCES: ROLE OF AN INDIVIDUAL

Different natural resources like forests, water, soil, food, mineral and energy resources play a vital role in the development of a nation. However, overuse of these resources in our modern society is resulting in fast depletion of these resources and several related problems. If we want our mankind to flourish there is a strong need to conserve these natural resources.

While conservation efforts are underway at National as well as International level, the individual efforts for conservation of natural resources can go a long way. Environment belongs to each one of us and all of us have a responsibility to contribute towards its conservation and protection.

“ Small droplets of water together form a big ocean

” Similarly, with our small individual efforts we can together help in conserving our natural resources to a large extent. Let us see how can individuals help in conservation of different resources.

Conserve Water

Dont keep water taps running while brushing, shaving, washing

or bathing.In washing machines fill the machine only to the level required for your clothes. Install water-saving toilets that use not more than 6 liters per flush. Check for water leaks in pipes and toilets and repair them promptly. A small pin-hole sized leak will lead to the wastageof 640 liters of water in a month. Reuse the soapy water of washings from clothes for washing off the courtyards, driveways etc. Water the plants in your kitchen-garden and the lawns in theevening when evaporation losses are minimum. Never water the plants in mid-day. Use drip irrigation and sprinkling irrigation to improve irrigation efficiency and reduce evaporation. Install a small system to capture rain water and collect normally wasted used water from sinks, cloth-washers, bathtubs etc. which can be used for watering the plants. Build rain water harvesting system in your house. Even the President of India is doing this.

Conserve energy

- Turn off lights, fans and other appliances when not in use.
- Obtain as much heat as possible from natural sources. Dry the clothes in sun instead of drier if it is a sunny day.
- Use solar cooker for cooking your food on sunny days which will be more nutritious and will cut down on your LPG expenses.
- Build your house with provision for sunspace which will keep your house warmer and will provide more light.
- Grow deciduous trees and climbers at proper places outside your home to cut off intense heat of summers and get a cool breeze and shade. This will cut off your electricity charges on coolers and air-conditioners. A big tree is estimated to have a cooling effect equivalent to five air conditioners. The deciduous trees shed their leaves in winter. Therefore they do not put any hindrance to the sunlight and heat.
- Drive less, make fewer trips and use public transportations whenever possible. You can share by joining a car-pool if you regularly have to go to the same place.
- Add more insulation to your house. During winter close the windows at night. During summer close the windows during days if using an A.C. Otherwise loss of heat would be more, consuming more electricity.
- Instead of using the heat convector more often wear adequate woolens.

- Recycle and reuse glass, metals and paper.
- Try riding bicycle or just walk down small distances instead of using your car or scooter.
- Lower the cooling load on an air conditioner by increasing the thermostat setting as 3-5 % electricity is saved for every one degree rise in temperature setting.

Protect the soil

While constructing your house, dont uproot the trees as far as possible. Plant the disturbed areas with a fast growing native ground cover.

Grow different types of ornamental plants, herbs and trees in your garden. Grow grass in the open areas which will bind the soil and prevent its erosion.

Make compost from your kitchen waste and use it for your kitchen-garden or flower-pots.

Do not irrigate the plants using a strong flow of water, as it would wash off the soil.

Better use sprinkling irrigation.

Use green manure and mulch in the garden and kitchen-garden which will protect the soil.

If you own agricultural fields, do not over-irrigate your fields without proper drainage to prevent water logging and salinisation.

Use mixed cropping so that some specific soil nutrients do not get depleted.

Promote Sustainable Agriculture

Do not waste food. Take as much as you can eat.

Reduce the use of pesticides.

Fertilize your crop primarily with organic fertilizers.

Use drip irrigation to water the crops.

Eat local and seasonal vegetables. This saves lot of energy on transport, storage and preservation.

Control pests by a combination of cultivation and biological control methods.

ENVIRONMENTAL DEGRADATION

Humans, like all organisms on Earth, interact with both the biotic (living) and abiotic (nonliving) factors in their environment. Environmental degradation occurs when a potentially renewable resource—one of the biotic or abiotic factors humans need and use—such as soil, grassland, forest, or wildlife—is extracted at a rate faster than the resource can be replaced, and thus

becomes depleted. If the rate of use of the resource remains high, the resource can become nonrenewable on a human time scale or even become nonexistent.

For example, topsoil is important to farmers because crops are grown in topsoil. It can take as many as 200 years to form 1 centimeter (0.40 inches) of topsoil through natural processes. Topsoil can also be lost through various causes. One of the main causes of topsoil loss is erosion. Erosion can happen when water washes soil downhill or when wind blows unprotected soil away. Worldwide, topsoil is being lost to erosion much more quickly than it is being replaced.

If topsoil loss is allowed to continue unchecked, the land can be rendered permanently infertile through a process known as desertification. Many areas of the world suffer from desertification. Grasslands do not receive much rain. If the soil cover is removed by overgrazing or by poor farming practices, the topsoil can be rapidly removed by wind erosion. This happened in parts of Texas and Oklahoma during the 1930s, leading to dust-bowl conditions. Although drought contributed to dust-bowl formation, the main cause was overgrazing and poor farming practices.

Loss of biodiversity is an important aspect of environmental degradation. Biologists agree that species are becoming extinct at an alarming rate. Biodiversity is also being lost at the ecosystem level due to environmental degradation. Tropical forests are recognized as the most diverse ecosystems on Earth and are experiencing the highest rate of ecosystem loss, but temperate habitats are also suffering degradation. Because the temperate parts of the world were settled first, the loss of biodiversity has been greatest there.

The quantitative loss of ecosystems is easy to measure. When a native prairie is converted to a cornfield or an open field is paved over to make a parking lot, the number of hectares can easily be calculated. Qualitative ecosystem degradation is harder to measure. The structure, function, or composition of an ecosystem can slowly change until the habitat is lost.

The Population Factor

Who is responsible for degrading the environment? We all are. Ordinary human activity from even the most responsible individuals inevitably pollutes and degrades the environment to some extent. We degrade the environment directly when we consume resources (for example, burning wood in a fireplace), and indirectly when we extract resources and transform them into products we need or want.

In 1999, the number of people on Earth exceeded 6 billion. The population of the world increased fourfold in the twentieth century. This rapid increase in population was accompanied by an even more rapid increase in the use of resources to support the growing population and to raise living standards. During the twentieth century, global energy use increased by a factor of 20. Following World War II, the world became even more dependent on extractive industries, such as mining and oil exploration, to supply the various minerals and fossil fuels required to support a higher standard of living. Energy shortages have an even greater impact on developing nations that are heavily dependent on subsidized fuel supplies to maintain food production.

The role of agriculture.

During the twentieth century, agriculturally productive land has been extensively modified to make it even more productive. This includes the widespread use during the twentieth century of chemical fertilizers (often produced from oil) pesticides, and extensive irrigation. To supply the needs of extensive irrigation, surface water has been diverted and many wells have been drilled seeking ever more subsurface water. At the same time that industrial agriculture was growing, agriculturally productive land was being lost to urban development and industry. In the twenty first century, competition for remaining land and water resources is expected to continue to increase.

Modern agriculture has been able to produce an enormous amount of food. Intensive agriculture is able to produce more food per hectare, but increases the need for fresh water and chemicals for pesticides and fertilizer. Much of the rise in the food supply since 1950 has been due to greatly expanded irrigation and the use of pesticides and fertilizers. However, reservoirs will eventually silt up and aquifers (subsurface water supplies) will be depleted. Irrigation with surface or subsurface water can also cause salt to accumulate in the soil. As the irrigation water soaks into the soil and evaporates, it leaves the minerals behind. Eventually, these minerals, including sodium chloride and other salts can build up to the point that the soil is rendered unsuitable for growing anything. This has already happened in much of the central valley of California. In addition, the simple ecosystems used by modern industrial agriculture are much less resilient than the complex ecosystems they replace. High-yield crops in monocultures are more susceptible to insect infestations and disease than traditionally farmed crops. High-yield agricultural practices can also lead to soil erosion, and thus a further loss of topsoil.

Forests suffer similar pressures. Trees are harvested for timber and pulp. Land is cleared for agriculture. Mixed, old-growth forests are replaced with trees all of the same species planted at the same time. These forest monocultures suffer many of the same problems as food crop monocultures. They suffer from insect infestations and are much less stable than a diverse ecosystem. Grasslands have also been extensively modified and in many areas suffer desertification. As a consequence, there are significant losses of productivity in agricultural and forest lands from overcultivation, overgrazing, desertification, and deforestation around the world. The human population is expected to continue to grow rapidly during the twenty-first century. As it does, many of the environmental resources on which humans depend are being degraded.

Resource use.

According to one simple model developed by G. Tyler Miller in Living in the Environment, the total environmental degradation, or total environmental impact, of a population depends on three factors: (1) the number of people, (2) the average number of units (kilograms, liters or pounds, gallons) of resources used by each person, and (3) how each person uses those resources. According to this model, there are different ways over-population can cause the environment to become unable to support the rate of resource consumption.

In some regions of the world, people use a relatively small number of units of any given resource, but there are so many people that the resource is still depleted. This is called people overpopulation and it is the principal cause of environmental degradation in the world's poorer developing nations. Because the population is already consuming the minimum amount of resources possible to sustain life, reducing consumption is not possible. In order to prevent or limit resource depletion, some countries have instituted family planning or have strictly limited the number of children allowed in each family.

In other regions there are relatively few people, but each person uses (on the average) so many units of a resource that the resource still becomes depleted. Miller calls this consumption overpopulation. The United States has the highest level of consumption of any nation, although the level of resource consumption in many other nations is rapidly increasing. Reducing resource consumption is certainly possible, but is politically unpopular. Many economists connect the

high standard of living in the United States to a high level of resource consumption, and possible reductions in standards of living are never popular.

Population distribution.

There are several other factors related to environmental degradation. The first is population distribution. When large numbers of people are concentrated in a small area together with industrial activity, air and water pollution can rise to unacceptable levels. Other factors are wasteful patterns of consumption and overconsumption. When people consume more than they need to maintain a high standard of living or fail to effectively control waste through recycling and conservation, then environmental degradation can occur.

Another factor related to environmental degradation is carrying capacity, the maximum population of a given species that an ecosystem can support for an extended period of time. Every habitat, ecosystem, or biome has a carrying capacity for the best population level of any particular species. This is the level that maintains ecosystem diversity (including genetic diversity) without depleting ecosystem resources. Humans now inhabit every portion of Earth and occupy a variety of different ecosystems. Discussions of carrying capacity for human population must include the whole Earth as an ecosystem. There is much debate and discussion of Earth's carrying capacity. Many scientists feel that Earth is already overpopulated and that drastic measures must be taken immediately to reduce population and resource consumption. Others feel, just as strongly, that Earth can support far more people than it does now at a high standard of living. New technology, including extractive technologies and genetic engineering of food crops, will continue to increase Earth's carrying capacity.

A Global Issue

Environmental degradation affects everyone. International environmental concerns frequently focus on large-scale problems such as desertification or global warming. However, vulnerable groups, such as impoverished people living in marginal areas, are more concerned with local issues. They may worry about the loss of rangeland, soil erosion, or the need for more intensive farming. These and similar issues affect poor people because they are directly related to the household food supply and food security. Environmental degradation results in decreased production and lowered income. As the land is more intensively farmed, soil fertility decreases

and crop yields are reduced. Unfortunately, rural poor people have few choices other than to overusing the limited resources available. The resulting environmental degradation can trigger a downward spiral in which the intensive use of resources results in more environmental degradation, which requires even more intensive use of resources.

EQUITABLE USE OF RESOURCES FOR SUSTAINABLE LIFE STYLE

There is a big divide in the world as North and South, the more developed countries (MDC' s) and less developed countries (LDC' s), the haves and the have nots. The less developed does not mean that they are backward as such, they are culturally very rich or even much more developed, but economically they are less developed. The gap between the two is mainly because of population and resources.

The MDCs have only 22% of world' s population, but they use 88% of its natural resources, 73% of its energy and command 85% of its income. In turn, they contribute a very big proportion to its pollution. These countries include USA, Canada, Japan, the CIS, Australia , New Zealand and Western European Countries. The LDCs, on the other hand, have very low or moderate industrial growth, have 78% of the worlds population and use about 12% of natural resources and 27% of energy. Their income is merely 15% of global income. The gap between the two is increasing with time due to sharp increase in population in the LDCs. The rich have grown richer while the poor have stayed poor or gone even poorer.

As the rich nations are developing more, they are also leading to more pollution and sustainability of the earth' s life support system is under threat. The poor nations, on the other hand, are still struggling hard with their large population and poverty problems. Their share of resources is too little leading to unsustainability. As the rich nations continue to grow, they will reach a limit. If they have a growth rate of 10 % every year, they will show 1024 times increase in the next 70 years. Will this much of growth be sustainable? The answer is ' No' because many of our earth' s resources are limited and even the renewable resources will become unsustainable if their use exceeds their regeneration.

Thus, the solution to this problem is to have more equitable distribution of resources and wealth. We cannot expect the poor countries to stop growth in order to check pollution because development brings employment and the main problem of these countries is to tackle poverty. A global consensus has to be reached for more balanced distribution of the basic resources like safe drinking water, food, fuel etc. so that the poor in the LDC' s are at least able to sustain their life. Unless they are provided with such basic resources, we cannot think of rooting out the problems related to dirty, unhygienic, polluted, disease infested settlements of these people-which contribute to unsustainability.

Thus, the two basic causes of unsustainability are over population in poor countries who have under consumption of resources and over consumption of resources by the rich countries, which generate wastes. In order to achieve sustainable life styles it is desirable to achieve a more balanced and equitable distribution of global resources and income to meet everyone' s basic needs. The rich countries will have to lower down their consumption levels while the bare minimum needs of the poor have to be fulfilled by providing them resources. A fairer sharing of resources will narrow down the gap between the rich and the poor and will lead to sustainable development for all and not just for a privileged group.

THE ILL-EFFECTS OF FIRECRACKERS

One of them, the more scientific one, is that the fumes produced by the crackers would kill insects and mosquitoes found after the rains.

Today, simple sparklers have given way to elaborate fireworks that can light up the entire sky above your home. Unfortunately the fumes that these crackers produce are harmful to the the environment and us.

Copper: Causes irritation in the respiratory tract.

Cadmium: Reduces the oxygen carrying capacity of blood, leading to anaemia.

Lead: Lead in the body has a harmful effect on the nervous system.

Magnesium: Magnesium fumes cause a condition known as metal fume fever.

Zinc: Causes metal fume fever and also induces vomiting.

Sodium: Sodium is a highly reactive element and combines with moisture to cause burns.

FIRECRACKERS AFFECT OUR HEALTH

The bursting of crackers during Diwali is primarily responsible for an increase in concentration of dust and pollutants. The fine dust that settles after bursting crackers is rich in pollutants like oxides of sulphur and nitrogen, metal dust and organic pollutants.

Even the tiny sparklers, torches and flower pots which are otherwise considered to create no noise at all generate thick smoke that can affect the respiratory tract of young children.

- The suspended particulate matter (SPM) levels rise significantly during Diwali. This causes throat, nose and eye related problems which can later develop into adverse health issues.
- Firecrackers have much more severe effects in people with heart, respiratory or nervous system disorders.
- They can aggravate problems for people suffering from colds, allergies or coughs and can also cause congestion of the throat and chest.
- They can also cause water contamination and acid rains.
- They result in air pollution that creates carcinogenic Sulphur compounds and airborne arsenic effect.
- The green light produced in fireworks displays comes from barium, which is radioactive and poisonous. The blue colour produced from copper compounds comes from dioxins linked to cancer.

FIRECRACKERS AFFECT THE ENVIRONMENT

Fire Hazards: Sometimes rockets set fire to huts, heaps of dry grass and even houses.

Noise Pollution: Firecrackers make more noise than the allowed decibel limit.

Air Pollution: Smog caused by firecrackers is harmful when inhaled. It also causes reduced visibility.The Central Pollution Control Board of India has also banned firecrackers with a decibel level of more than 125 at a distance of 4mts from the bursting point.

FIRECRACKERS AFFECT ANIMALS

- The sound of bursting crackers can be quite traumatic to pets, as they cannot bear loud sounds.
- We know that dogs have an incredible hearing ability and they can detect sounds that cannot be heard by human beings. Shakuntala Majumdar, President of the Thane Society for Protection of Cruelty to Animals (SPCA) says, "Their actual frequency range is 67Hz to 45kHz as compared to the human ear's range of 20kHz. Thus firecrackers with low decibels can affect their temperament."

Part B- 2 Marks

1. Give a note on solar energy.
2. List out the components of natural resources.
3. What are renewable and non-renewable resources?
4. Differentiate: renewable and non-renewable resources.
5. What is desertification?
6. What are the usage of water resources.
7. List out the merits of wind energy.
8. List out the demerits of Wind Energy.
9. What are the consequences of deforestation?
10. What are the commercial importances of forest resources.

Part C- 6 Marks

1. Discuss the merits and demerits of wind energy.
2. What are the major causes and consequences of deforestation?
3. Discuss the major uses of forests. How would you justify that ecological uses of forests surpass commercial uses?
4. How can you as an individual conserve different natural resources?
5. Explain about the usage of water resources?
6. Describe the commercial and ecological importance of the forest and why should we care
7. about the forest?
8. Environmental degradation can change renewable resources into non-renewable resources- Discuss.

9. What are the environmental impacts of ground water usage?
10. Discuss about the alternate energy resources.
11. What are the uses of various types of minerals?

KARPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE						
DEPARTMENT OF MANAGEMENT						
UNIT 2- Renewable and Non Renewable Resources (Each Question Carries ONE Mark)						
S.No	Questions	Opt 1	Opt 2	Opt 3	Opt 4	Answer
1	_____is one of the following is the non-renewable resource	Water	Oxygen	Sunlight	Coal	Coal
2	_____ soil is the best for plant growth	Sandy soil	Clay	Gravel	Loamy Soil	Loamy Soil
3	_____ of stratosphere provides protection to our life	Nitrogen	Hydrogen	Ozone	Argon	Ozone

4	Atomic energy is obtained by using the ores of _____	copper	uranium	lithium	radium	uranium
5	The death of last individual of a species is called _____	extinction	clay	vanishe	climax	extinction
6	Red data books provide a list of _____	advanced plants	rare, endangered or endemic species	disease resistant animals	minerals	rare, endangered or endemic species

7	The resources that can be replaced by natural ecological cycle is called…….	Natural Resources	Exhaustible Resources	Non renewable resources	Renewable Resources	Renewable Resources
8	Both power and manure are provided by _____plants	thermal	nuclear	biogas	hydroelectri	biogas
9	The resources that are derived from bio-mass of living organisms are called _____ resources	renewable	non-renewable	environmental	natural	renewable

10	_____ is the major raw material for biogas	Plant leaves	Cow dung	Mu	Grass	Cow dung
11	Bio gas generation is mainly based on the principle of _____	fermentation	degradation	purification	sedimentation	fermentation
12	The movement of soil compounds is called…….	Soil Nutrition	Soil erosion	Flooding	Sedimentation	Soil erosion

13	The dramatic increase in agricultural production that have been made possible by highyield “miracle crops” are called_____	biotechnical revolution	bioeconomic revolution	green house effect	green revolution	green revolution
14	The nation whose government is promoting large families because of an aging population and low fertility rate is _____	United States	India	France	China	France
15	Which among the following is not a renewable source of energy?	Biomass energy	Solar energy	Hydro-power	Geothermal energy	Solar energy

16	Blue revolution is associated with _____	agriculture	iron and steel	irrigation	fishing	fishing
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	environment	forest	resources
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	25	30	15

19	The complete failure of monsoon rainfall with a dry climate accompanied by acute shortage of water causes _____	soil erosion	flash flood	loss of bio-diversity	drought	drought
20	The study of minerals is called _____	geology	mineralogy	mining science	metallurgy	mineralogy
21	The resources that are obtained from any non-living materials are called _____resources	non-renewable	renewable	natural	environmental	non-renewable

22	_____ is the degradation of land in arid, semi-arid and dry sub-humid areas	Land fertility	Desertification	Ecosystem	Vegetation	Desertification
23	Cruid oil is…….	Colourless	Odourless	Smelly yellow to black liquid	Odourless yellow to black liquid	Smelly yellow to black liquid
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	Rain shadow	Costal	Rain shadow

25	Oil spills are a source of pollution for_____	water	land and water	land and air	air and noise	land and water
26	Air is composed of gases, water vapours and _____	rainfall	snowfall	dust particles	light	dust particles
27	_____ is a water borne disease	Small Pox	Meningitis	diarrhoea	Cholera	Cholera

28	Increase in global mean temperature causes _____	greenhouse effect	forest fire	desertification	loss of fertility	greenhouse effect
29	Common energy source in Indian villages is……	Electricity	Sun	Wood and animal dung	Coal	Wood and animal dung
30	_____ is the natural phenomenon, caused by an unlimited and unprecedented Rainfall	Soil erosion	Cyclone	Floods	Hightening	Floods

31	_____ scale is useful to record the force of win	decibel	richter	beaufort	fujit	richter
32	The first 'Green revolution' in _____ produced a large amount of foo	1960s	1970s	1980s	1990s	1960s
33	_____ is a nonrenewable energy resource	Solar	Methane	Hydroelectricit	Coal	Coal

34	_____ types of habitats are there in a biosphere	4	2	3	6	4
35	Flora is the _____ life occurring in a particular region or time	plant	animal	human	microbial	plant
36	_____ is the leading source of energy used in the United States today	coal	oil resources	natural gas	nuclear power	oil resources

37	The energy used for all plant life processes is derived from _____ radiation	ultra violet	infra red	beta	solar	solar
38	Of all of the energy production in the United States, _____ percentage is lost in distribution and inefficient use	10	25	40	50	40
39	_____ is least likely to contain an oil trap	an anticline	fault	natural stratigraphy	syncline	syncline

40	_____ rock types would most likely be the best oil reservoir	Granite	Shale	Sandstone	Salt	Sandstone
41	About 75% of electricity comes from water in _____	South America	India	Australia	China	South America
42	Two-thirds of the world's known oil reserves are located in _____	siberi	gulf of mexico and caribbean	the middle east	indonesi	the middle east

43	Oil derived from coal, oil shales or tar sands is called _____	natural gas	biomass	syncrude	biogas	syncrude
44	India ranks _____ amongst the wind-energy producing countries of the worl	first	secon	thir	fourth	fourth
45	_____ energy is derived from heated groundwater	solar	geothermal	hydroelectri	nuclear	solar

46	Gobar gas is obtained from_____	manure	cow dung	crop residues	fossil	cow dung
47	Water used for paper mills should not contain _____	magnesium	sodium	iron	chlorine	iron
48	Fuel cells are……	Carbon cell	Hydrogen battery	Nuclear cell	Chromium cell	Hydrogen battery

49	Photovoltaic energy is the conversion of sunlight int	Chemical energy	Biogas	Electricity	Geothermal energy	Chemical energy
50	Which of the following is a disadvantage of most of	Highly polluting	High waste disposal	Unreliable supply	High running cost	Unreliable supply
51	Steam reforming is currently the least expensive me	Coal	Biogas	Hydrogen	Natural gas	Hydrogen

52	Which is the renewable energy source?	natural gas furnace	cows	coal burning	gas grill	cows
53	Air is composed of gases, water vapours and _____	rainfall	snowfall	dust particles	light	dust particles
54	The newspaper contains one of the following toxic materials which is _____	C	P	Mg	Hg	P

55	_____ cycle is not a gaseous biogeochemical cycle in ecosystem	Nitrogen	Carbon	Sulphur	Phosphorus	Phosphorus
56	If you are using biomass as a source of energy you might be……	Heating with coal	Heating with natural gas	Heating with petroleum	Heating with a wood stove	Heating with a wood stove
57	_____that contains chemical waste and causes of damage to plants and animals	Smog	Acid Rain	Seasonal Rain	Monsoon Rain	Acid Rain

58	Which of the following has nothing to do with hydropower?	Burning	Gravity	Sun	Water cycle	Burning
59	Carbon dioxide is called green-house gas because it is _____	transparent to sunlight but traps heat	transparent to heat but traps sunlight	used in green-house to increase plant growth	transparent to both sunlight and heat	transparent to sunlight but traps heat
60	The slow rate of decomposition of fallen logs in nature is due to their _____	poor nitrogen content	low moisture content	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

- Introduction
- Definition
- Genetic Biodiversity
- Species Biodiversity
- Ecosystem Diversity

Biogeographical classification of India

Value of biodiversity

- Consumptive
- Productive uses
- Social
- Ethical
- Aesthetic and option values.

Threats to biodiversity

- Habitat loss
- Poaching of wildlife
- Man-wildlife conflicts.

Biodiversity - Definition

The term biodiversity was coined as a contraction of biological diversity by E.O. Wilson in 1985. Biodiversity may be defined as the variety and variability of living organisms and the ecological complexes in which they exist. In other words, biodiversity is the occurrence of different types of ecosystems, different species of organisms with the whole range of their variants and genes adapted to different climates, environments along with their interactions and processes.

Biodiversity includes the genetic variability (for which different varieties of spices have appeared in the course of evolution) and diversity of life forms such as plants, animal microbes, etc. living in a wide range of ecosystems.

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 describes the variation in the number and types of genes as well as chromosomes present in different species. The magnitude of variation in genes of a species increases with increase in size and environmental parameters of the habitat.

The genetic variation arises by gene and chromosome mutation in individuals and in sexually reproducing organisms and it is spread in the population by recombination of genetic materials during cell division after sexual reproduction.

Genetic diversity has the following importance:

(i) It helps in speciation or evolution of new species;

(ii) It is useful in adaptation to changes in environmental conditions;

(iii) It is important for agricultural productivity and development.

- 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

It describes the variety in the number and richness of the spices with in a region. The species richness may be defined as the number of species per unit area. The richness of a species tells about the extent of biodiversity of a site and provides a means for comparing different sites.

The species richness depends largely on climatic conditions. The number of individuals of different species with in a region represents species evenness or species equitability. The product species richness and species evenness give species diversity of a region. When a species is confined entirely to a particular area, it is termed as endemic species.

- 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

It describes the assemblage and Interaction of spices living together and the physical environment a given area. It relates varieties of habitats, biotic communities ecological processes in biosphere. It also tells about the diversity within the ecosystem. It is referred as Land escape diversity because it includes placement and size of various ecosystems.

For example, the landscapes like grass lands, deserts, mountains etc. show ecosystem diversity. The ecosystem diversity is due to diversity of niches, trophic levels and ecological processes like nutrient cycling, food webs, energy flow, role of dominant species and various related biotic interactions. Such type of diversity can generate more productive and stable ecosystems or communities capable of tolerating various types of stresses e.g. drought, flood etc.

According to Whittaker (1965), the community diversities are of three types:

(i) α-Diversity:

- It tells the species diversity in a given community.
- It depends upon species richness and evenness.

(ii) β-Diversity:

It describes a range of communities due to replacement of species which arises due to the presence of different microhabitats, niches and environmental conditions.

(iii) γ -Diversity:

It describes diversity of habitat over a total land escape or geographical area.

- 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.

BIOGEOGRAPHICAL CLASSIFICATION OF INDIA

As per available data, the varieties of species living on the earth are 1753739. Out of the above species, 134781 are residing in India although surface area of India is 2% of the earth's surface. Wild life Institute of India has divided it into ten biogeographical regions and twenty five biotic provinces.

Biogeographical regions are:

(i) Trans Himalayas,

(ii) Gangetic plain,

(iii) Desert,

(iv) Semiarid zone;

(v) Western Ghats;

(vi) Deccan peninsula,

(vii) North eastern zone,

(viii) Coastal lands

(ix) Himalayas,

(x) Islands.

India is one of the twelve mega diversity nations of the world due to the following reasons:

(i) It has 7.3% of the global fauna and 10.88% of global flora as per the data collected by Ministry of Environment and forest.

(ii) It has 350 different mammals, 1200 species of birds- 453 different reptiles, 182 amphibians and 45,000 plants spices.

(iii) It has 50,000 known species of insects which include 13,000 butterflies and moths.

(iv) It has 10 different biogeographical regions and 25 biotic provinces having varieties of lands and species.

(v) In addition to geographical distribution, geological events in the land mass provide high level of biological diversity.

(vi) Several crops arose in the country and spread throughout the world.

(vii) There is wide variety of domestic animals like cows, buffaloes, goats, sheep, pigs, horses etc.

(viii) The marine biota includes sea weeds, fishes, crustaceans, molluses, corals, reptiles etc.

(ix) There are a number of hot spots (namely Eastern Ghats, Western Ghats, North Eastern hills etc.).

- 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 biogeographic 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 living organisms on earth are of great diversity, living in diverse habitats and possessing diverse qualities and are vital to human existence providing food, shelter, clothing's, medicines etc.

- 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.

Uses of Biodiversity

Biodiversity has the following uses for the development humanity:

(i) It provides food of all types.

(ii) It provides fibers, sources for the preparation of clothes.

(iii) It provides different types of oil seeds for the preparation of oils.

(iv) It provides new varieties of rice, potato etc. through the process of hybridization.

(v) It provides different drugs and medicines which are based on different plant products.

(vi) It is very essential for natural pest control, maintenance of population of various species, pollination by insects and birds, nutrient cycling, conservation and purification of water, formation of soil etc. All these services together are valued 16.54 trillion dollars per year.

BIODIVERSITY AT GLOBAL, NATIONAL AND LOCAL LEVELS

There are at present 1.8 million species known and documented by scientists in the world. However, scientists have estimated that the number of species of plants and animals on earth could vary from 1.5 to 20 billion! Thus the majority of species are yet to be discovered. Most of the world's bio-rich nations are in the South, which are the developing nations. In con-trast, the majority of the countries capable of exploiting biodiversity are Northern nations, in the economically developed world. These na-tions however have low levels of biodiversity. Thus the developed world has come to support the concept that biodiversity must be consid-ered to be a 'global resource'. However, if biodiversity should form a 'common property resource' to be shared by all nations, there is no reason to exclude oil, or uranium, or even intel-lectual and technological expertise as global as- sets. India's sovereignty over its biological diversity cannot be compromised without a revo-lutionary change in world thinking about shar-ing of all types of natural resources.

Countries with diversities higher than India are located in South America such as Brazil, and South East Asian countries such as Malaysia and Indonesia. The species found in these countries, however, are

different from our own. This makes it imperative to preserve our own biodiversity as a major economic resource. While few of the other 'megadiversity nations' have developed the technology to exploit their species for bio-technology and genetic engineering, India is ca-pable of doing so. Throughout the world, the value of biologically rich natural areas is now being increasingly ap-preciated as being of unimaginable value. In-ternational agreements such as the World Heritage Convention attempt to protect and support such areas. India is a signatory to the convention and has included several protected Areas as World Heritage sites. These include Manas on the border between Bhutan and In-dia, Kaziranga in Assam, Bharatpur in U.P., Nandadevi in the Himalayas, and the Sunderbans in the Ganges delta in West Bengal. India has also signed the Convention in the Trade of Endangered Species (CITES) which is intended to reduce the utilization of endan-gered plants and animals by controlling trade in their products and in the pet trade.

INDIA AS A MEGA DIVERSITY NATION

Geological events in the landmass of India have provided conditions for high levels of biological diversity. A split in the single giant continent around 70 million years ago, led to the formation of northern and southern continents, with India a part of Gondwanaland - the southern landmass, together with Africa, Australia and the Antarctic. Later tectonic movements shifted India northward across the equator to join the Northern Eurasian continent. As the intervening shallow Tethis Sea closed down, plants and animals that had evolved both in Europe and in the Far East migrated into India before the Himalayas had formed. A final influx came from Africa with Ethiopian species, which, were adapted to the Savannas and semi-arid regions. Thus India's special geographical position between three distinctive centres of biological evolution and radiation of species is responsible for our rich and varied biodiversity.

Among the biologically rich nations, India stands among the top 10 or 15 countries for its great variety of plants and animals, many of which are not found elsewhere. India has 350 different mammals (rated eight highest in the world), 1,200 species of birds (eighth in the world), and 453 species of reptiles (fifth in the world) and 45,000 plant species, of which most are angiosperms, (fifteenth in the world). These include especially high species diversity of ferns (1022 species) and orchids (1082 species). India has 50,000 known species of insects, including 13,000 butterflies and moths. It is estimated that the number of

unknown species could be several times higher. It is estimated that 18% of Indian plants are endemic to the country and found nowhere else in the world. Among the plant species the flowering plants have a much higher degree of endemism, a third of these are not found else-where in the world. Among amphibians found in India, 62% are unique to this country. Among lizards, of the 153 species recorded, 50% are endemic. High endemism has also been re-corded for various groups of insects, marine Worms, centipedes, mayflies and fresh water sponges.

	India's World Ranking	Number of species in India
Mammals	8th	350
Birds	8th	1200
Reptiles	5th	453
Amphibia	15th	182
Angiosperms	15th-20th	14,500

Apart from the high biodiversity of Indian wild plants and animals there is also a great diversity of cultivated crops and breeds of domestic live- stock. This is a result of several thousand years during which civilizations have grown and flourished in the Indian subcontinent. The traditional Cultivars included 30,000 to 50,000 varieties of rice and a number of cereals, vegetables and fruit. The highest diversity of cultivars is concentrated in the high rainfall areas of the Western Ghats, Eastern Ghats, Northern Himalayas and the North-Eastern hills. Gene-banks have collected over 34,000 cereals and 22,000 pulses grown in India. India has 27 indigenous breeds of cattle, 40 breeds of sheep, 22 breeds of goats and 8 breeds of buffaloes.

HOT SPOTS OF BIODIVERSITY

Hot spots are the areas with high density of biodiversity or mega diversity which are most threatened at present. There are 16 hot spots in world, out of which two are located in India namely North-East Himalayas and Western Ghats.

The hot spots are determined considering four factors:

(i) Degrees of endemism;

(ii) Degree of expectation

(iii) Degrees of threat to habitat due to its degradation and fragmentation and

(iv) Number of Species diversity.

The global hot spot and endemic species present within them are:

(1) North East Himalayas (3,500);

(ii) Western Ghats (1,600);

(iii) Cape region of South Africa (6,000);

(iv) Upland Western Amazonia (5,000);

(v) Madagascar (4,900);

(vi) Philippines (3,700)

(vii) Boreo (3, 500);

(viii) South West Australia (2,830);

(ix) Western Ecuador (2,500);

(x) Colombian Choco (2,500);

(xi) Peninsular Malaysia) (2, 400);

(xii) Californian Floristic Province (2,140);

(xiii) Central Chile (1,450);

(xiv) Eastern Arc. Mts (Tanzania) (535);

(xv) South West Srilanka (500);

(xvi) South west Tvorie (200).

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.

Biodiversity is considered as a reservoir of resources to be used for the manufacture of food, medicine, industrial products, etc. But with an increased demand of rapid population growth, biodiversity is gradually depleting. A number of plants" and animal species have already become extinct and many are endangered.

The different factors responsible for causing threat to biodiversity are as follows:

1. Habitat destruction:

The primary cause of loss of biodiversity is habitat loss or destruction which is resulted due to the large industrial and commercial activities associated with agriculture, irrigation, construction of dams, mining, fishing etc.

2. Habitat fragmentation:

With increased population, the habitats are fragmented into pieces by roads, fields, canals, power lines, towns etc. The isolated fragment of habitats restricts the potential of species for dispersal and colonization. In addition, the habitat fragmentation also brings about microclimatic changes in light, temperature, wind etc.

3. Pollution:

The most dreaded factor inducing loss of biodiversity is environmental pollution which include air pollution, Water pollution, industrial pollution, pollution due to chemical Pastes, pesticides radioactive materials etc.

4. Over exploitation:

The natural resources are over exploited to meet growing rural poverty, intensive technological growth and globalization of economy. All these factors together may be responsible for the extinction of a number of species.

5. Introduction of exotic species:

The introduction of exotic species are due to:

(i) horticulture

(ii) agriculture;

(iii) European colonisation and

(iv) accidental transport.

It is seen that some exotic species may kill or eat the native species thereby causing its extinction.

6. Diseases:

Since the animals are more vulnerable to infection, the anthropological activities may increase the incidence of diseases in wild species, leading to their extinction.

7. Shifting or Jhum cultivation:

The shifting or Jhum cultivation by poor tribal people greatly affects the forest structure which is a store house of biodiversity.

8. Poaching of wild life:

A number of wildlife species are becoming extinct due to poaching and hunting.

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 comples 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.

ENDANGERED AND ENDEMIC SPECIES OF INDIA

To appreciate the endemic and endangered spe-cies of India it is important to understand the wide variety of plant and animal species that are found in the country. Of the well-known species, there are several which are endangered by human activity. The endangered species in the country are categorised as Vulnerable, Rare, Indeterminate and Threatened. Other species are found only in India and are thus endemic or restricted to our country. Some of these may have very localized distribution and are considered highly endemic. Several plant and animal species in the country are now found in only one or a few Protected Areas. Among the important endangered animals are charismatic species such as the tiger, the elephant, the rhino, etc. The less well-known major mammals restricted to a single area include the Indian wild ass, the Hangul or Kashmir stag, the Golden langur, the pygmy hog and a host of others. There are also endangered bird species such as the Siberian crane, the Great Indian Bustard, the Florican and several birds of prey. During the recent past, vultures which were common a decade ago, have suddenly disappeared and are now highly threatened. Equally threatened are several species of reptiles and amphibia. Many invertebrates are also threatened, including a large number of species that inhabit our coral reefs. Many plant species are now increasingly threatened due to changes in their habitats induced by human activity. Apart from major trees, shrubs and climbers that are extremely habitat specific and thus endangered, there are thousands of small herbs which are greatly threatened by habitat loss. Several orchids are yet another group of plants that are under threat.

Many plants are threatened due to overharvesting as ingredients in medicinal products. To protect endangered species India has created the Wildlife Protection Act. This includes lists of plants and animals categorised according to the threat on their survival. We know so little about the species diversity of our country. There are several groups of which we know very little. Most of us are only aware of the plight of a few glamorous large mammals, but we need to appreciate the threat to the less known species of plants and animals. We need to find ways to support the conservation of our incredible wildlife for future generations.

Conservation of Biodiversity:

Biodiversity is being depleted by the loss of habitat, fragmentation of habitat, over exploitation of resources, human sponsored ecosystems, climatic changes, pollution invasive exotic spices, diseases, shifting cultivation, poaching of wild life etc.

Since the human beings are enjoying all the benefits from biodiversity, they should take proper care for the preservation of biodiversity in all its form and good health for the future generation i.e., the human being should prevent the degradation and destruction of the habitats thereby maintaining the biodiversity at its optimum level.

Conservation of biodiversity is protection, upliftment and scientific management of biodiversity so as to maintain it at its threshold level and derive sustainable benefits for the present and future generation. In other words, conservation of bio-diversity is the proper management of the biosphere by human beings in such a way that it gives maximum benefits for the present generation and also develops its potential so as to meet the needs of the future generations.

Mainly the conservation of biodiversity has three basic objectives:

(a) To maintain essential ecological processes and life supporting systems.

(b) To preserve the diversity of species.

(c) To make sustainable utilisation of species and ecosystems.

Strategies for Conservation of Biodiversity:

The following strategies should be undertaken in order to conserve biodiversity:

(1) All the possible varieties (old or new) of food, forage and timber plants, live stock, agriculture animals and microbes should be conserved.

(2) All the economically important organisms in protected areas should be identified and conserved.

(3) Critical habitats for each species should be identified and safeguarded.

(4) Priority should be given to preserve unique ecosystems.

(5) There should be sustainable utilisation of resources.

(6) International trade in wild life should be highly regulated.

(7) The poaching and hunting of wildlife should be prevented as far as practicable.

(8) Care should be taken for the development of reserves and protected areas.

(9) Efforts should be made to reduce the level of pollutants in the environment.

(10) Public awareness should be created regarding biodiversity and its importance for the living organisms.

(11) Priority should be given in wildlife conservation programme to endangered species over vulnerable species and to vulnerable species over rare species.

(12) The habitats of migratory birds should be protected by bilateral and multilateral agreement.

(13) The over exploitation of useful products of wild life should be prevented.

(14) The useful animals, plants and their wild relatives should be protected both in their natural habitat (in-situ) and in zoological botanical gardens (ex-situ)

(15) Efforts should be made for setting up of National parks and wild life sanctuaries to safeguard the genetic diversity and their continuing evolution.

(16) Environmental laws should be strictly followed.

Conservation Methods:

There are two types of conservation methods namely in-situ and ex-situ conservations. Let us discuss the different conservation methods along with their importance.

(a) In situ conservation:

The conservation of species in their natural habitat or natural ecosystem is known as in situ conservation. In the process, the natural surrounding or ecosystem is protected and maintained so that all the constituent species (known or unknown) are conserved and benefited. The factors which are detrimental to the existence of species concerned are eliminated by suitable mechanism.

The different advantages of in situ conservation are as follows:

(a) If is a cheap and convenient way of conserving biological diversity.

(b) It offers a way to preserve a large number of organisms simultaneously, known or unknown to us.

(c) The existence in natural ecosystem provides opportunity to the living organisms to adjust to differed' environmental conditions and to evolve in to a better life form.

The only disadvantage of in situ conservation is that it requires large space of earth which is often difficult because of growing demand for space. The protection and management of biodiversity through in situ conservation involve certain specific areas known as protected areas which include national parks, Sanctuaries and Biosphere reserves.

1. Protected areas:

The protected areas are biogeographical areas where biological diversity along with natural and cultural resources are protected, maintained and managed through legal and administrative measures. The demarcation of biodiversity in each area is determined on the basis of climatic and physiological conditions.

In these areas, hunting, firewood collection, timber harvesting etc. are prohibited so that the wild plants and animals can grow and multiply freely without any hindrance. Some protected areas are: Cold desert (Ladakh and Spiti), Hot desert (Thar), Saline Swampy area (Sunderban and Rann of Kutch), Tropical moist deciduous forest (Western Ghats and north East) etc. Protected areas include national parks, sanctuaries and biosphere reserves. There are 37,000 protected areas throughout the world. As per World Conservation Monitoring Centre, India has 581 protected areas, national parks and sanctuaries.

2. National parks:

These are the small reserves meant for the protection of wild life and their natural habitats. These are maintained by government. The area of national parks ranges between 0.04 to 3162 km. The boundaries are well demarcated and circumscribed. The activities like grazing forestry, cultivation and habitat manipulation are not permitted in these areas. There are about 89 national parks in India.

Some important national Parks of India are:

(i) Biological Park, Nandankanan, Orissa,

(ii) Corbett national Park Nainital, U.P. (First national Park)

(iii) Koziranga national Park, Jorhat, Assam

(iv) Tudula national Park, Maharashtra

(v) Hazaribagh national Park, Hazaribagh, Bihar

(vi) Band havgarh national park, M.P.

(vii) Bandipur national park, Karnataka.

(viii) Kanha National Park, M.P.

(ix) Reibul Lamjao National Park, Manipur

(x) Nawgaon National Park, Maharashtra

3. Sanctuaries:

These are the areas where only wild animals (fauna) are present. The activities like harvesting of timbers, collection of forest products, cultivation of lands etc. are permitted as long as these do not interfere with the project. That is, controlled biotic interference is permitted in sanctuaries, which allows visiting of tourists for recreation. The area under a sanctuary remains in between 0.61 to 7818 km.

Some important sanctuaries of Orissa are as follows:

(i) Nandankanan Zoological Park

(ii) Chandaka Elephant reserve

(iii) Simlipal Tiger Reserve

(iv) Bhitarkanika Wild life Sanctuary

(v) Gharial project at Tikarpada

(vi) Chilika (Nalaban) Sanctuary

4. Biosphere reserves:

Biosphere reserves or natural reserves are multipurpose protected areas with boundaries circumscribed by legislation. The main aim of biosphere reserve is to preserve genetic diversity in representative ecosystems by protecting wild animals, traditional life style of inhabitant and domesticated plant/ animal genetic resources. These are scientifically managed allowing only the tourists to visit.

Some importance of biosphere reserves are as follows:

(a) These help in the restoration of degraded ecosystem.

(b) The main role of these reserves is to preserve genetic resources, species, ecosystems, and habitats without disturbing the habitants.

(c) These maintain cultural, social and ecologically sustainable economic developments.

(d) These support education and research in various ecological aspects,

Some important biosphere reserves are:

Simlipal, (Orissa), Sunderban (West Bengal), Kanha (M.P Kaziranga (Assam) etc. The biosphere reserve net work was introduced by UNESCO 1971.

TABLE 5.2 : BIOSPHERE RESERVES OF INDIA

S. No.	Date notified	Name of the site	Area in sq.km.	Location (state)
1.	0.1.08.86	Nilgiri	5,520	Parts of Wynad, Nagarhole, bandipur and Mudumalai, Nilambur, Silent Valley, and the Siruvani Hills (Tamil Nadu, Kerala and Karnataka)
2.	18.01.88	Nanda Devi	5,860.69	Parts o the Chamoli, Pithoragarh, and Almorae dis tricts Uttaranchal)
3.	01.09.88	Nokrerk	820	Part of Gora Hills (Meghalaya)
4.	14.03.89	Manas	2,837	Parts of the Kokrajhar, Bongaigaon, Parpeta, Nalbari, Kamprup, and Daarang districts (Assam)
5.	29.03.89	Sunderbans	9,630	Parts of the Brahamaputra and Ganga deltas (West Bengal)
6.	18.02.89	Gulf of Mannar	10,500	Indian part of Gulf of Mannar between India and Sri Lanka (Tamil Nadu)
7.	06.01.89	Great Nicobar	885	Southernmost islands of the Andaman and Nicobar islands.
8.	21.06.94	Similpal	4,374	Partof Mayurbhanj district (Orissa)
9.	29.07.97	Dibru-Saikhowa	765	Parts of the Dibrugarh and Tinsukia districts (Assam)
10.	02.09.98	Dehang Debang	5,112	Parts of Siang and Debang Valley (Arunachal Pradesh).
11.	03.03.99	Pachmarhi	4,926.28	Part of the Betul, Hoshangabad, and Chindwara dis tricts (Madhya Pradesh)
12.	07.02.00	Kanchanjanga	2,619.92	Part of Kanchanjanga Hills (Sikkim)

(b) Ex-situ conservation:

Ex-situ conservation involves maintenance and breeding of endangered plants and animals under partially or wholly controlled conditions in specific areas like zoo, gardens, nurseries etc. That is, the conservation of selected plants and animals in selected areas outside their natural habitat is known as ex-situ conservation.

The stresses on living organisms due to competition for food, water, space etc. can be avoided by ex-situ conservation there by providing conditions necessary for a secure life and breeding.

Some important areas under these conservation are:

(i) Seed gene bank,

(ii) Field gene bank;

(iii) Botanical gardens;

(iv) Zoos.

The strategies for ex-situ conservations are:

(i) Identification of species to be conserved.

(ii) Adoption of Different ex-situ methods of conservation.

(i) Long-term captive breeding and propagation for the species which have lost their habitats permanently.

(ii) Short-term propagation and release of the animals in their natural habitat

(iii) Animal translocation

(iv) Animal reintroduction

(v) Advanced technology in the service of endangered species.

The different advantages of ex-situ conservation are:

(a) It gives longer life time and breeding activity to animals.

(b) Genetic techniques can be utilised in the process.

(c) Captivity breed species can again be reintroduced in the wild.

Some disadvantages of this method are:

(a) The favourable conditions may not be maintained always.

(b) Mew life forms cannot evolve.

(c) This technique involves only few species.

Different mechanisms involved in the conservation of biodiversity is shown in Fig. 5.1.

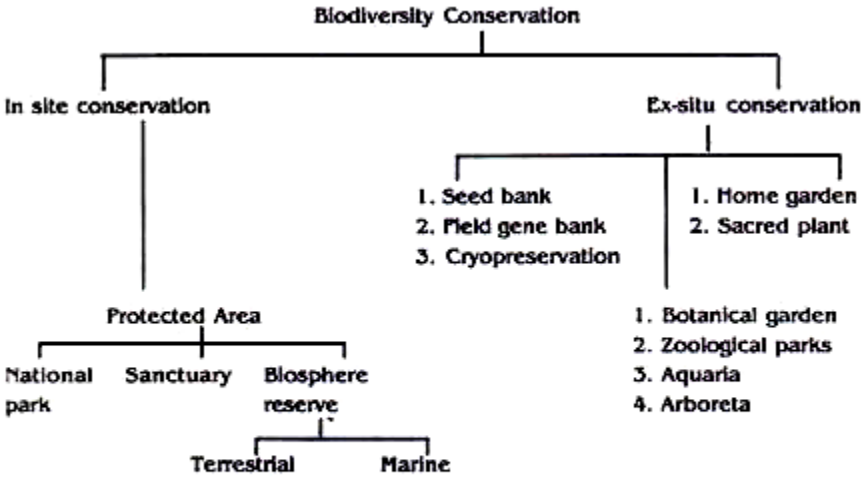


FIG. 5.1 : SCHEME SHOWING BIODIVERSITY CONSERVATION MANAGEMENT SYSTEMS.

Part B- 2 Marks

1. What is Genetic Diversity?
2. Differentiate: Ex-situ and In-situ conservation.
3. What is "Hot spot"?
4. Define Biodiversity.
5. What is Ecosystem biodiversity?
6. What is meant by in situ conservation of biodiversity?
7. What is meant by ex-situ conservation of biodiversity?
8. What do you mean by consumptive use value of biodiversity?
9. What do you mean by productive use value of bio diversity?
10. Which are the hotspots found in India?

Part C- 6 Marks

1. Describe in detail about the values of Bio Diversity.
2. India as a Mega-biodiversity nation-Discuss.
3. What are the major causes of man-wildlife conflicts? Discuss the remedial steps that can curb the conflict.
4. Enumerate the threats of biodiversity?
5. Define biodiversity. Explain genetic diversity, species diversity and ecosystem diversity.
6. What is meant by in situ and ex-situ conservation of biodiversity? Give examples.
7. What are all the categories of threatened plants and explain?
8. What do you mean by consumptive use value, productive use value, social value, ethical value and option value of biodiversity?
9. Explain about In-situ conservation, its advantages and disadvantages?
10. What are hotspots of biodiversity? Which are the hotspots found in India? Discuss their salient features.

KARPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE						
DEPARTMENT OF MANAGEMENT						
UNIT 3 Biodiversity and its Conservation (Each Question Carries ONE Mark)						
S.No	**Questions**	**Opt 1**	**Opt 2**	**Opt 3**	**Opt 4**	**Answer**
1	The species rich ecosystem	Marine ecosystem	Terrestrial ecosystem	Special Ecosystem	Extra terrestrial ecosystem	Marine ecosystem
2	The most fundamental level of biodiversity	Genetic diversity	Species diversity	Population	Diversity	Genetic diversity
3	The lowest species diversity in the tropical areas……..	Eastern Atlantic	Eastern Pacific	Western Atlantic	Indo-Pacific Region	Eastern Atlantic

4	Physically India is divided into…….	Four region	Seven region	Five region	Two region	Four region
5	Some species play ecological roles that are of great importance than predicted…….	primary species	Keystone species	Climax species	Decomposers	Keystone species
6	People love, live, a phenomenon called…….	Spirituality	Meditation	Peace	Biophilia	Biophilia

7	Three important issues of biodiversity…….	Commodity, Amenity, and Morality	Genus, species and population	Community, diversity amd ecosystem	Flora, Fauna and Humans	Commodity, Amenity, and Morality
8	Total identifies species on theearth……	1.5 million	5-30 million	3 million	10 million	1.5 million
9	Two biodiversityhotspots in India……	Gangetic and Western Himalayas	Western Ghats and Eastern Himalayas	Peninsular and Vindhyas	J&K and Rajasthan	Western Ghats and Eastern Himalayas

10	Total biodiversity hotspots in the world……..	25	2	15	50	25
11	Levels of biodiversity include all but one……	Genetics	Species	Population	Ecosystem	Population
12	The type of diversity including all the different kinds of living things found in a certain habitat is called as……	Species diversity	Genetic diversity	Ecosystem diversity	Population diversity	Species diversity

13	A taxon with restricted geographical distribution is termed as?	Rare	Vulnerable	Extinct	Endemic	Endemic
14	Conservation of biodiversity outside the natural habitat is called as……..	Ex-situ	In-situ	Conservation	In-vivo	Ex-situ
15	Which of the following does not come under the threatened categories?	Endangered	Vulnerable	Least concern	Rare	Least concern

16	Biosphere reserve has following zone except one…….	Core zone	Command zone	Buffer zone	Spherical zone	Spherical zone
17	In which of the following boundaries are not circumscribed……	Biosphere reserve	Sanctuary	National parks	Colony parks	Sanctuary
18	The knowledge of which of the following factor does not help in the wildlife Management…….	Habitat of wildlife	Behaviour of wildlife	Food habit of wildlife	Name of wildlife	Name of wildlife

19	In _____ type of wildlife management the wildlife is protected from hunting mainly during breeding season and is enforced by law and if violated is punishable and termed as illlegal…….	Closed season	Open wildlife season	Custodial management	Limited entry zone	Closed season
20	The tigers are found in which of the following biosphere reserve:	Thar desert biosphere reserve	Neelgiri biosphere reserve	Namdhapa biosphere reserve	Sunderbans biosphere reserve	Sunderbans biosphere reserve
21	How many biosphere reserves are present in India ?	41	34	14	17	14

22	Biodiversity of which organism is more in Eastern Ghat in comparison to Western Ghat ?	Reptilia	Amphibian	Aves	Mammals	Amphibian
23	Which one of the following is not used for *ex situ* pl	Field gene banks	Seed banks	Shifting cultivation	Botanical Gardens	Shifting cultivation
24	Which one is odd for species diversity ?	alpha diversity	gamma diversity	beta diversity	lamnda diversity	lamnda diversity

25	Which micro organism is responsible for synthesis of antibiotics ?	Bacteria	Virus	Fungus	Algae	Fungus
26	Species diversity is responsible for which phenomena ?	process of Evolution	speciation	For alternative types (allele) of gene	For stability and normal function of Ecosystem	For stability and normal function of Ecosystem
27	How many botanical gardens are registered in IABG ?	1500	80,000	800	900	800

28	Which of the following represent maximum number of species among global biodiversity?	Algae	Lichens	Fungi	Mosses and Ferns	Fungi
29	Prolonged liberal irrigation of agricultural fields is li	Aridity	Metal toxicity	Salinity	Acidity	Salinity
30	The greatest problem of water conservation is to reduce the amount of……	Precipitation	Runoff water	Groundwater	Evaporation	Runoff water

31	Maximum nutritional diversity is found in the group……	Monera	Plantae	Fungi	Animalia	Monera
32	Which regions are included in Biodiversity Hot-spot ?	Sanctuary	National park	Garden	Only Hotspot	Sanctuary
33	Which one is odd for India ?	7th rank in agriculture species	origin place of 166 species of crop plants	Primary centre for domestication of ginger, turmeric, citrus, cardamom	It contains 12 mega biodiversity region	7th rank in agriculture species

34	Which one is the correct pair ?	Bali Tiger – Endangered species	Caspian Tiger – Extinct species	Javan Tiger – Rare species	Bali Tiger - Extinct species	Caspian Tiger – Extinct species
35	For which animal sunderbans is declared as a National Park ?	Lion	Rhino	Tiger	Wild ass	Tiger
36	Which one is odd for Amzon rain forest ?	Africa	Russia	Mauritius	Java	Java

37	Among the recently extinct animal, Guagga is of which country ?	Mammals-472	Reptile-427	Birds-1300	piceis-3000	Mammals-472
38	Which organisation is active for conservation of biodiversity at world level ?	WWF	WCU	a and b both	EE	a and b both
39	Find odd one out :-	Project Elephant	Tiger Project	Gir Lion Project	Project Wild ass	Project Wild ass

40	Which animal is remnant gene pool in the world ?	Flamingo	Painted Frog	Wild ass	Spring tailed Lizard	Wild ass
41	Find odd one out :	Nanda devi	Great Nicobar	Mannar	Thar	Thar
42	Which is the example of ex-situ conservation ?	National park	Sanctuary	Biosphere reserve	Zoo	Zoo

43	Which is true for wild life conservation ?	Hunting of prey	ex-situ conservation	In-situ conservation	ex-situ conservation and In-situ conservation	ex-situ conservation and In-situ conservation
44	At which place animals and plants are most protected ?	Botanical gardens	National Park	Zoos	Sanctuary	National Park
45	Which is not applicable institute conservation ?	National Park	Sanctuary	Botanical Garden	Biosphere reserve	Botanical Garden

46	What is called the area which is remain around the core zone of biosphere region ?	Buffer	Transition zone	Developed zone	Peripherial zone	Buffer
47	Which is the Hot spot of India ?	Gangatic plain	Western Ghat	Eastern Ghat	Arravali mountain	Western Ghat
48	Which is the most appropriate method for conservation of wild life ?	Vaccination	Hybridization	conservation in natural habitat	Killing of predator	conservation in natural habitat

49	Where Mangroves forest found ?	Dry region	Coastal region	Open area	tropical region	Coastal region
50	Where is the genes of rare plants species to stored ?	Gene bank	Gene Library	Herberium	Open area	Gene bank
51	For which animal Project Gir is famous ?	Elephant	Hangul	Tiger	Lion	Lion

52	MAB means ….....	Man and biosphere programme	Mammal and biological programme	Mammal and biosphere programme	Men and biological programme	Man and biosphere programme
53	Who publish Red-list ?	WWF	IUCN	MAB	IBWL	IUCN
54	In India different types of mangoes species are example of …..	species diversity	Genetic diversity	Induced mutation	Breeding	Genetic diversity

55	Which number is correct for Indentfied popular species ?	1.1 to 1.1 million	0.5 to 1.0 million	2.5 to 3.0 million	1.7 to 1.8 million	1.7 to 1.8 million
56	IUCN means ….....	International union for conservation of nature and natural resources	Indian union for conservation of nature and natural resources	International union for conservation of nature and nutrients resources	Indian Union chemical nomenclature	International union for conservation of nature and natural resources
57	In India, which example has maximum varieties ?	Wheat	Rice	Mango	Tea	Mango

58	In India, Western ghat is known as Hot-spot because of …..	Evergreen forest	High endemism	more height	Topical climate	High endemism
59	What is important of gene diversity ?	Maintenance of species	speciation	Research of genetic code	Maintenance and research of spices	speciation
60	Which is the modern concept of conservation ?	Biosphere reserve	sanctuary	National park	Protected forest	Biosphere reserve

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 (SO2)
- Ammonia (NH3)

- Nitrogen dioxide(NO2)
- Hydrogen cyanide
- Hydrogen fluorides
- Hydrogen sulphide (H2S)
- Chlorines
- Phosgenes
- Arsines
- Aldehydes
- Ozone
- Ionizing radiations
- CO2

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 (SO2) fumes.

The primary pollutants are following

- Soot released from unburned fuel
- SO2
- Benzopyrene (hydrocarbon) released from cigarette smoke.
- NH3
- Oxides of nitrogen
- CO (carbon monoxide)
- Lead

Secondary Air Pollutants

- Secondary air pollutants are poisonous nitrogen oxides, hydrocarbons and O2 interact to produce more powerful photochemical oxidants like ozone (O3), 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 (O3).

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 SO2 and fluorides present in the air.

Necrosis

- The breakdown of cells is called necrosis.
- It is caused by SO2, nitrogen dioxide, ozone and fluorides.

Green house effect

- CO2 is released into the air by the combustion of fuels.
- It is estimated that CO2 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

- H2S smells like rotten eggs and nausea.

Vomiting

- SO2 causes vomiting.

Jaundice

- Arsines induce RBC breakdown and jaundice.

Oxygen carrying capacity

- CO reduces O2 carrying capacity of RBC by its permanent combination with haemoglobin.

Coughing

- Coughing is induced by phosgenes (carbonyl chloride).

Headache

- SO2 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

- Intheatmosphere, about 30km above the surface of the earth, the ozone molecules (O3) 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 CO2 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 (SO2) and oxides of nitrogen such as nitrous oxide (N2O) 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 O2 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 NH3, SO2, 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.

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 H2S.
- 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 O2 of the water for respiration, the O2 is depleted from the water.
- The rapid growth also consumes all the nutrients of the water.
- The depletion of O2 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

o Sedimentation

o Dilution
o 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 O2 contents and reduces BOD and CO2.

(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

CO2

- CO2 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 CO2 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 CO2 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.

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.

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.

(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.

MARINE POLLUTION

Marine pollution can be defined as the intro-duction of substances to the marine environment directly or indirectly by man resulting in adverse effects such as hazards to human health, obstruction of marine activities and lowering the quality of sea water. While the causes of marine pollution may be similar to that of general water pollution there are some very specific causes that pollute marine waters.

• The most obvious inputs of waste is through pipes directly discharging wastes into the sea. Very often municipal waste and sewage from residences and hotels in coastal towns are directly discharged into the sea.

• Pesticides and fertilizers from agriculture which are washed off the land by rain, enter water courses and eventually reach the sea.

• Petroleum and oils washed off from the roads normally enter the sewage system but stormwater overflows carry these materials into rivers and eventually into the seas.

Mining for materials such as copper and gold is a major source of contamination in the ocean. For example, copper is a major source of pollutant in the ocean and can interfere with the life cycles of numerous marine organisms and life.

Causes of Ocean Pollution

There are various ways for how pollution enters the ocean:

1. Sewage: Pollution can enter the ocean directly. Sewage or polluting substances flow through sewage, rivers, or drainages directly into the ocean. This is often how minerals and substances from mining camps find their way into the ocean. The release of other chemical nutrients into the ocean's ecosystem leads to reductions in oxygen levels, the decay of plant life, a severe decline in the quality of the sea water itself. As a result, all levels of oceanic life, plants and animals, are highly affected.

2. Toxic Chemicals From Industries: Industrial and agricultural waste are another most common form of wastes that are directly discharged into the oceans, resulting in ocean pollution. The dumping of toxic liquids in the ocean directly affects the marine life as they are considered hazardous and secondly, they raise the temperature of the ocean, known as thermal pollution, as the temperature of these liquids is quite high. Animals and plants that cannot survive at higher temperatures eventually perish.

3. Land Runoff: Land runoff is another source of pollution in the ocean. This occurs when water infiltrates the soil to its maximum extent and the excess water from rain, flooding or melting flows over the land and into the ocean. Often times, this water picks up man-made, harmful contaminants that pollute the ocean, including fertilizers, petroleum, pesticides and other forms of soil contaminants. Fertilizers and waste from land animals and humans can be a huge detriment to the ocean by creating dead zones.

4. Large Scale Oil Spills: Ship pollution is a huge source of ocean pollution, the most devastating effect of which is oil spills. Crude oil lasts for years in the sea and is extremely toxic to marine life, often suffocating marine animals to death once it entraps them. Crude oil is also extremely difficult to clean up, unfortunately meaning that when it is split; it is usually there to stay.

In addition, many ships lose thousands of crates each year due to storms, emergencies, and accidents. This causes noise pollution (excessive, unexpected noise that interrupts the balance of life, most often caused by modes of transportation), excessive algae, and ballast water. Often times, other species can also invade an ecosystem and do harm to it by interrupting the life cycles of other organisms, causing a clash of nature that has already been damaged by the overflow of pollution.

5. Ocean Mining: Ocean mining in the deep sea is yet another source of ocean pollution. Ocean mining sites drilling for silver, gold, copper, cobalt and zinc create sulfide deposits up to three

and a half thousand meters down in to the ocean. While we have yet the gathering of scientific evidence to fully explain the harsh environmental impacts of deep sea mining, we do have a general idea that deep sea mining causes damage to the lowest levels of the ocean and increase the toxicity of the region. This permanent damage dealt also causes leaking, corrosion and oil spills that only drastically further hinder the ecosystem of the region.

6. Littering: Pollution from the atmosphere is, believe it or not, a huge source of ocean pollution. This occurs when objects that are far inland are blown by the wind over long distances and end up in the ocean. These objects can be anything from natural things like dust and sand, to man-made objects such as debris and trash. Most debris, especially plastic debris, cannot decompose and remains suspended in the oceans current for years. Animals can become snagged on the plastic or mistake it for food, slowly killing them over a long period of time. Animals who are most often the victims of plastic debris include turtles, dolphins, fish, sharks, crabs, sea birds, and crocodiles.

In addition, the temperature of the ocean is highly affected by carbon dioxide and climate changes, which impacts primarily the ecosystems and fish communities that live in the ocean. In particular, the rising levels of Co2 acidify the ocean in the form of acid rain. Even though the ocean can absorb carbon dioxide that originates from the atmosphere, the carbon dioxide levels are steadily increasing and the ocean's absorbing mechanisms, due to the rising of the ocean's temperatures, are unable to keep up with the pace.

Effects of Ocean Pollution

1. Effect of Toxic Wastes on Marine Animals: Oil spill is dangerous to marine life in several ways. The oil spilled in the ocean could get on to the gills and feathers of marine animals, which makes it difficult for them to move or fly properly or feed their children. The long term effect on marine life can include cancer, failure in the reproductive system, behavioral changes, and even death.

2. Disruption to the Cycle of Coral Reefs: Oil spill floats on the surface of water and prevents sunlight from reaching to marine plants and affects in the process of photosynthesis. Skin irritation, eye irritation, lung and liver problems can impact marine life over long period of time.

3: Depletes Oxygen Content in Water: Most of the debris in the ocean does not decompose and remain in the ocean for years. It uses oxygen as it degrades. As a result of this, oxygen levels go down. When oxygen levels go down, the chances of survival of marine animals like whales, turtles, sharks, dolphins, penguins for long time also goes down.

4: Failure in the Reproductive System of Sea Animals: Industrial and agricultural wastes include various poisonous chemicals that are considered hazardous for marine life. Chemicals from pesticides can accumulate in the fatty tissue of animals, leading to failure in their reproductive system.

5: Effect on Food Chain: Chemicals used in industries and agriculture get washed into the rivers and from there are carried into the oceans. These chemicals do not get dissolved and sink at the bottom of the ocean. Small animals ingest these chemicals and are later eaten by large animals, which then affects the whole food chain.

6. Affects Human Health: Animals from impacted food chain are then eaten by humans which affects their health as toxins from these contaminated animals gets deposited in the tissues of people and can lead to cancer, birth defects or long term health problems.

Control Measures/ Solutions for Marine Pollution

1. Be careful with our chemicals.

Climate change and marine pollution are both results of excess human interference in the natural world. If we choose eco-friendly household cleaners and take measures to reduce the fumes we release into the air (for instance, by choosing public transport over cars) we can reduce the impact of our lives on the oceans.

Further, careful site monitoring to prevent or stop any chemical or oil spills at all times will reduce the instances of oil spills.

2. Don't flush or rinse away harmful particles.

If we do not flush plastics down the toilet, and if we do not pour oils and exfoliating beads down the faucet, we prevent these particles from reaching our oceans. Switch to exfoliants that use natural materials like seeds, sugar or sand instead – and recycle all plastics!

3. Campaign.

Influence the decisions of policymakers and factory bosses to make them more eco-friendly by lobbying, writing letters, spreading the word on social media and campaigning. Motivating the shipping companies to use safe and environmentally friendly vessels are among the key measures that can be taken here.

4. Volunteer at an oil spill site.

Volunteers are always needed at oil spill sites to save the lives of marine birds by washing the oil from their feathers and caring for them until they are ready to fly, swim and dive under water again. Intervention is always needed as soon as possible to ensure that these birds do not suffer any ill effects to their health.

5. Volunteer at a beach cleanup – or organize one yourself.

Rid your local beach of litter by getting together with the rest of the community to pick up the trash left behind by careless picnickers, boat crews and more. Joining together as a community to care for the natural world is a wonderful way to remind everyone how intimately we are

connected to nature, and how much we depend on it. Working together with other people also helps to keep us motivated and reminds us that we are not alone in our quest to care for the environment.

6. Ensuring no debris is released into the ocean.

Recycling our plastics and other recyclable, and disposing of our waste responsibly is key here.

SOLID WASTE MANAGEMENT

- Waste, which is non-affective and comes from city, town or village as domestic and biomedical waste is termed as municipal solid waste
- The process of transportation, storage, collection and processing of solid waste in a protective and economic manner is termed as solid waste management.
- The above steps are followed thoroughly in waste management, its first and foremost priority is waste avoidance by minimizing it.
- To reduce waste, reuse it and recycle, it is called waste prevention.
- It is our second priority to reuse, recycles it at the maximum level.
- Once the possibility of waste prevention is exhausted, the next priority is to reduce the volume of residual waste pass on for final disposal.
- In recycling, material is separated from the garbage for the process of recycling.

For example

- Old cars are recycled in the German industry.
- Gas, oil, Chemicals and Tar are also retrieved from the old tyres.
- Papers, cans etc. are recycled to produce fresh papers.
- Glass is melted to prepare new articles.

Types

- Garbage or food waste
- Rubbish
- Agricultural waste
- Industrial waste
- Hazardous waste

Causes

- Over population - Pollution naturally increases with the growing number of persons, produce more waste.
- Affluence - The tendency to pronounce the things as fashion and check them out, when not required as out of fashion.
- Technology - Packaging of most of the gifts is considered as the source of solid waste pollution as most of these are non-biodegradable.
- Due to poor implementation of environment protection laws, urbanization, lack of awareness and lack of participation from the public, the problem of solid waste has increased at the highest level.

- Growth in consumption leads to consumption of items and on the other hand, wastes production.
- Population increase
- Growing Urbanization
- Industry
- Mining
- Transport

Effects

- Contaminates water and air, resulting into diseases and dysentery in Human beings.
- Mosquitoes breed in the stagnant water, blocked due to waste choked in the drains.
- Decomposition of solid waste spreads obnoxious odour in the air, thus polluting it.
- Burning of waste, especially plastic adds up obnoxious fumes in the air.
- Garbage dumps and decomposed waste helps many harmful species to breed in them.
- The infected water supply also leads to large scale epidemics.

Control measures

- Solid waste management include the waste generation
- Collection of solid waste
- Disposal of solid waste

Disposal

- It involves the following process:

Sanitary landfill:

- The people in the city dump around 90% of the solid waste into natural or constructed pit or depression which compacts due to the surrounding dust.

Composting:

- In this process, the materials like glass, rubber and plastic etc. are separated and the rest waste is exposed for bacterial action for decomposition for several months to produce manure.

Incineration:

- Burning of waste to warm up residential units is termed as incineration.
- It is a convenient and quick method.

Pyrolysis:

- It's the process of burning the waste in absence of 02- In it organic compounds split into gaseous and gaseous fractions (CO, C02, CH4, tar and charred carbon).

Disposal into sea:

- It's a simple and cheap method in which the solid waste is disposed under deep sea water at a remarkable distance from the coastal areas.

NUCLEAR HAZARDS

Nuclear hazards are a result of Radio active or Radiation pollution. Like noise pollution, radiation pollution is also invisible and have considered as physical type of the pollution. All organisms have been exposed to low levels of radiation from natural sources for past many years, but hazards from radiation have increased recently due to nuclear work in many fields. Radiation pollution is caused due to addition of radiation, mostly ionizing types to the environment through activities of man giving people an exposure to more such radiation than they normally would be exposed. According to Dr. H. P. Jammet from atomic energy commission, France "Increase in radiation level, emerging from activities of man involving the use of naturally occurring or artificially produced radio active materials.

Radio active material are those in which nuclear disintegrates spontaneously and giving energy in the form of radiations. Hence radiation is release of energy from the nucleus of an atom. There are two types of radiations non - ionizing and ionizing. Non ionizing radiations are the radiation of short wavelength but with more energy content. This energy can excite the atom but does not produce ions. These are harmful to micro organisms but can injure only the surface tissue of higher plants and animals. These radiations are also known to increase the rate of mutation among the organism light and radio waves are common example of non - ionizing type.

Ionizing radiations concerning mostly with the pollution are having great energy content and this energy can ionize atom and molecules both. By getting energy from radiations, electrons of atom are separated and it is called ionization. Ionization of a molecule yield charged and uncharged fragments. Uncharged fragments are called free radicals. Free radicals are chemically very reactive and the most important and the most important type of ionizing radiation from the stand point of pollution have been Alpha, Beta and Gamma radiation. Alpha radiation is made up of energetic alpha particles. These are fast moving particles having two protons and two neutrons because of positive charge they get deflected by negatively charged ions. These are less penetration in comparison to beta particles and gamma rays and X rays. The epidemic of Human skin deflects all the alpha particles to which it is exposed. Beta radiations are made up of energetic Electrons which are small but with high speed. They can ionize any matter coming in their path. Beta particles are more penetrating than alpha and cause internal damage to human body if inhaled or swallowed. Gamma radiations are made up of very energetic photon s with short wave length. Despite being uncharged, photons are able to bring about very strong interaction with matter. Many other types of ionizing radiation are also encounted less frequently but they can also be dangerous to living organisms. Protons, neutrons and deuterons with sufficient great energy are familiar example. Radiations are measured with different units like curie, roentgen, RAD and REM. Curie is the most commonly used units named after madam curie who discovered radium. It can be defined as the quantities of any radio-active material that gives 3.70*10 disintegrations per second. This unit was defined so that one gram of natural

radium together with its decay products amounted to one curie. Mill curie and micro curie units are also used. At present curie is replaced by Becquerel.

Ultraviolet and infrared radiation are also coming along with sunlight in our body, muscles during the decays of potassium, some radiation are generated. Very minute
Quantity of uranium, thorium, strontium and carbon coating are also present in the body. These radiations are mostly not harmful. Man made sources of the radiation are dangerous and includes ore processing, medical field, nuclear test, atomic power plant, fall out electric field and electronic appliances.

Radio - active Ore processing:

By mining, washing, refining and separation processes of radio-active ores like Uranium, Thorium and Radium are resulting in radio-active pollution. Pitchblende and Ureninites are common ores of the Uranium. Uranium and Thorium are mostly used in nuclear work.

Medical: Use of X -ray:-

X-Ray and radio-active isotopes use of X-ray and radio-active isotopes are becoming common in medical field. X-rays are lights penetrating like gamma rays. Improper exposure during diagnosis means Checkup due to untrained person or defects in machine results in health hazards. Similarly overdose of radio-active isotopes to patients and improper handling also result in hazards.

Nuclear Test:-

Nuclear explosion test increases radiation in Environment and long lived elements are released common long live elements includes
Strontium-90
Coesium-137
Barium-141
Iodine-131
Nuclear Power plants:-

To full fill the increasing demand of energy nuclear power plants are increasing in number throughout the world. There are about 600 nuclear power plants in developing countries and 100 alone in USA alone. Accidents in nuclear power plants results in great damage to the ecosystem. Wastes of nuclear power plants are also dangerous. Gaseous and particulates like C-14 and I-129 are released in environment as stack emission. Heavy water (Tritium) and heat are also released

from coolants. None of the nuclear power plant is perfectly safe leakage may occur from various points which are radioactive.

Radio-active fall out:-

Fall out is a process in which radio-active matter gradually settled down on earth surface after nuclear explosion or accident. Radio-active fall out contain about 200 radio -active isotopes like C-14, Sr-89, Sr-90 and CS-137. After settling they enter in food chain and food web and results in health hazards. The biological magnifications of many isotopes are also reported.

Electric field and Electronic appliances:-

Power transmission lines continuously emit low radiation in ambient environment, TV sets, mobiles and electronic toys are also release radiations in low concentration. Mobile towers are also not very safe. Radio-active pollution perspective of north Indian cities like Delhi, Gurgaon, Chandigarh, Ambala and Panipat is dangerous. Average concentration of radiation recorded was between 4000 to 5000 micro watt per square meter. 19 and 25 kilowatt x-ray tubes used in TV sets are also dangerous.

Radiation are affecting to all the organism effects are mostly depending on concentration and time period. In plants reduction of chlorophyll occurs and DNA is also affected adversely. In case of fruits and vegetables it is found that by the effect of radiation some toxic chemicals are produced. The toxic chemicals may change colour and test of fruits and vegetables. In case of animals it is found that fish-productivity is reduced and mortality of zooplankton increases. Human beings are also affected by radiation. Skin cancer called melanoma, lung cancer, breast cancer cataracts in eye and leukemia are diseases resulting from radiations. Loss of hairs, blood, blood vomiting and reduction in W.B.C. count, are common effects on human being due to the radiation. Bone marrow, reproductive system and functions of thyroid glands are adversely affected by the radiations. Dizziness headache, fever and diarrhea are also reported due to radiation exposure. Radiation into the pelvic region of pregnant women may cause damage to the fetus and this may result in birth of deformed children's. Massive doses of radiation include a collection of symptoms called as radiation sickness.

Control measures:-

Some control measures if we follow them properly then they can reduced the dangers of the nuclear hazards. During radio-active ore processing all safety measures should be applied like wet drilling and underground drainage etc. Production of radio-active isotopes should be minimum and very careful use in the laboratories. Nuclear medicines and radiation therapy

should be given with extreme care and under the supervision of an expert. Nuclear tests should be banned to control the hazardous of fall out radiations. Nuclear power plant waste should be disposed with extreme care and following all rules and regulation which are internationally made.

Establishment of nuclear power plant should be reduced and use of solar and wind energy should be promoted. Residential areas should be at a safe distance from high tension electric line and mobile towers. Electric appliances TV, mobile and computers should be used with all safety measures.

ROLE OF AN INDIVIDUAL IN PREVENTION OF POLLUTION

- Individuals should minimize wastage of resources such as electricity. Every unit of electricity saved is equivalent unit of electricity produced as it not only saves the fuel that would be used to produce that electricity, but also help to prevent pollution that is accompanied by burning of that fuel. Therefore, person should always switch off appliances when not in use.
- Individuals should prefer walking or use cycles instead of using motor vehicles, especially when distances to be travelled are small.
- Individuals can make considerable contribution by using mass transport (buses, trains, etc) instead of using personal vehicles.
- When going to workplace, colleagues from nearby localities should pool vehicles instead of going in individual personal vehicles.
- Taking personal vehicles for periodic pollution checks at centres approved by authorities.
- Individuals should reuse items whenever possible.
- Products that are made of recycled material should be given preference.
- Use gunny bags made of jute instead of plastic bags.
- Take part in environment conservation drives such as tree planting drives.
- Use water resources efficiently.
- Use renewable resources by installing equipment such as solar heaters and using solar cookers.
- Dispose potentially harmful products such as cells, batteries, pesticide containers, etc properly.
- Use of refrigerators should be minimised wherever possible as they are main source of CFC, which is responsible for Ozone layer depletion.
- Follow and promote family planning, as more population means more resources utilized and more resources utilized imply more pollution.
- Avoid making noise producing activities such as listening to loud music.
- Use handkerchiefs instead of paper tissues.
- Organize drives to clean streets and clean drains with help of other people of locality.

- Spread awareness and inspire other people to prevent pollution. Individuals should be encouraged to acquire information and innovations from world over and implement them locally.

POLLUTION – CASE STUDIES

A case study of groundwater pollution in India

An example of groundwater pollution caused by excessive extraction is that fluoride contami-nation. Fluorisis is not a localized problem. It has spread across 19 states and across a variety of ecological regions ranging from the Thar desert, the Gangetic plains and the Deccan plateau. Each of these regions are distinct in terms of rainfall, soil type, groundwater recharge regime, climatic conditions and hydrology. High fluoride concentration in groundwater is a natural phenomenon in several countries such as China, Sri Lanka, West Indies, Spain, Holland, Italy and Mexico. Experts claim that a fluoride belt stretches across the Middle East across Pakistan and India and then into Southeast Asia and the South of China. According to a report of the Rajiv Gandhi National Drinking Water mission, the bedrock of the Indian peninsula consists of a number of fluoride bearing minerals. When the bedrock weathers the fluoride leaches into water and the soil. Although the Indian penin-sular bedrock has always been the same, this problem has only surfaced during the last three decades. This is related to the over extraction of groundwater which has resulted in the tapping of aquifers with high fluoride concentrations. The beginnings of this phenomenon can be traced back to the 1970s and the 1980s when there was massive state investment in rural water development for irrigation as well as for drinking. Encouraged by state subsidies on diesel and electricity, people invested in diesel and submersible pumps in a bid to extract ground- water through borewells. This policy aggravated the fluoride problem. Fluoride mainly enters the human body through drinking water where 96 to 99 percent of it combines with the bones as it has an affinity for calcium phosphate in the bones. Excess intake of fluoride can lead to dental fluorosis, skeletal fluorosis or non-skeletal fluorosis. Dental fluo-rosis is characterized by discoloured, blackened, mottled or chalky white teeth. Skeletal fluorosis leads to severe and permanent bone and joint deformities. Non-skeletal fluorosis leads to gastro-intestinal problems and neurological dis-orders. Fluoride can damage the foetus and adversely affect the IQ of children. Once fluoride is detected in water, the only solution is to deflouridate it. Various technologies are available for this process. However the type of technology to be selected depends upon the fluoride levels in the water and the volume of water to be deflouridated. None of the Indian technologies are however fool-proof. Deflouridation plants and household water treatment kits are stop-gap solutions.

A case study of pesticide pollution in India

One of the most terrifying effects of pesticide contamination of ground water came to light when pesticide residues were found in bottled water. Between July and December 2002, the Pollution Monitoring Laboratory of the New Delhi based Center for Science and Environment (CSE) analysed 17 brands of bottled water both packaged drinking water and packaged natural mineral water commonly sold in areas that fall within the national capital region of Delhi. Pesticide residues of organochlorine and organo-phosphorus pesticides which are most commonly used in India were found in all the samples. Among organochlorines, gamma-hexachlorocyclohexane (lindane) and DDT were prevalent while among organophosphorus pesticides, Malathion and Chlorpyrifos were most common. All these were present above permissible limits specified by the European Economic Community, which is the norm, used all over Europe.

One may wonder as to how these pesticide residues get into bottled water that is manufactured by several big companies. This can be traced to several facts. There is no egulation that the bottled water industry must be located in 'clean' zones. Currently the manufacturingplants of most brands are situated in the dirtiest industrial estates or in the midst of agricultural fields. Most companies use bore wells to pump out water from the ground from depths varying from 24m to even 152 m below the ground. The raw water samples collected from the plants also reveled the presence of pesticide residues. This clearly indicated that the source of pesticide residues in the polluted groundwater are used to manufacture the bottled water. This is despite the fact that all bottled water plants use a range of purification methods. Thus obviously the fault lies in the treatment methods used. These plants use the membrane technology where the water is filtered using membranes with ultra-small pores to remove fine suspended solids and all bacteria and protozoa and even viruses. While nanofiltration can remove insecticides and herbicides it is expensive and thus rarely used. Most industries also use an activated charcoal adsorption process, which is effective in removing organic pesticides but not heavy metals. To remove pesticides the plants use re-verse osmosis and granular activated charcoal methods. Thus even though manufacturers claim to use these process the presence of pesticide residues points to the fact that either manufacturers do not use the treatment process effectively or only treat a part of the raw water. The low concentration of pesticide residues in bottled water do not cause acute or immediate effect.

However repeated exposure even to extremely miniscule amounts can result in chronic effects like cancer, liver and kidney damage, disorders of the nervous system, damage to the immune system and birth defects. Similarly six months after CSE reported pesticide residues in bottled water it also found these pesticides in popular cold drink brands sold across the country. This is because the main ingredient in a cold drink or a carbonated non-alcoholic beverage is water and there are no standards specified for water to be used in these beverages in India. There were no standards for bottled water in India till on September 29, 2000 the

Union Ministry of Health and Family Welfare issued a notification (no759(E)) amending the Prevention of Food Adulteration Rules, 1954. The BIS (Bureau of Indian Standards) certification mark became mandatory for bottled water from March 29,2001. However the parameters for pesticide residues remained ambiguous. Following the report published by CSE in Down to Earth, Vol 11, no. 18, a series of Committees were established and eventually on 18th July 2003 amend-ments were made in the Prevention of Food Adulteration Rules stating that pesticide residues considered individually should not exceed 0.0001mg.lit and the total pesticide residues will not be more than 0.0005 mg/lit that the analysis shall be conducted by using internationally established test methods meeting the residue limits specified herein. This notification came into force from January 1, 2004.

DISASTER MANAGEMENT, FLOODS, EARTHQUAKES, CYCLONES AND LAND SLIDES

Disaster is a sudden, calamitous event bringing great damage, loss, destruction and devastation to life and property. The damage caused by disaster is immeasurable and varies with the geographical location, climate and the type of the earth surface . This influences the mental, socio-economic, political and cultural state of the affected area. Generally, disaster has the following effects in the concerned areas,

1. It completely disrupts the normal day to day life
2. It negatively influences the emergency systems
3. Normal needs and processes like food, shelter, health, etc. are affected and deteriorate depending on the intensity and severity of the disaster. It may also be termed as "a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of the affected society to cope using its own resources."

Types of Disaster

Generally, disasters are of two types –

Natural and Manmade. Based on the devastation, these are further classified into major/minor natural disaster and major/minor manmade disasters. Some of the disasters are listed below,

Major natural disasters:

- Flood
- Cyclone
- Drought
- Earthquake

Minor natural disasters:

- Cold wave
- Thunderstorms
- Heat waves

- Mud slides
- Storm

Disaster prevention, mitigation and preparedness

The first important steps towards reducing disaster impact are to correctly analyse the potential risk and identify measures that can prevent, mitigate or prepare for emergencies. Information and Communication Technology can play a significant role in highlighting risk areas,vulnerabilities and potentially affected populations by producing geographically referenced analysis through, for example, a geographic information system (GIS). The importance of timely disaster warning in mitigating negative impacts can never be underestimated. For example, although damage to property cannot be avoided, developed countries have been able to reduce loss of life due to disasters much more effectively than
their counterparts in the developing world. A key reason for this is the implementation of effective disaster warning systems and evacuation procedures used by the developed countries, and the absence of such measures in the developing world.

A warning can be defined as the communication of information about a hazard or threat to a population at risk, in order for them to take appropriate actions to mitigate any potentially negative impacts on themselves, those in their care and their property.
The occurrence of a hazard does not necessarily result in a disaster. While hazards cannot be avoided, their negative impacts can be mitigated. The goal of
early public warning is to ensure to the greatest extent possible that the hazard does not become a disaster. Such warnings must be unambiguous, communicate the risks succinctly and provide necessary guidance.
The success of a warning can be measured by the actions that it causes people to take, such as evacuation or avoiding at-risk areas. In a disaster situation, there is no doubt that timely warnings allow people to take actions that saves lives, reduce damage to property and minimize human suffering. To facilitate an effective warning system, there is a major need for better coordination among the early warning providers as well as those handling logistics and raising awareness about disaster preparedness and management. While disaster warnings are meant to be a public good, they are often most effectively delivered through privately-owned communication networks and devices. There are many new communication technologies that allow warning providers not only to reach the people at risk but also to personalize their warning message to a particular situation.

Opportunities are available right now to significantly reduce loss of life and potential economic hardship if disaster warning systems can be improved. It is important to note that disaster warning is indeed a system, not a singular technology, constituting the identification, detection and risk assessment of the hazard, the accurate identification of the vulnerability of a population at risk, and finally, the communication of information about the threat to the vulnerable population in sufficient time and clarity so that they can take action to avert negative

consequences. This final component underscores the importance of education and creating awareness in the population so that they may respond with the appropriate actions.

Disaster Warning

Disaster Reduction identifies several key parties that play major roles in the disaster management process, especially in disaster warning. Communities, particularly those most vulnerable, are vital to people-centred early warning systems. Their input into system design and their ability to respond ultimately determine the extent of risk associated with natural hazards. Communities should be aware of hazards and potential negative impacts to which they a re exposed and be able to take specific actions to minimize the threat of loss or damage. As such, the geographic location of a community is an essential determinant in the selection of disasters on which the system should focus their community education. For example, coastal communities need to be educated and prepared for the possibility of a tsunami, while a mountain community can be educated to respond to an early warning system for landslides.

Local governments should have considerable knowledge of the hazards to which their communities are exposed. They must be actively involved in the design and maintenance of early warning systems, and understand information received to be able to advise, instruct or engage the local population in a manner that increases their safety and reduces the potential loss of resources on which the community depends.

National governments are responsible for policies and frameworks that facilitate early warning, in addition to the technical systems necessary for the preparation
and issuance of timely and effective hazard warnings for their respective countries. They should ensure that warnings and related responses are directed towards the most vulnerable populations through the design of holistic disaster response and early warning frameworks that address the specific needs of the related micro - and macro -level actors.

The provision of support to local communities and local governments to develop operational capabilities is an essential function to translate early warning knowledge into risk reduction practices.

Regional institutions and organizations should provide specialized knowledge and advice in support of national efforts to develop or sustain the operational capabilities of countries that share a common geographical environment. Regional organizations are crucial to linking international capabilities to the particular needs of individual countries and in facilitating effective early warning practices among adjacent countries.

International bodies should provide support for national early warning activities and foster the exchange of data and knowledge between individual countries. Support may include the provision of advisory information, technical assistance, and policy and organizational support necessary to ensure the development and operational capabilities of national authorities or agencies responsible for early warning practice.

Non-governmental organizations (NGOs) play a critical role in raising awareness among individuals and organizations involved in early warning and in the implementation of early warning systems, particularly at the community level. In addition, they play an important advocacy role to help ensure that early warning stays on the agenda of government policy makers.

The private sector has a diverse role to play in early warning, including developing early warning capabilities in their own organizations. The private sector is also essential as they are usually better equipped to implement Information and Communication Technology -based solutions. The private sector
has a large untapped potential to help provide skilled services in the form of technical manpower, know how, or donations of goods or services (in -kind and cash), especially for the communication, dissemination and response elements of early warning.

The media plays an important role in improving the disaster consciousness of the general population and in disseminating early warnings. The media can be the critical link between the agency providing the warning and the general public.
The scientific community has a critical role in providing specialized scientific and technical input to assist governments and communities in developing early warning systems. Their expertise is critical to analysing the risks communities face from natural hazards, supporting the design of scientific and systematic monitoring and warning services, fostering data exchange, translating scientific or technical information into comprehensible messages, and disseminating understandable warnings to those at risk.

Floods

A flood is an expance of water submerging land. A flood is caused by excess water in a location, usually due to rain from a storm or thunderstorm or the rapid melting of snow. A flood happens when an area of land, usually low -lying, is covered with water. The worst floods usually occur when a river overflows its banks. The flood is constituted not only of the overflowing water but also of all other waters that are unable to drain off into water channels.

Causes of floods

1)When snow on a mountain melts or when a river or a lake of some sort overflows

2)Flooding from water displacement, such as in a landslide,
3)The failure of a dam,
4)An earthquake induced tsunami,
5)A hurricane's storm surge or melt water from volcanic activity.
6)Flooding of Coastal areas by high tides or by tsunami waves caused by undersea earthquakes.
7)A flood that rises and falls rapidly with little or no advance warning is called a flash flood. Flash floods usually result from intence rainfall over a relatively small area.

Elements at risk

1) Buildings built of earth (mud),weak foundation and water soluble material.
2) Basement of buildings.
3) Utilities such as sewerage, water supply.
4)Agricultural equipment and crops, vehicles, fishing boats etc.

Effects of flood

- Physical damage - structures such as buildings get damaged due to flood water. Landslides can also take place. Top soil gets washed away
- Causalities - people and livestock die due to drowning. It can also lead to epidemics and Diseases.

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- Water supplies - Contamination of water. Clean drinking water becomes scarce.

- Crops and food supplies - shortage of food crops can be caused due to loss of entire harvest.

Flood management

Flood management involves the following activities:
1) Mapping- of the flood prone area.
2)Land use control- no major development should be permitted in the areas subjected to flooding.
3)Construction of engineered structures- strong structures to withstand flood forces. Moreover the buildings should be constructed on an elevated area and if necessary should be build on stits.
4)Flood control- it aims to reduce flood damage. It includes:

a) Flood reduction
b) Flood diversion
c) Flood proofing

For example,
London is protected from flooding by a huge mechanical barrier across the river

Thames, which is raised when the water level reaches a certain point.
Notable floods
o Jakarta on January 2007 till now is having a 1.5 M flood.whole city is affected. 80 people killed.
oThe floods in peninsular Malaysia, Sabha and Sumithra in December 2006 and January 2007 is considered to be the worst in 100 years, resulting in evaluation of over 100,000 people in the worst-hit state of Johor at its peak.
oEthiopia saw one of its worst floods in August 2006.

Cyclone

The name cyclone was first coined by Captain Henry Piddington, Chairman of Marine Court, Calcutta in 1848. It is derived from Greek word means coil of a snake. Cyclone is an meteorological phenomena in which an area of low pressure characterized by inward spiraling winds that rotate counter clockwise in the northern hemisphere and clockwise in the southern hemisphere of the earth. Near the places of their origin they are only 80 Km in diameter, but well developed cyclones have their diameter ranging from 300 to 1500 km. They move at faster rate over the oceans than over the land because the irregularities of the land surface retard their speed.

The six main types of cyclones are
Polar cyclone, polar low, extra tropical, subtropical, tropical and mesoscale.

Polar cyclone

Polar or arctic cyclones are vast areas of low pressure. A polar cyclone is a low pressure weather system usually spanning 1,000-2000 kilometers per hour, in which the air circulates in a counterclockwise fashion in the northern hemisphere.

Polar low

A polar low is a small-scale, short-lived atmosphere system (depression) that is found over the ocean areas in both the Northern and southern hemispheres. They are part of the larger class of mesoscale weather systems. Polar lows can be difficult to detect using conventional weather reports and are a hazard to high latitude operations, such as shipping and gas and oil platforms. Polar lows have been referred to by many other terms, such as comma cloud, mesocyclone, polar meso scale vortex, Arctic hurricane, Arctic low and depression.

Extra-tropical

An extra tropical cyclone sometimes inaccurately called a cyclone is a synoptic scale low pressure weather system that has neither tropical nor polar characteristics. The "extra-tropical"

refers to the fact that this type of cyclone generally occurs outside of the tropics, in the middle latitudes of the planet.These systems may also be described as "mid-latitude cyclones" or "post-tropical cyclones.

Sub-tropical

A sub -tropical cyclone is a weather system that has some characteristics of an extra-tropical cyclone. It can in a wide band of latitude, from the equator to 50°C. ZIYAD is a very dangerous cyclone now affecting Mauritius.

Tropical

A tropical cyclone is a low -pressure cyclonic storm system. It is caused by evaporated water which comes off the ocean and becomes a storm. Typical cyclones are the worst natural hazards in the tropics. They are large revolving vortices in the atmosphere extending horizontally from 150-1000 km and vertically from the surface from 12-14 km. Strong winds spiraling anti-clockwise in the Northern Hemisphere blow around the cyclone center at the low level. At the higher levels, the sense of rotation is just opposite to that at the lower level. They generally move 300-5000 km per day over the ocean. While moving over the ocean, they pick up energy from the warm water of the ocean and some of them grow into a devastating intensity. On an average, about 5-6 tropical cyclones form in the Bay of Bengal and the Arabian sea every year, out of which 2-3 may be severe. Depending on their location and strength, there are various terms by which tropical cyclones are known, such as hurricane, typhoon, tropical storm, cyclonic storm and tropical depression. They are all cyclonic storm systems that form over the oceans. Tropical cyclones can produce extremely strong winds, tornadoes, torrential rain, high waves, and storm surges. The heavy rains and storm surges can produce extensive flooding.

Although one cannot control cyclones, the effects of cyclones can be mitigated through effective mitigation policies and strategies.

- Installation Of Earth Warning Systems : Such systems fitted along the coastlines can greatly assist forecasting techniques, thus helping in early evacuation of people in the storm surge areas.
- Developing communication infrastructure Amateur Radio has today emerged as second line unconventional communications systems and is an important tool for disaster mitigation.
- Developing shelter belts: Shelter belts with plantations of trees can act as effective wind- and tide-breakers. Apart from acting as effective windbreakers and protecting soil crops from being damaged, they also prevent soil erosion.

- Developing community cyclone shelters: Cyclone shelters at strategic locations can help in minimizing the loss of human life. In the normal course of life, these shelters can be used as public utility buildings.
- Construction of permanent houses: There is a need to build appropriately-designed concrete houses that can withstand high winds and tidal waves.
- Training and education: Public awareness programs that inform the population about their response to cyclone warnings and preparedness can go a long way in reducing causalities.
- Land use control and settlement planning: Ideally, no residential and industrial units should be permitted in the coastal belt of 5 km from the sea, as it is the most vulnerable belt. No further growth of settlements in this region should be permitted. Major settlements and other important establishments should be located beyond 10 km from the sea.

Earthquakes and Mitigation Measures

Earthquake is those movements of the earth crust which make the ground vibrate and shake backward and forward. The shaking of earth crust proceeds in the form of waves from the centre of disturbance. Longitudinal waves, transverse waves and surface waves are the 3 types of waves. Earthquake may be caused by two types of forces.

1) Techtonic occurrence: techtonic occurrence like faulting, breaking of rocks, raising or sinking of layers of the earth, folding of the strata or vapour seeking to escape from the earth.

2) volcanic activity: violent eruptions and intrusion of igneous magma from below the earth.

Types of earthquake:

Volcanic earthquake: are associated with the flow of hot magma interrupting volcanoes. These happen to be localized and seldom cause any extensive damage.

Techtonic earthquake: are those which result from structural and justments inside the earth.

Plutonic earthquake:are those which have their origin at greater depths. They may also be generated in the same manner as the techtonic earthquake far belw the surface of the earth.

Effects of earthquake:

• Collapse of manmade structure like building, bridges, towers etc.

•Roads get affected due to subsidence of the ground and enormous fissures appear on land.

•Extensive landslides in hilly regions and rocky depris come down to block the path of streams.

•When earthquake are accompanied by volcanic activity, the destruction is very enormous.

Mitigation measures:

• Damage to structure can be avoided by prohibiting restriction on such earthquake prone zones.

•Power lines and pipelines can be built with extra slack where they cross such earthquake prone zones.

•New buildings should be constructed with proper earthquake resistant measures. They require secure anchoring and tight bonding of foundations, frame, outer and inner walls, floors and roofs.

•Vulnerable older building located in high risk areas might be rebuilt to withstand anticipated earth quake.

Land Slides and Mitigation Measures

In the recent years, intensive construction activity and the destabilizing forces of nature have aggravated the land Slide problem. Landslides refer to the downward sliding of huge quantities of land masses. Sliding occurs along steep slopes of hills of mountains. The rate of movement of such a mass is never constant. Landslides occur as a result of changes on a slope, sudden or gradual, either in its composition, structure, hydrology or vegetation. The changes can be due to geology, climate, weathering, changing land use and earthquakes. The causes of landslides may be grouped into two types:

•Inherent or internal causes.

•Immediate causes.

Effect of landslides:

Landslides are not only destructive to the man but also to the structures. One of the most disastrous landslides occurred in Switzerland in 1806, when great masses of loose rock and soil suddenly slide down into the valley form the mountainside. It resulted in killing of 800 persons.

Initially the Vajont Dam, was the highest arch failed due to landslide on October 9, 1963, when a rock mass of about 600 million tons slide down into the lake.

•A significant reduction in hazards caused by landslides can be achieved by Prevention of the exposure of population and facilitates by physically controlling the landslides.

•Development programs that involve modification of the topography, exploitation of natural resources and change in the balance load on the ground should not be permitted.

•Some critical measures that could be undertaken to prevent further landslides are drainage measures, erosion control measures such bamboo check-dams, terracing, jute and coir netting and rock control measures such as grass plantation, vegetated dry masonry walls, retaining walls and, most importantly, preventing deforestation and improving afforestation.

• Disasters cannot be totally prevented. However, early warning systems, careful planning and preparedness on part of the vulnerable community would help in minimizing the loss of life and property due to these disasters.

Part B- 2 Marks

1. State the effects of industrial wastes
2. State the reasons for floods.
3. What do you mean by "Disaster Management"?
4. Define Environmental pollution.
5. Discriminate between marine pollution and water pollution.
6. Short note on Cyclones
7. What is meant by Landslides?
8. List out various methods for control of air pollution.
9. What is Marine Pollution?
10. Define Noise Pollution.

Part C- 6 Marks

1. Explain in detail the causes, effects and control measures of different Environment pollutions.

2. Write note on. (a) Floods (b) Landslides (c) Cyclones
3. Discuss adverse effects and control of water pollution.
4. Discuss in detail how you would manage the solid wastes in urban areas.
5. Classify solid waste. What are the sources of urban and industrial solid wastes?
6. Give an account of noise generated during Diwali. What would you suggest to reduce this menace?
7. Discuss various sources of marine pollution. How can you prevent pollution of our oceans?
8. Enumerate various methods for control of air pollution.
9. Describe the role to be played by an individual in prevention of environmental pollution.
10. Enumerate with examples the major sources of surface water pollution and ground water pollution.

KARPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE						
DEPARTMENT OF MANAGEMENT						
UNIT 4- Environmental Pollution (Each Question Carries ONE Mark)						
S.No	**Questions**	**Opt 1**	**Opt 2**	**Opt 3**	**Opt 4**	**Answer**
1	Which of the following is not an air pollutant?	Smoke	Carbon Dioxide	Nitrogen Gas	Sulphur Dioxide	Nitrogen Gas
2	Which part of plant evaporates water ?	Stomata	Fruit	Branch	Root	Stomata
3	A fossil fuel is best described as_____	a flammable solid or gas	a fuel that contains carbon.	fossilised rock that will burn in a power station.	a flammable substance formed from ancient biological material.	a flammable substance formed from ancient biological material.

4	An example of a non-renewable, non-fossil energy resource is_____	oil.	coal.	tidal	uranium.	tidal
5	Which of the following is not a renewable energy source?	wind	solar	biomass	natural gas	biomass
6	The term ‘exothermic’ refers to a chemical reaction _____	in which heat is absorbed.	in which heat is given out.	that proceeds very rapidly.	that requires high temperatures to begin the reaction.	that requires high temperatures to begin the reaction.

7	What percentage of the coal's energy reaches the city?	approximately 30%	approximately 50%	approximately 60%	approximately 90%	approximately 90%
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	2400 kJ	1200 kj	2400 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.	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.

10	Which of the following is the best description of sulphur dioxide?	a gas less dense than air	a gas more dense than air	a gas insoluble in water	an acidic liquid at ordinary room temperature	an acidic liquid at ordinary room temperature
11	The dosage of sulphur 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.	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.
12	The toxicity of mercury is best described as_____	how mercury enters the environment.	a measure of the harm mercury does to a person.	the persistence of mercury in the environment.	how much mercury a person experiences in a given time	the persistence of mercury in the environment.

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.	chronic toxicity.	synergistic action.	chronic toxicity.
14	Which one of the following best accounts for mercury's significant harm to the environment?	persistence	degradability	specificity	synergism	synergism
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.	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

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	the habitat of endemic threatened populations has been disturbed	previously submerged heritage buildings can be investigated	previously submerged heritage buildings can be investigated
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.	water conservation.	waste minimisation.	waste minimisation.
18	The dominant gas in biogas is:_____	CH4	C2 H5	CO2	NO2	CH4

19	Maximum amount of gas found in air is ___	Oxygen	Carbon dioxide	Hydrogen	Nitrogen	Nitrogen
20	which state of matter, the distance between the molecules is minimum ?	Solid	Plasma	Liquid	Gas	Plasma
21	Which energy is converted into electrical energy by a solar cell ?	Nuclear Energy	Chemical Energy	Solar Energy	Magnetic Energy	Solar Energy

22	Carrier of Dengue disease is___	Aedes Mosquito	Culex Mosquito	Housefly	Anopheles Mosquito	Aedes Mosquito
23	Which state of India is known as 'Tiger State'?	Gujarat	West Bengal	Madhya Pradesh	Assam	Madhya Pradesh
24	Which of the following has maximum speed ?	Air	Water Current	Sound	Light	Light

25	Tobacco addiction is caused due to_____	Cocaine	Nicotine	Caffeine	Histamine	Nicotine
26	Which of the following is called artificial kidney?	dialyzer	donar kidney	tissue-matched	preserved kidney	dialyzer
27	Which of the following causes AIDS ?	Bacteria	Fungus	Retro virus	TMV	Retro virus

28	Global warming is caused due to _____	lack of rainfall	presence of a hole in ozone layer	human activities against nature	extinction of animals and plants	human activities against nature
29	The most abundant green house gas is_____	NO2	CO2	O3	SO2	CO2
30	Which is considered as a future source of power, that can meet our unlimited demand ?	Hydel power	Hydrogen	Thermal power	Solar power	Hydrogen

31	What is the rate of growth of human population ?	10 million per year	90 million per year	1 million per year	80 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	Surface impoundments	incineration	Surface impoundments
33	High level radioactive waste can be managed in which of the following ways?	Open dumping	Composting	Incineration	Dumping in sealed containers	Dumping in sealed containers

34	Which country has the maximum number of tube-wells in the world ?	America	Australia	China	India	India
35	Which of the following is a major source of thermal pollution in water bodies?	Sewage treatment plant	Solid waste disposal sites	Thermal power plant	Biogas Treatment Plant	Thermal power plant
36	Sound becomes hazardous noise pollution at decibels:	Above 80	Above 30	Above 100	Above 120	Above 80

37	Disease caused by eating fish inhabiting mercury contaminated water is:	Bright’s disease	Hiroshima episode	Mina-mata disease	Osteosclerosis	Mina-mata disease
38	Which energy is converted into electrical energy by a solar cell ?	Chemical Energy	Nuclear Energy	Solar Energy	Magnetic Energy	Solar Energy
39	Which of the following is a biodegradable waste?	Plastics	Polythene	Glass	manure	manure

40	Wildlife Week is celebrated on_____	1st October to 7th October	15th October to 2 1st October	1st June to 7th June	15th June to 21st June	1st October to 7th October
41	In which state of matter, the distance between the molecules is minimum ?	Solid	Liquid	Gas	Plasma	Solid
42	The biochemical laboratory of human body is	Stomach	Liver	Intestine	Kidney	Liver

43	The nuclear accident at Chernobyl occurred in	1966	1976	1986	1996	1986
44	Carbon monoxide is _____.	caused by ozone depletion	a major component of the atmosphere	extremely damaging to human blood	produced by plants during photosynthesis	extremely damaging to human blood
45	Which of the following has maximum speed ?	Air	Water Current	Sound	Light	Light

46	Tobacco addiction is caused due to_____	Cocaine	Caffeine	Nicotine	Histamine	Nicotine
47	Ozone layer is found in _____	Thermosphere	Stratosphere	Troposphere	Mesosphere	Stratosphere
48	Full form of CNG is _____	Common National Gas	Compressed Natural Gas	Common Natural Gas	Cirtified Natural Gas	Compressed Natural Gas

49	Renewable source of energy is _____	Coal	Petroleum	Plants	Uranium	Plants
50	Sugar is form of _____	Protein	Carbohydrate	Fat	Water	Carbohydrate
51	The mosquito repellent (coils, mats and liquids) that we generally use in our homes are:____	Pesticides	Fertilizers	Sedatives	Insecticides	Insecticides

52	Combustion of coal in power plant produces mainly ____ which is a major pollutant of air.	Sulpher Dioxide	Nitrogen Dioxide	Methane	Chloroflurocarbons	Nitrogen Dioxide
53	One of the problems that occurs as a consequence of CFC pollution is _____.	movement of toxins into lakes and rivers, which poisons fish	increasing skin cancer in humans	toxins accumulating in homes	damage to human red blood cells	increasing skin cancer in humans
54	A battery or cell converts ____ energy into electrical energy	Solar	Heat	Mechanical	Chemical	Chemical

55	In developed countries, the two most deadly sources of indoor pollution are _____.	pesticides and cleaning agents	synthetic furniture materials and radiation from electronic equipment	radiation from electronic equipment and pesticides	radon and cigarette smoke	radon and cigarette smoke
56	Which of the following plays an important role in the cause of rainfall?	Evaporation	Condensation	Both evaporation & condensation	Filtration	Both evaporation & condensation
57	Bacteria and fungal spores can be included as _____.	contributors to indoor pollutants	VOCs and POPs	sources of radon in the home	problems in degrading the ozone layer	contributors to indoor pollutants

58	Particulate matter dispersed as aerosols _____.	includes nitrogen oxides	may cause damage to respiratory tissues when inhaled	binds with hemoglobin, preventing hemoglobin's binding with oxygen	interacts only with surface tissues of humans, causing mild irritation	may cause damage to respiratory tissues when inhaled
59	Which of the following is a consequence of acidic deposition?	It increases the likelihood of low-lying ground fogs	It results in offshore eutrophication, damaging coral reefs	It creates rainwater that can damage skin cells or cause cancers	It changes soil chemistry, leaching out important minerals	It changes soil chemistry, leaching out important minerals
60	The most obvious cause of industrial smog is _____.	burning trash	fires for heating food	indoor air pollution	burning fossil fuels	burning fossil fuels

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

• 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 (CaSO4.2H2O) 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.

o Closing taps when not in use

o Repairing any leakage from pipes

o 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

o By storing in tanks or reservoirs above or below ground.

o By constructing pits, dug-we., lagoons, trench or check-dams on small rivulets

o 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.

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

• 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.

Gender equity

Gender equity is a set of actions, attitudes, and assumptions that provide opportunities and create expectations about individuals. In our definition of gender equity, gender is never separate from race, ethnicity, language, disability, income, or other diversities that define us as human beings. It offers a framework for educational reform in which all females and males

- are engaged, reflective learners, regardless of the subject
- are prepared for future education, jobs, careers, and civic participation
- set and meet high expectations for themselves and others
- develop as respectful, inclusive, and productive individuals, friends, family members, workers, and citizens
- receive equitable treatment and achieve equitable outcomes in school and beyond
- "Gender equality requires equal enjoyment by women and men of socially-valued goods, opportunities, resources and rewards."

In other words, gender equality refers to equal access to social goods, services and resources and equal opportunities in all spheres of life for both men and women. When there is gender inequality, it is women that are more likely to be disadvantaged and marginalised; but we should not ignore the negative impact that gender inequality can have on men as well. For example, societal norms regarding the appropriate behaviour for men tend to put them under pressure as regards the need to provide materially for their family, and also deny them opportunities of being more nurturing towards their children and wife. Therefore gender equality is the concern of all and changes must be brought about for both men and women. However, this is not to say that

men and women are equally affected by gender inequality. It remains true that women have the greater share of disadvantages.

However, gender equality, as defined above, does not often result in equal outcomes for men and women. Being given the same chances in life is not sufficient to bring about true equality. Women and men have different needs and experiences and accommodation should be made for these differences. For example, giving boys and girls equal access to all the courses offered in a school may not result in girls taking advantage of this opportunity if some courses are predominantly filled with male students and have only male teachers. There is still the unfortunate tendency to consider male norms as a measure for women's position. Providing women and men with the same opportunities is the first step; but for true gender equality to be achieved there is a need for gender equity.

"Gender equity is the process of being fair to women and men." (UNFPA). Women and men should not only be given equal access to resources and equal opportunities, but they should also be given the means of benefiting from this equality. This is where the concept of 'gender equity' comes into play. Gender equity implies fairness in the way women and men are treated. The different life experiences and needs of men and women are taken into consideration and compensation is made for women's historical and social disadvantages. The lower status of women in society often constitutes a handicap and provisions should be made to redress this inequality before they can take advantage of the opportunities provided. Gender equity thus serves to level the playing field and empower women. Therefore, we can say that equity is essential to achieve true equality.

The conservation ethic and traditional value systems of India

In ancient Indian traditions people have always valued mountains, rivers, forests, trees and several animals. Thus much of nature was venerated and protected. Forests have been associated with the names of forest gods and goddesses both in the Hindu religion as well as in tribal cultures. 'Tree' goddesses have been associated with specific plant species. Ficus religiosa, the peepal tree, is venerated and is thus not to be cut down. The Banyan tree in some regions such as Maharashtra, is venerated once a year by tying a thread around it as a symbol of respect. The Tulsi plant is grown on the doorstep outside every home.

Patches of forest have been dedicated to a deity in many Indian cultures especially in tribal areas. These traditionally protected forest patches depict the true nature of undisturbed vegetation and have a large number of indigenous plant species as their exploitation has been controlled through local sentiments. Certain species of trees have been protected as they are valued for their fruit or flowers. The mango tree is protected for its fruit around most farms even when wood becomes scarce. The Mohua tree (Madhuca indica) is protected by tribal people as it provides edible flowers, oil from its seeds and is used to make a potent alcohol. Many plants, shrubs and herbs

have been used in Indian medicines which were once available in the wild in plenty. These are now rapidly vanishing. Many species of animals are venerated as being the 'vahan' or vehicle of different gods on which they are said to travel through the cosmos.

In Indian mythology, the elephant is associated with Ganesha. The elephant headed Ganesha is also linked to the rat. Vishnu is associated with the eagle. Rama is linked to monkeys. In mythology, Hanuman, the monkey god, rendered invaluable help to Rama during his travels to Lanka. The Sun god, Surya, rides a horse and has a superb chariot on which he moves through the sky. The lion is linked to Durga and the blackbuck to the moon godess. The cow is associated with Krishna. Vishnu's incarnations have been represented as taking various animal forms which serially include, fish, tortoise, a boar and a dwarf, and a half man half lion form.

The associations to various plants that have been given a religious significance include Tulsi, which is linked to Lakshmi and Vishnu. The Tulsi plant is also linked to the worship of ones own ancestors. The peepal tree is said to be the tree under which Buddha attained enlightenment. It is also associated with Vishnu and Krishna. Several trees are associated with the goddess Laxmi, including Amalaki, Mango and the Tulsi shrub.

Traditions also held that these species, which were considered as an important aspect of Nature, were the basis of local life support systems and were integral to bringing about a harmonious life. In traditional societies of the past, these examples were all a part of ethical values that protected nature. As modern science based on the exploitation on nature spread into India, many of these traditions began to lose their effectiveness as measures that led to conserving nature.

Climate change - causes and effects

Climate change

Climate change refers to the sum of all statistical weather information of the atmospheric elements, with specified area over a long period of time. Climate never remains static but is a dynamic process and changes to a lesser or greater degree. Climate change is a common deviation from average as well as extreme temperatures.

The Earth's surface and lowest part of the atmosphere have warmed up to an average by almost 0.6C during the last 100 years. If the rate climate change is constant, global surface temperatures could be anywhere between 1.4 and 5.8C higher now than in 1999 by 2100. Sea level rise is projected to be between 9 and 88cm by 2100.

The United Nations Framework Convention on Climate Change (UNFCC-1992) and the Kyoto Protocol (KP-1997) represent the first steps taken by the international community to protect the

climate system from man-made interferences. Several countries have agreed to reduce greenhouse gas emissions by about 5% by 2008 to 2012. In practical terms, this means

- using resources, particularly fossil-fuel-derived energy more efficiently
- reusing and recycling products wherever possible and
- developing renewable forms of energy that are inexhaustible and do not pollute the environment

Causes of climate change

1. Variation of Earth's orbital characteristics
2. Atmospheric carbon dioxide variations
3. Volcanic eruptions and
4. Variations in solar output

Effects of climate change

Climate change has pronounced effects on every part of the Earth. It affects both living and non living components of most ecosystems on the Earth.

1. Mean Sea Level (MSL) is increased by around 1.8mm per year.
2. Many ecosystems of the world will have to adapt rapidly to the constantly changing global temperatures.
3. The rate of species becoming extinct will be increased.
4. Human health, agriculture, forestry and water resources will be affected.
5. Increasing change in surface temperatures, changing rates of evapo-transpiration and precipitation (due to climate change) will influence the hydrological cycle.
6. Frequency and intensity of extreme weather events is increased leading to unexpected flooding and drought
7. Societies experiencing social, economic and climatic stress will be worst affected and least able to adapt.

Global warming - Definition, Effects, Control and Remedial measures

Global warming is defined as the increase in temperature of Earth, that causes change in climate.

The last few centuries have seen an increase in industrial, agricultural and other human activity resulting in release of more *green house gases* in the atmosphere. These gases cause the atmosphere to trap increasing amounts of heat energy in the Earth's surface making the planet warmer than usual.

The global temperature is now 1C higher than in 1900. Predictions of future climate indicate that by the middle of the next century, the Earth's global temperature may be 1C to 3C higher than what it is today.

Researchers have checked through indirect evidence (tree rings, coral growth, ice cores) and confirmed that the warmest decade in the past 1000 years was from 1990 to 1999. The warmest year of the millenium was 1998.

The International Red Cross and Red Crescent have analyzed the past 33 years of natural disasters and 90% of them were weather related. Moreover, the occurrence of these disasters has increased in the past three decades.

Effects of Global Warming

Following are the effects of global warming:

1. More heat waves
2. Expansion of desert area
3. Natural fires in forest lands
4. More evaporation of water from oceans and water bodies
5. Melting of Ice caps in Arctic and Antarctic regions
6. More cloud formation in the atmosphere
7. Shorter and warmer winters coupled with longer and hotter summers
8. Changes in rainfall pattern
9. Rise in sea level
10. Flooding and submergence of low lying coastal areas
11. Disruption in farming
12. More drought
13. Impact on plants, animals and humans

Control and remedial measures:

Some of the remedial and control measures of global warming are listed below:

1. Reduction in consumption of fossil fuels such as coal and petroleum

2. Use of bio-gas plants
3. Use of nuclear power plants
4. Increasing forest cover
5. Use of unleaded petrol in automobiles
6. Installation of pollution controlling devices in automobiles (catalytic converter) and industries (Electro Static Precipitators, Bag filters, Wet scrubbers etc)

Acid rain - Formation, Effects and Control measures

Acid rain

Normally rain water is slightly acidic due to the fact that CO2 present in the atmosphere gets dissolved in it. Because of the presence of Oxides of Nitrogen and Sulphur (NOx and SOx) as pollutants in the atmosphere, the pH of rain water is lowered further. This type of precipitation of water is called acid rain or acid deposition.

Formation of Acid Rain

Acid rain means the presence of excessive acids in rain water. Thermal power plants, industries and vehicles release nitrous oxide and sulphur dioxide into the atmosphere by burning of coal and oil. When these gases react with water vapour in the atmosphere, they form acids and descend on Earth as "acid rain" through rain water.

$SOx + H2O = H2SO4$

$NOx + H2O = HNO3$

Due to the drifting of these gases in the atmosphere by wind, their presence is felt as far as 2000 km away. Air pollution in one nation can cause acid rain in another nation.

Effects of Acid Rain

Effect of acid rain on human beings:

1. Acid rain has been found to be very dangerous to living organisms as it can destroy life. Human nervous system, respiratory system and digestive system are affected by acid rain.

2. It can also cause premature death from heart and lung disorders such as asthma and bronchitis

Effect of acid rain on buildings

1. The '**Taj Mahal**' in Agra is affected from the acid fumes being emitted from 'Mathura Refinery'. Crystals of CuSO4 and MgSO4 are formed as a result of corrosion due to acid rain.
2. Acid rain corrodes houses, monuments, statues, bridges and fences.

Ozone layer depletion

Ozone layer depletion process

Ozone is a colourless, odorless gas composed of three atoms of oxygen (O3). Ozone has the same chemical structure regardless of where it occurs and can be useful or harmful depending on where it occurs in the atmosphere. Ozone is formed naturally in the *upper stratosphere* when wavelengths less than 240nm are absorbed by normal oxygen molecules which dissociate to give O atoms. The O atoms in combination with other oxygen molecules produce ozone. In the stratosphere, about 19 to 30 km above the Earth's surface, ozone is constantly being produced and destroyed naturally. This production and destruction makes stratosphere with ozone layer that filters the Ultra-Violet radiation from the Sun and protects life on Earth. Normally there is a fine balance between production and destruction of ozone thereby safeguarding life on Earth.

Man-made chemicals called *Chloro Fluoro Carbons*(**CFC**s) are used as aerosol sprays, refrigerants and coolants etc destroy ozone molecules in the stratosphere. The CFCs themselves do not destroy ozone molecules but they decay ozone molecules at low temperatures. A small amount of chlorine atom and chlorine mono-oxide function as catalyst in the process of destruction of ozone. The equations involved are:

$Cl + O3 = ClO + O2$

$ClO + O = Cl + O2$

Hence, net effect:

$O3 + O = 2O2$

Chlorine atom in the above reaction functions as a catalyst and is not consumed in the reaction. Chlorine atom used in the reaction remains as chlorine atom even at the end of the reaction. Once chlorine has broken one ozone molecule, it is free to repeat the process until it is removed by another reaction in the atmosphere. Chloro-Fluoro-Carbons are very stable molecules and can live upto 100 years.

Ozone Depletion Potential (ODP)

The ozone depletion potential of a compound is defined as the measure of its ability to destroy stratospheric ozone.

It may be defined as the **ratio** of *total amount of ozone destroyed by a particular agent* to *the amount of ozone destroyed by the same mass of* ***CFC-11***.

The ODP of CFC-11 is always taken as 1.0

ODP is a relative measure with CFC-11 taken as a standard reference. Therefore, if the ODP of a compound is 0.5, it is roughly speaking *half as 'bad'* as CFC-11.

Factors affecting ODP

1. Nature of the halogen (Bromine containing halocarbons usually have much higher ODPs than hydrocarbons. This is because Bromine is an effective ozone destruction catalyst than Chlorine)
2. The number of chlorine or bromine atoms in a molecule.
3. Molecular mass and
4. Atmospheric lifetime

Dobson Unit

Dobson Unit (DU) is the scale for measuring the total amount of ozone occupying a column

overhead. One Dobson Unit (1DU) is defined as 0.01mm at 0C and 1 atmospheric pressure. If the ozone layer thickness when compressed to 0C and 1 atmosphere pressure is about 5mm, the average amount of ozone would be about 500 DU.

Harmful effects of ozone layer depletion

Ozone layer protects all life forms on Earth from the Sun's harmful UV radiation. Any significant decrease in the amount of ozone in the stratosphere results in the amount of UV radiation reaching the Earth's surface leading to harmful effects on all living organisms.

Effects on human health

1. Reddening of skin in sun shine (Sun burn)
2. Skin cancer
3. Reduction in body's immunity to disease
4. Eye disorders like cataracts and blindness

Other living organisms

1. UV rays are particularly harmful to small plants and animals living in the sea called *'plankton'*. Plankton forms the base of ocean food chain
2. UV rays damage certain crops like rice which is the staple food for many people in the world
3. UV radiation can damage polymers used in paint, clothing and other materials.

Nuclear Accidents and Holocaust: Definition, Causes and Consequences of Accidents

A nuclear and radiation accident is defined by the International Atomic agency as an "event that has led to significant consequences to people, the environment or the facility". Examples include lethal effects to individuals, large radioactivity release to the environment, or "reactor core melt."

The prime example of a "major nuclear accident" is one in which a reactor core is damaged and significant amounts of radiation are released, such as in the Chernobyl Disaster in 1986. The

impact of nuclear accidents has been a topic of debate practically since the first nuclear reactors were constructed. It has also been a key factor in public concern about nuclear facilities.

Some technical measures to reduce the risk of accidents or to minimize the amount of radioactivity released to the environment have been adopted. Despite the use of such measures, "there have been many accidents with varying impacts as well near misses and incidents".

Benjamin K. Sovacool has reported that worldwide there have been 99 accidents at nuclear power plants. Fifty-seven accidents have occurred since the Chernobyl disaster, and 57% (56 out of 99) of all nuclear-related accidents have occurred in the USA.

Serious nuclear power plant accidents include the Fukushima Daiichi nuclear disaster (2011), Chernobyl disaster (1986), Three Mile Island accident (1979), and the SL-1 accident (1961). Stuart Arm states, "apart from Chernobyl, no nuclear workers or members of the public have ever died as a result of exposure to radiation due to a commercial nuclear reactor incident."

Nuclear-powered submarine mishaps include the K-19 reactor accident (1961), the K-27 reactor accident (1968), and the K-431 reactor accident (1985). Serious radiation accidents include the Kyshtym disaster, Wind scale fire, radiotherapy accident in Costa Rica, radiotherapy, and radiation accident in Morocco, Goiania accident, radiation accident in Mexico City, radiotherapy unit accident in Thailand, and the Mayapuri radiological accident in India.

Two of the major nuclear accidents are as follows:

(i) Chernobyl Nuclear Disaster:

26th of April 1986 witnessed one of the world's worst Nuclear Disaster ever in Chernobyl. Chernobyl is approximately 80 miles (which is 120 kilometers) north of the capital city of the Ukraine, Kiev. The accident took lives of 30 people immediately and vast evacuation of 135000 people within 20 mile radius of the power plant was carried out after the accident.

Causes of the Accident:

There was not one cause of this accident, there were several which all contributed to it. This accident happened while testing an RMBK reactor. A chain reaction occurred in the reactor and

got out of control, causing explosions and a huge fireball which blew off the heavy concrete and steel lid on the reactor.

These are the causes:

1. Design fault in RBMK reactor

2. A violation, of procedures

3. Breakdown of communication

4. Lack of a 'Safety Culture' in the power plant.

Consequences of the Accident:

1. Environmental consequences:

The radioactive fallout caused radioactive material to deposit itself over large areas of ground. It has had an effect over most of the northern hemisphere in one way or another. In some local ecosystems within a 6 mile (10 km) radius of the power plant the radiation is lethally high especially in small mammals such as mice and coniferous trees. Luckily within 4 years of the accident nature began to restore itself, but genetically these plants may be scarred for life.

2. Health effects:

Firstly, there was a huge increase in Thyroid Cancer in Ukrainian children (from birth to 15 years old). From 1981-1985 there was an average of 4-6 patients per million but between 1986 and 1997 this increased to an average of 45 patients per million.

It was also established that 64% of Thyroid Cancer patients lived in the most contaminated areas of the Ukraine (Kiev province, Kiev city, provinces of Rovno, Zhitomir, Cherkassy and Chernigov).

3. Psychological consequences:

There has been an increase in psychological disorders such as anxiety, depression, helplessness and other disorders which lead to mental stress. These disorders are not a consequence of radiation, but a consequence from the stress of evacuation, the lack of information given after the accident and the stress of knowing that their health and their children's health could be affected.

4. Economic, political and social consequences:

The worst contaminated areas were economically, socially and politically declining as the birth rate had decreased and emigration numbers had substantially risen which had caused a shortage in labour force. These areas could not evolve industrially or agriculturally because of strict rules that were introduced because the area was too contaminated.

The few products made were hard to sell or export because people were aware that it had come from the Ukraine and so were scared of being affected, this caused a further economic decline. Socially people have been limited on their activities making everyday life very difficult.

Now in the year 2000, everything is looking a lot better and is starting to rise again and probably in about 10 years time almost everything will be as good as normal in the Ukraine.

(ii) Fukushima Daiichi Nuclear Disaster:

The Fukushima Daiichi nuclear disaster was a series of equipment failures, nuclear meltdowns, and releases of radioactive materials at the Fukushima I Nuclear Power Plant, following the Tohoku earthquake and tsunami on 11 March, 2011. It is the largest nuclear disaster since the Chernobyl disaster of 1986.

The plant comprises six separate boiling water reactors originally designed by General Electric (GE), and maintained by the Tokyo Electric Power Company (TEPCO). At the time of the quake, Reactor 4 had been de-fuelled while 5 and 6 were in cold shutdown for planned maintenance.

The remaining reactors shut down automatically after the earthquake, and emergency generators came online to control electronics and coolant systems. The tsunami resulted in flooding of the rooms containing the emergency generators.

Consequently those generators ceased working, causing eventual power loss to the pumps that circulate coolant water in the reactor. The pumps then stopped working, causing the reactors to overheat due to the high decay heat that normally continues for a short time, even after a nuclear reactor shut down.

The flooding and earthquake damage hindered external assistance. In the hours and days that followed. Reactors 1, 2 and 3 experienced full meltdown. As workers struggled to cool and shut down the reactors, several hydrogen- air chemical explosions occurred.

The hydrogen gas was produced by high heat in the reactors causing a hydrogen-producing reaction between the nuclear fuel metal cladding and the water surrounding them. The government ordered that seawater be used to attempt to cool the reactors this had the effect of ruining the reactors entirely. As the water levels in the fuel rods pools dropped, they began to overheat. Fears of radioactivity releases led to a 20 km (12 mi)-radius evacuation around the plant.

During the early days of the accident workers were temporarily evacuated at various times for radiation safety reasons. Electrical power was slowly restored for some of the reactors, allowing for automated cooling.

Wastelands: Classification and Reclamation of Wasteland

Wastelands are lands which are unproductive, unfit for cultivation, grazing and other economic uses due to rough terrain and eroded soils. The lands which are waterlogged and saline are also termed as wastelands. The loss of fertility followed by erosion also leads to the conversion of marginal forest lands into wastelands.

Land is an important resource since it is put to different uses by man. India has a land area of nearly 32.88Xkm^2 which is about 2.4 percent of the world. Loss of vegetation cover leads to loss of soil through erosion, which ultimately creates wastelands.

Wastelands are lands which are unproductive, unfit for cultivation, grazing and other economic uses due to rough terrain and eroded soils. The lands which are waterlogged and saline are also termed as wastelands. The loss of fertility followed by erosion also leads to the conversion of marginal forest lands into wastelands.

In the absence of land management policy, geomorphic processes become active due to which soil layers are eroded and transported, making these lands infertile, stony and useless. This is one of the pressing problems of one country as loss of soil has already ruined large amounts of cultivable lands.

If it remains unchecked it will affect the remaining lands. Hence, conservation of soil, protecting the existing cultivable lands and reclaiming the already depleted wastelands figure predominantly among the priority tasks of planning for the future.

It is reported that every year about 3 million hectares of cropland are ruined by various kinds of erosion. About 4 million hectares are converted into deserts and 8 million hectares are taken away for non-agricultural purposes such as plots for houses, roads, factories and reservoirs. The deforestation leads to soil erosion and the eroded soils exhibit droughty tendency.

Further, the falling trees aggravate the lowering of water table and dry conditions. The loss of fertility followed by erosion also leads to the transformation of marginal forest lands into wastelands.

Classification of Wastelands:

The wastelands are broadly classified into two categories:

1. Barren and uncultivable wastelands:

These lands cannot be brought under cultivation or economic use except at a very high cost, whether they exist as isolated pockets or within cultivated holdings. Such lands are sandy deserts, gully land, stony or leached land, lands on hilly slopes, rocky exposures etc.

2. Cultivable wastelands:

These lands are not cultivated for five years or more. It consists of lands available for cultivation, but not used for cultivation. Next to fallow lands, cultivable wastelands are important for agricultural purposes, because they can be reclaimed through conservational methods for cultivation, grazing or Agroforestry.

Maximum wasteland areas in our country lie in Rajasthan anthropogenic activities leading to wasteland formation are deforestation, overgrazing, mining and intensive agricultural practices.

Reclamation of Wastelands:

The different methods used for the reclamation of wastelands are:

1. These lands can be brought under cultivation by using excess water and fertilizers.

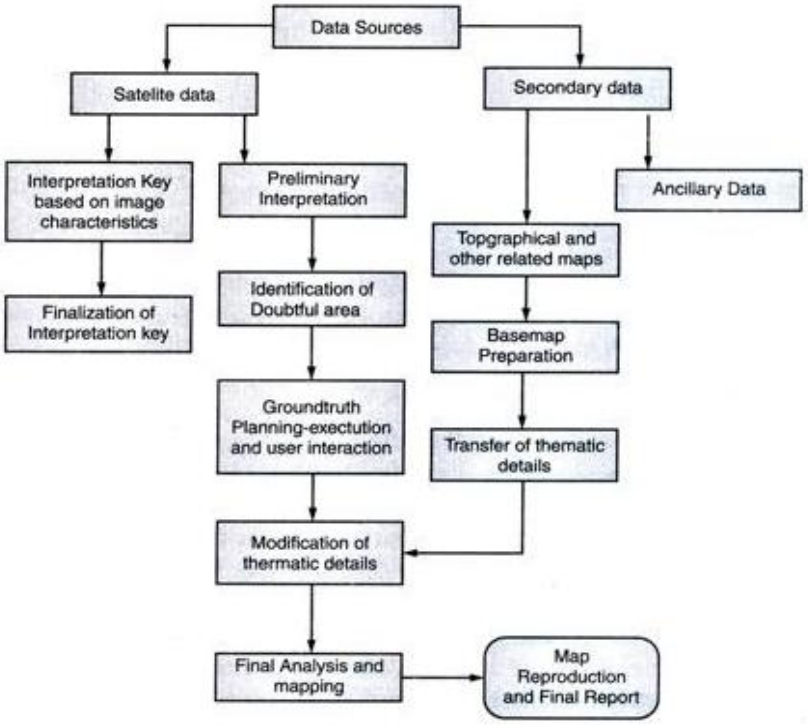
2. Afforestation and agronomical methods are used to conserve the soil, which help us to use it for agriculture.

3. Contour bunds are constructed which afford safe disposal of water of the catchment areas.

4. These lands can be used for settling the landless agricultural laborers.

For effective developmental planning for wastelands, correct assessment is needed, which is being taken up by various Land use development boards and organizations across the globe using new technologies like remote sensing and Geographic Information System (GIS) techniques.

It is being strongly felt that wastelands need to be mapped at sufficiently large- scale. Further to mapping, a detailed action plan can be generated for reclamation of wastelands with due regard to other resource information.



Consumerism and waste products

- Consumerism is related to the constant purchasing of new goods, with little attention to their true need, durability, product origin, or the environmental consequences of their manufacture and disposal.
- Consumerism interferes with the sustainable use of resources in a society by replacing the normal common sense desire for an adequate supply of life's necessities, with and insatiable quest for things that are purchased by larger and larger incomes to buy them.
- Especially in developed countries, landfills are being rapidly filled with cheap discarded products that fail to work within short time and cannot be repaired.
- In many cases, consumer products are made psychologically obsolete by advertising industry long before they actually wear out.
- The inordinate amount of waste that is generated by consumer-oriented societies around the world is now a serious environmental issue.
- Most human activities are related to production and consumption cycle which produce excessive amounts of waste in the form of solid, liquid and gaseous waste products.
- With the advent of and industrial civilization, the highly complex technological processes for production of goods have rapidly increased problems due to inadequate waste disposal.
- With the rapid increase in population, the amount of waste in terms of quantity and quality has increased waste management pressure many-fold in recent years.
- Our health will be affected by dangerous industrial effluents, and be will be smothered by clouds of smoke and unhealthy gases. Therefore, the reuse of goods and waste utilization should become a part of the production-consumption cycle.
- For example, it is estimated that the per capita production of domestic waste is many times higher in a developed country hence compared to a developing country.
- Large quantities of solid, liquid and gaseous waste is produced by urban industrial communities in the form of plastic, paper, leather, tin cans, bottles, mineral refuse, and pathological waste from hospitals.
- Dead animals, agricultural wastes, fertilizer and pesticide overuse, and human and animal excreta are essentially rural concerns.
- This attitude towards waste has led to disastrous effects on the environment besides the overexploitation of natural resources.

Environmental Protection Act of 1986

The Act came into force on Nov. 19, 1986, the birth anniversary of our Late Prime Minister Indira Gandhi, who was a pioneer of environmental protection issues in our country. The Act extends to whole of India.

Some terms related to environment have been described as follows in the Act:

(i) Environment includes water, air and land and the inter-relationships that exist among and between them and human beings, all other living organisms and property.

(ii) Environmental pollution means the presence of any solid, liquid or gaseous substance present in such concentration, as may be, or tend to be, injurious to environment.

(iii) Hazardous substance means any substance or preparation, which by its physio-chemical properties or handling is liable to cause harm to human beings, other living organisms, property or environment.

The Act has given powers to the Central Government to take measures to protect and improve environment while the state government coordinates the actions. The most important functions of Central Govt, under this Act include setting up of:

(a) The standards of quality of air, water or soil for various areas and purpose.

(b) The maximum permissible limits of concentration of various environmental pollutants (including noise) for different areas.

(c) The procedures and safeguards for the handling of hazardous substances in different areas.

(d) The prohibition and restriction on the location of industries and to carry on process and operations in different areas.

(e) The procedures and safeguards for the prevention of accidents which may cause environmental pollution and provide remedial measures for such accidents.

The power of entry and inspection, power to take sample etc. under the act lies with the Central Government or any officer empowered by it.

For the purpose of protecting and improving the quality of the environment and preventing and abating pollution, standards have been specified under Schedule- I-VI of Environment (Protection) Rules, 1986 for emission of gaseous pollutants and discharge of effluents/waste water from industries.

These standards vary from industry to industry and also vary with the medium into which the effluent is discharged or the area of emission, for instance, the maximum permissible limits of B.O.D. (Biochemical Oxygen Demand) of the waste water is 30 ppm if it is discharged into inland waters, 350 ppm if discharged into' a public and 100 ppm, if discharged on to land or coastal region. Likewise emission standards vary in residential, sensitive and industrial area.

Under the Environmental (Protection) Rules 1986 the State Pollution Boards have to follow the guidelines provided under Schedule VI, some of which are as follows:

(a) The have to advise the Industries for treating the waste water and gases with the best available technology to achieve the prescribed standards.

(b) The industries have to be encouraged for recycling and reusing the wastes.

(c) They have to encourage the industries for recovery of biogas, energy and reusable materials.

(d) While permitting the discharge of effluents and emissions into the environment, the State Boards have to take into account the assimilative capacity of the water body.

(e) The Central and State Boards have to emphasize on the implementation of clean technologies by the industries in order to increase fuel efficiency and reduce the generation of environmental pollutants.

Under the Environment (Protection) Rules, 1986 the Central Government also made Hazardous Wastes (Management and handling) Rules 1989. Under these rules it is the responsibilities of the occupier that such wastes are properly handled and disposed off without any adverse effects.

There are 18 Hazardous Waste categories recognized under this rule and there are guidelines for their proper handling, storage, treatment, transport and disposal which should be strictly followed by the owner.

The Environment (Protection) Act, 1986 has also made provision for environmental Audit as a means of checking whether or not a company is complying with the environmental laws and regulations.

Air Prevention and Control of Pollution Act (1981)

The Act specifically empowers State Government to designate air pollution areas and to prescribe the type of fuel to be used in these designated areas. According to this Act, no person

can operate certain types of industries including the asbestos, cement, fertilizer and petroleum industries without consent of the State Board.

The Board can predicate its consent upon the fulfillment of certain conditions. The Air Act apparently adopts an industry wide "best available technology" requirement. As in the Water Act, courts may hear complaints under the Act only at the instigation of, or with the sanction of, the State Board.

The Government passed this Act in 1981 to clean up our air by controlling pollution. It states that sources of air pollution such as industry, vehicles, power plants, etc., are not permitted to release particulate matter, lead, carbon monoxide, sulfur dioxide, nitrogen oxide, volatile organic compounds (VOCs) or other toxic substances beyond a prescribed level.

To ensure this, Pollution Control Boards (PCBs) have been set up by Government to measure pollution levels in the atmosphere and at certain sources by testing the air. This is measured in parts per million or in milligrams or micrograms per cubic meter.

The particulate matter and gases that are released by industry and by cars, buses and two wheelers is measured by using air-sampling equipment. However, the most important aspect is for people themselves to appreciate the dangers of air pollution and reduce their own potential as polluters by seeing that their own vehicles or the industry they work in reduces levels of emissions.

This Act is created to take appropriate steps for the preservation of the natural resources of the Earth which among other things includes the preservation of high quality air and ensures controlling the level of air pollution.

The main objectives of the Act are as follows:

(a) To provide for the prevention, control and abatement of air pollution.

(b) To provide for the establishment of central and State Boards with a view to implement the Act.

(c) To confer on the Boards the powers to implement the provisions of the Act and assign to the Boards functions relating to pollution.

Air pollution is more acute in heavily industrialized and urbanized areas, which are also densely populated. The presence of pollution beyond certain Limits due to various pollutants discharged through industrial emission is monitored by the PCBs set up in every state.

Powers and Functions of the Boards:

Central Pollution Board:

The main function of the Central Board is to implement legislation created to improve the quality of air and to prevent and control air pollution in the country.

The-Board advises the Central Government on matters concerning the improvement of air quality and also coordinates activities, provides technical assistance and guidance to State Boards and lays down standards for the quality of air. It collects and disseminates information in respect of matters relating to air pollution and performs functions as prescribed in the Act.

State Pollution Control Boards:

The State Boards have the power to advise the State Government on any matter concerning the prevention and control of air pollution. They have the right to inspect at all reasonable times any control equipment, industrial plant, or manufacturing process and give orders to take the necessary steps to control pollution.

They are expected to inspect air pollution control areas at intervals or whenever necessary. They are empowered to provide standards for emissions to be laid down for different industrial plants with regard to quantity and composition of emission of air pollutants into the atmosphere.

A State Board may establish or recognize a laboratory to perform this function. The State Governments have been given powers to declare air pollution control areas after consulting with the State Board and also give instructions to ensure standards of emission from automobiles and restriction on use of certain industrial plants.

Penalties:

The persons managing industry are to be penalized if they produce emissions of air pollutants in excess of the standards laid down by the State Board. The Board also makes applications to the court for restraining persons causing air pollution.

Whoever contravenes any of the provision of the Act or any order or direction issued is punishable with imprisonment for a term which may extend to three months or with a fine of Rs.

10,000 or with both, and in case of continuing offence with an additional fine which may extend to Rs 5,000 for every day during which such contravention continues after conviction for the first contravention.

Water Prevention and Control of Pollution Act (1974)

The government formulated this act in 1974 to prevent the pollution of water by industrial, agricultural and household wastewater that can contaminate our water sources. Wastewaters with high levels of pollutants that enter wetlands, rivers, lakes, wells as well as the sea are serious health hazards.

Controlling the point sources by monitoring the levels of different pollutants is one way to prevent pollution, by punishing the polluter. Individuals can also do several things to reduce water pollution such as using biodegradable chemicals for household use, reducing the use of pesticides in gardens, and identifying polluting sources at work places and in industrial units where oil are or other petroleum products and heavy metals are used.

Excessive organic matter, sediments and infecting organism from hospital wastes can also pollute our water. Citizen needs to develop a watchdog force to inform authorities to appropriate actions against different types of water pollution. However, preventing pollution is better than trying to cure the problems it has created, or punishing offenders.

The main objectives of the Water Act are to provide for prevention, control and abatement of water pollution and the maintenance or restoration of the wholesomeness of water. It is designed to assess pollution levels and punish polluters. The Central Government and State Government have set up PCBs to monitor water pollution.

The Water Act, 1974 with certain amendments in 1978 is an extensive legislation with more than sixty sections for the prevention and control of water pollution. Among other things, the Act provides for constitution of central and State Boards for preventing water pollution, power to take water samples and their analysis, discharge of sewage or trade effluents, appeals, revision, minimum and maximum penalties, publication of names of offenders, offences by companies and Government departments, cognizance of offences, water laboratories, analysis etc.

Prevention and control of water pollution is achieved through a permit or 'consent administration' procedure. Discharge of effluents is permitted by obtaining the consent of the State Water Board, subject to any condition they specify. Any person who fails to comply with a directive of the State cannot, however, entertain in suit under this Act unless the suit is brought by, or with the sanction of the State Board.

Water Pollution Cess Act, 1977 According to this Act, anyone consuming water has to pay certain amount of cess depending on:

1. Whether the industry is using water for industrial cooling, spraying in mine pits or boilers feed,

2. For domestic purposes.

3. In processing, whereby water gets polluted and pollutants are easily biodegradable.

4. In processing whereby water gets polluted and the pollutants are not easily bio-degradable and are toxic.

Those industries that had installed a suitable treatment plant for the treatment of industrial effluents can get a rebate of 70 per cent on the cess payable.

Wildlife Protection Act (1972)

The Wildlife Act was passed in 1972 to protect the wildlife and their habitats. The habitat destruction due to agriculture, industries, urbanisation and other human activities had led to the erosion of the country's wildlife.

The major activities and provisions in the act can be summed up as follows:

1. It defines the wildlife related terminology.

2. Enactment of an All India Wildlife Protection Act (1972).

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

4. Becoming a party to the Convention of International Trade in Endangered Species of Fauna and Flora (CITES, 1976).

5. Launching a "national component of UNESCO's 'Man and Biosphere Programme' (1971).

6. Under the Act, comprehensive listing of endangered wildlife species was done for the first time and prohibition of hunting of the endangered species was mentioned.

7. Protection to some endangered plants.

8. The Act provides for setting up of National Parks, Wildlife Sanctuaries etc.

9. The Act provides for the constitution of Central Zoo Authority.

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

11. The act imposes a ban on the trade or commerce in scheduled animals.

12. It provides for legal powers to officers and punishment to offenders.

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 stated under this Act. The Act is adopted by all states in India except J & K, which has its own Act.

Some of the major drawbacks of the Act include mild penalty to offenders, illegal wildlife 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.

Forest Conservation Act of 1980

The Forest Conservation Act was passed in 1980 to provide for the conservation of forests and tor matters connected therewith. The Act extends in whole of India except the State of Jammu & Kashmir and is in force from 25th October 1980.

The Act which was subsequently amended in 1988 (69 of 1988) have the following sections:

1. Extent and commencement.

2. Restriction on the conservation of forests of use of forest land for non-forest purpose.

3. Constitution of advisory committee.

(A) Penalty for conservation of Act.

(B) Offences by authorities and government departments.

4. Power to make rules.

5. Repeal and saving.

Sections 3 (A) and 3 (B) were added through the amendments of 1988, which deal with penalty for conservation of the provisions of the Act and offences by authorities and Government Department, respectively.

Salient Features of the Act: The Forest Conservation Act was enacted with a view to check further deforestation, which ultimately results in ecological imbalances, accordingly the provisions made therewith must apply to all forest irrespective of the nature of ownership for classification thereof.

The world forest covers all statutorily recognized forests whether designated as reserved, protected or otherwise for Section 2 (i) of the Act. The term forest land included any area recorded as forest in the Government record irrespective of the ownership.

The salient features of the Act are as follows:

1. The act places restrictions on the power of the State Government concerning preservation of forests or use of forest land for non-forest purposes. Section 2 of the Act provides that the State Government shall not make amendments except with the prior approval of the Central Government or any order directing thereon:

(i) That any reserved forest or any portion thereof, shall cease to be reserved.

(ii) That any forest land or any portion thereof may be used for any non-forest purpose.

(iii) That any forest land or any portion thereof may be assigned by way of lease of otherwise to any private person or non-Government body.

(iv) That any forest or any portion thereof may be cleared of trees which have grown naturally in that land for the purpose of using it for reforestation.

2. The Act provides for the constitution of advisory committee to advise the Government with regard to the grant of approved by the Central Government (Sec. 2) or any other matter connected with conservation of forests which may be referred to it by the Central Government (Sec.3)

3. As per Section 2 of the Act, all ongoing non-forest activities within any forest, in any State throughout the country, without prior approval of the Centre, must cease forthwith.

4. On violation of the provision of Section 2, the offender shall be punishable with imprisonment for a period extending to 15 days (Section 3-A). Any government department or any authority deemed to be guilty of the offence shall be liable to be proceeded against and punished accordingly.

5. The amendment of 1988 shattered all the expectations of tribal communities and many voluntary agencies placed all the forest land under the jurisdiction of the forest department.

For the purpose of section 2 of the Act, non-forest purpose means the breaking up or clearing of any forest land or portion thereof for:

(a) The cultivation of tea, coffee, spices, rubber, palms, oil-bearing plant, horticulture crops or medicinal plants.

(b) Any purpose other than reforestation, but does not include any work relating to ancillary conservation, development and management of forest and wildlife, namely, the establishment of check posts, fire-lines, wireless communication and construction of fencing, bridges and culverts, dams, waterholes, trench marks, boundary marks, pipelines or other like purposes.

In conclusion the forest should be looked upon as a source of revenue. Forests are renewable natural sources.

These are national assets to be protected and enhanced for the well being of the people and Nation.

Issues Involved in Enforcement of Environmental Legislation in India

Some of the important issues involved in enforcement of environmental legislation in India are as follows: 1. The precautionary principle, 2. The polluter-pays principle, 3. Freedom of information

The environmental issue in India looks gloomy despite so many Legislations and Acts. The rivers and lakes continue to be choked with industrial waste and sewage. The air in many cities of India is heavily polluted. Deforestation takes place quite normally. The protection of wildlife is not carried out in its true spirit, despite the enforcement of Acts.

The people must be guided and helped to establish the trend of acceptance of preventing the environment as a whole, our health and Earth's resources, The presence of legislation to protect the air, water, soil etc., doesn't necessarily mean the problem is addressed.

Once the legislation is made at the global, national or state level, it has to be implemented. For environmental legislation to be successfully implemented there has to be an effective agency to collect relevant data, process it and pass it on to a law enforcement agency. If the law or rule is broken by an individual or institution, this has to be punished through the legal process.

The Government of India constituted a Central Board for prevention and control of water pollution after the Water Act, 1974 was passed. Subsequently Air (Prevention and Control of Pollution) Act 1986 was passed. The Central Board for prevention and control of water pollution was entrusted to manage the affairs enumerated in Air Act, 1986 and Environment Act, 1986.

Several other acts and rules were enacted. All the state governments also constituted pollution central boards in their respective states and accepted the central legislation in their respective legislative assemblies. Some of the pollution monitoring is carried out by other agencies, e.g., vehicular pollution is monitored by transport department. This is a real drawback because several agencies cannot control pollution.

Environmental litigation is more expensive than other types of disputes, as it involves expert testimony and technical evidence central and state boards must be able to afford the expertise and the administrative backing.

So, efforts are made to share the costs of anti-pollution measures taken by the industry to avoid state sponsored expensive and lengthy legal battles. The laws enacted by the government should be made very stringent and harsh so that every citizen may not dare to play with the environment and instead he/she should protect it.

Three issues that are especially important for environmental legislation are:

1. The precautionary principle:

This principle has evolved to deal with risks and uncertainties faced by environmental management. The principle implies that an ounce of prevention is worth a pound of cure it does not prevent problems but may reduce their occurrence and helps ensure contingency plans are made.

The application of this principle requires either cautious progress until a development can be judged 'innocent', or avoiding development until research indicates exactly what the risks are, and then proceeding to minimize them.

Once a threat is identified, action should be taken to prevent or control damage even if there is uncertainly, about whether the threat is real. Some environmental problems become impossible or costly to solve if there is delay, therefore waiting for research and legal proof is not costless.

2. The polluter-pays principle:

In addition to, the obvious the polluter pays for the damaged caused by a development this principle also implies that a polluter pays for monitoring and policing. A problem with this approach is that fines may bankrupt small businesses, yet be low enough for a large company to write them off as an occasional overhead, which does little for pollution control.

There is, thus, debate as to whether the principle should be retrospective. Developing nations are seeking to have developed countries pay more for carbon dioxide and other emissions controls, arguing that they polluted the global environment during the Industrial Revolution, yet enjoy the fruits of invention from the era.

This principle, in fact, is more a way of allocating costs to the polluter than a legal principle. This principle was adopted by OECD member countries in 1972, at least in theory.

3. Freedom of information:

Environmental planning and management is hindered if the public, NGOs or even official bodies are unable to get information. Many countries have now begun to release more information, the USA has a Freedom of Information Act, and the European Union is moving in this direction.

But still many governors and multinational corporations fear that industrial secrets will leak to competitors if there is too much disclosure, and there are situations where authorities declare strategic needs and suspend disclosure.

Family Welfare Programme and Population Growth

Most population experts believe that less developed nations must initiate family planning or welfare program in order to check population growth. This program allows couples to determine the number and spacing of offspring's.

For less developed countries family planning programme can accelerate the decline in birth that occurs slowly through economic growth and the demographic transition. Some researchers believe that family planning program is responsible for a 40% to 50% decline in fertility in these countries.

It means smaller size of family that is one to two children may be either male or females. The family should accept car and not baby. Family planning programme has been initiated by health department of the Government.

Huge amount of money is been spent by the Government of India because India is second populous country in the world. We have already crossed one hundred crores people by now.

More than 30&40 crores are married couple in our country. If we observe the principal of the family planning than by the end of a few years the population of this country shall be more than China. We have already crossed one hundred crores people by now.

More than 30-40 crores are married couple in our country. If we observe the principal of the family planning than by the end of a few years the population of this country shall be more than China.

Family welfare programme which is a need of the day stress the following recommendations.

1. One or two children to a family.

2. Child by choice and not by accident.

3. Having more children and not bringing them up in a proper standard is violence.

4. Having healthy children.

5. Using contraceptives at the time of male-female mating.

6. Sterilization both bisectomy and vasectomy.

7. Late marriage.

8. Fixing marriage age of both male and female. It is 18 years for female and 21 year for male. In urban areas this age is on the hire side.

9. Banning universal marriage.

10. Educating woman for having smaller size of family.

11. Spreading family planning programmes in rural areas of Indian society.

12. Disseminating education in rural areas in such a style that they prefer small size of family.

13. Children may not be considered gift of nature but result of mating either sex.

14. Spreading and advertising about the use of family planning measures.

15. Opening more and more family welfare centre in rural India because 70% population live in village.

16. Providing incentive to those who can have small size of family.

If above measures are adopted effectively then sufficient economic welfare can be exercised to Indian society. Kerala has earned the distinction of having lowest birth rates among all states of India. The main parameters deciding the affectivity of this model depends upon the age of marriage of women at 21 years as against an Indian average of 18 years, female literacy of 53% against Indian average of 13%, greater emphasis on primary education with 60% budget provision for the same, as against 50% in many other states better public distribution system of food among 97% of population, better medical facilities in rural areas and greater success of family planning programs.

Environment and Human Health Explained

The interconnectedness of life on earth means that nothing we put into the ecosystem simply disappears. In other words, what we do to the planet, we do to ourselves. Pollutants reach humans through the food we eat, the water we drink, and the air we breathe and endanger our health in both immediate and long-lasting ways. According to the Natural Resources Defense Council, outdoor air pollution alone is associated with over one million deaths and countless illnesses each year across the globe. Children are especially susceptible to toxins like mercury and pesticides.

Why Environmental Health Matters

Food

Pesticides used in food production and antibiotics in livestock contaminate don't disappear when they hit the store shelves: they go directly into the food we eat. Not only do these modern additives degrade the soil quality of our farmland and harm the pollinators that help grow our food, they can lead to cancer and antibiotic resistance in the people who eat them. Even pesticides like DDT that have been banned for decades can be found in urine samples of nearly every person in the U.S. today.

Water

The human body is largely water – up to 70% water, in fact. Add that to the reality that only 2% of water on the planet is drinkable and it becomes clear why protecting our water supply is so important. Although the Clean Water and Safe Drinking Water Acts are meant to keep toxins out of our water, many still slip by both our policy safeguards and our physical filtration systems. Fracking for natural gas, which has contaminated groundwater, has led to health problems in communities where those resources are being extracted. Polluted runoff from cities and farms flows into the rivers we draw much of our drinking water from and ends up in our bodies.

Air

Motor vehicle and industrial emissions impact human health too, as these sources contain dangerous pollutants like mercury and sulfur dioxide. The American Lung Association found that 41% of Americans live in areas that have unhealthy levels of air pollution and are at risk of illnesses like lung and heart disease, cancer, and asthma. Rising global temperatures from climate change worsen pollution. Indoor air can be dangerous as well given the presence of chemicals from building materials, household products and mold. Illnesses caused by air pollution keep children out of school and adults out of work and lead to an estimated 35,700 premature deaths in the U.S. per year.

What You Can Do

You can limit your expose to toxins as much as possible on the individual level by eating organic food, avoiding places and times of heavy air pollution and getting your water tested for dangerous metals and chemicals. But more importantly, we need advocates who will stop pollution at its source. EarthShare member organizations are doing just that, by speaking out for cleaner energy and transportation options, researching the chemicals applied in our food system and preserving the purity of our waterways.

Get involved by:

- Making an online donation to EarthShare
- Introducing the EarthShare employee program to your workplace
- Reading the resources below from our member organizations

Purchasing Guides

- Label Lookup, Natural Resources Defense Council
- Smarter Living: Chemical Index, Natural Resources Defense Council
- What's On My Food?, Pesticide Action Network

Campaigns

- The Right to Breathe Campaign, Earthjustice
- Take Back the Tap, Food & Water Watch
- The No Fracking Campaign, Center for Health, Environment & Justice
- Medical Alliance to Stop Global Warming, Physicians for Social Responsibility

HUMAN RIGHTS

I. Environment as a basic right

The concept of human rights in general emerged after the Second World War, but the right to a healthy environment, as one of those human rights, was never a priority. Today, this right is an emerging concept that is being hotly debated in the human rights arena. A healthy environment is an essential aspect of the right to life, not only for human beings but also for other animals on the planet. Violation, therefore, of the right to healthy environment is potentially a violation of the basic right to life.

Environmental deterioration could eventually endanger life of present and future generations. Therefore, the right to life has been used in a diversified manner in India. It includes, inter alia, the right to survive as a species, quality of life, the right to live with dignity and the right to livelihood. In India, this has been expressly recognised as a constitutional right. Article 21 of the Indian Constitution states: 'No person shall be deprived of his life or personal liberty except according to procedures established by law.' The Supreme Court expanded this negative right in two ways. Firstly, any law affecting personal liberty should be reasonable, fair and just. Secondly, the Court recognised several unarticulated liberties that were implied by article 21. It

is by this second method that the Supreme Court interpreted the right to life and personal liberty to include the right to a clean environment.

II. International scenario

The human conference on human environment held at Stockholm in 1972. Popularly called as the Magna Carta of human environment warned that the "natural resources of the Earth including air, water, land, flaura and fauna and especially the representative sample of natural ecosystem must be safeguarded for the benefit of the present and future generations through careful planning or management as appropriate." The report on the World Commission on Environment and Development suggested 22 legal principles for environmental protection and sustainable development. 'Caring for the Earth 1991' and the 'Earth Summit' of 1992 also declared that human beings are entitled to a healthy and productive life in harmony with nature.

III. Indian scenario

Although the real panic in India came to be felt only after the Bhopal gas tragedy in 1984, yet it began concentrating on the problem of pollution soon after the Stockholm conference. India parliament passed many statutes to protect and improve the environment viz. Wildlife (protection) Act, 1972; Water (prevention and control of pollution) Act, 1974; the forest (conservation) Act, 1989; the air (prevention and control of pollution) Act,1981 and above all the Environment (protection) Act, 1986. Further the constitutional (forty-second Amendment) Act, 1976 incorporated two significant articles viz. Article 48-A and 51A (g) thereby making the Indian Constitution the first in the world conferring constitutional status to the environment protection.

An international conference on Environmental education was conducted at New Delhi which called for a massive programme on environmental education, research and monitoring emphasizing on the need for both formal and informal education, which should start right from the childhood stressing for the need of governmental and nongovernmental organizations and specialized institutions to come forward for teaching and training towards protection of the environment.

The Penal Code too at that time contained provisions making pollution a crime.

¬ Section 277 relates to water pollution.

¬ Section 278 relates to water pollution

¬ Section 426, 430, 431 and 432 relates to pollution in general.

¬ Section 368 talks about public nuisance where under noise pollution can inter alia be controlled.

The concern for an integrated environment in the context for planning for economic development was specifically raised in the fourth five year plan, which mainly talked about the obligation of each generation to have a sustainable development and also about the inter- dependence of living things and their relationship with land, air and water.

The National Committee on Environmental Planning and Coordination (NCEPC) was established in February, 1972 and within its purview were covered several environmental projects like human settlements, planning, survey of natural eco- systems, like wetlands and spreading of environmental awareness. In every State and in Union Territories environmental boards have eventually been set up and the major object of the committee was to advise on environmental problems and to make recommendations for their improvement. This office was finally made the Environment Division of the Department of Science and Technology.

VALUE EDUCATION

The principles of ecology and fundamentals of environment can really help create a sense of earth-citizenship and a sense of duty to care for the earth and its resources and to manage them in a sustainable way so that our children and grand children to inherit a safe and clean planet to live on.

i. Human values:

Preparation of textbooks and resource materials about environmental education can play an important role in building positive attitudes about environment. The basic human value ‘man in nature’ rather than ‘nature for man’ needs to be infused through the same.

ii. Social values:

Love, compassion, tolerance and justice which are the basic teachings of most of our religions need to be woven into environmental education. These are the values to be nurtured so that all forms of life and the biodiversity on this earth are protected.

iii. Cultural and religious values:

These are the values enshrined in Vedas like "Dehi me dadami te" i.e. "you give me and I give you" (Yajurveda) emphasize that man should not exploit nature without nurturing her. Our cultural customs and rituals in many ways teach us to perform such functions as would protect and nurture nature and respect every aspect of nature, treating them as sacred, be it rivers, earth, mountains or forests.

iv. Ethical values:

Environmental education should encompass the ethical values of earth- centric rather than human-centric world-view. The educational system should promote the earth-citizenship thinking. Instead of considering human being as supreme we have to think of the welfare of the earth.

v. Global values:

The concept that the human civilization is a part of the planet as a whole and similarly nature and various natural phenomena over the earth are interconnected and inter-linked with special bonds of harmony. If we disturb this harmony anywhere there will be an ecological imbalance leading to catastrophic results.

vi. Spiritual values:

Principles of self-restraint, self-discipline, contentment, reduction of wants, freedom from greed and austerity are some of the finest elements intricately woven into the traditional and religious fabric of our country. All these values promote conservationism and transform our consumerist approach.

The above-mentioned human values, socio-cultural, ethical, spiritual and global values incorporated into environmental education can go a long way in attaining the goals of sustainable development and environmental conservation. Value-based environmental education can bring in a total transformation of our mind-set, our attitudes and our lifestyles. Approaches to impart environmental education.

Environmental education needs to be imparted through formal and informal ways 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 formal 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

(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.

Human Immunodeficiency Virus (HIV)

HIV stands for human immunodeficiency virus. If left untreated, HIV can lead to the disease AIDS (acquired immunodeficiency syndrome).

Unlike some other viruses, the human body can't get rid of HIV completely. So once you have HIV, you have it for life.

HIV attacks the body's immune system, specifically the CD4 cells (T cells), which help the immune system fight off infections. If left untreated, HIV reduces the number of CD4 cells (T cells) in the body, making the person more likely to get infections or infection-related cancers. Over time, HIV can destroy so many of these cells that the body can't fight off infections and disease. These opportunistic infections or cancers take advantage of a very weak immune system and signal that the person has AIDS, the last state of HIV infection.

No effective cure for HIV currently exists, but with proper treatment and medical care, HIV can be controlled. The medicine used to treat HIV is called antiretroviral therapy or ART. If taken the right way, every day, this medicine can dramatically prolong the lives of many people with

HIV, keep them healthy, and greatly lower their chance of transmitting the virus to others. Today, a person who is diagnosed with HIV, treated before the disease is far advanced, and stays on treatment can live a nearly as long as someone who does not have HIV.

The only way to know for sure if you have HIV is to get tested. Testing is relatively simple. You can ask your health care provider for an HIV test. Many medical clinics, substance abuse programs, community health centers, and hospitals offer them too. You can also buy a home testing kit at a pharmacy or online.

Acquired Immunodeficiency Syndrome (AIDS)

AIDS stands for acquired immunodeficiency syndrome. AIDS is the final stage of HIV infection, and not everyone who has HIV advances to this stage.

AIDS is the stage of infection that occurs when your immune system is badly damaged and you become vulnerable to *opportunistic infections*. When the number of your CD4 cells falls below 200 cells per cubic millimeter of blood (200 cells/mm^3), you are considered to have progressed to AIDS. (The CD4 count of an uninfected adult/adolescent who is generally in good health ranges from 500 cells/mm^3 to 1,600 cells/mm^3.) You can also be diagnosed with AIDS if you develop one or more opportunistic infections, regardless of your CD4 count.

Without treatment, people who are diagnosed with AIDS typically survive about 3 years. Once someone has a dangerous opportunistic illness, life expectancy without treatment falls to about 1 year. People with AIDS need medical treatment to prevent death.

Women and Child Welfare Schemes in India

Women constitute 48 per cent of the total population of the country. They suffer many disadvantages as compared to men in literary rates, labour participation rates and earnings. The development of women has been receiving attention of the Government of India from the First Plan. But it was treated as a subject of 'welfare' and clubbed together with the welfare of the disadvantaged groups like destitute, disabled, aged, etc. In 1953, the Central Social Welfare Board was set up which acts as an Apex Body at the Centre to promote voluntary action at various levels, especially at the grassroots, to take up welfare-related activities for women and children.

The Second to Fifth Plans continued this strategy, besides giving priority to women's education, and launching measures to improve material and child health services, supplementary feeding for children and expectant and nursing mothers.

In the Sixth Plan, there was a shift in the approach from 'welfare' to 'development' of women. The Sixth Plan adopted a multi-disciplinary approach with special emphasis on the three core sectors of health, education and employment.

The Seventh Plan stressed on raising their economic and social status and bringing them into the mainstream of national development. One of the significant step in this direction was to identify/promote the 'Beneficiary Oriented Schemes' in various developmental sector which extended direct benefits to women.

The strategy also included the generation of both skilled and unskilled employment through proper education and vocational training. The Eighth Plan ensured that the benefits of development to women should flow from other development sectors and enable women to function as equal partners and participants in the development process.

The Ninth Plan made two important changes in the strategy of development of women. The first was the 'Empowerment of Women'. Its aim was to create an enabling environment where women could freely exercise their rights both within and outside home, and are equal partners along with men.

The second was the convergence of existing services available in both women-specific and women-related sectors To this effect, a special strategy of 'Women's Component Plan' was adopted through which not less than 30 per cent of funds/benefits now flow to women from all the general development sectors.

For social and economic development of women, the Centre has set up the Department of Women and Child Development which has been implementing the following schemes:

1. Swayamsidha:

Swayamsidha is an integrated scheme for the development and empowerment of women through self-help groups. It covers services, access to micro-credit and promotes micro-enterprises.

2. Swashakti Project:

Swashakti Project aims at increasing women's access to resources for better quality of life through the use of time reduction devices, by providing health and education services and by imparting skills to women for income generating activities.

3. Child Development Services Scheme (CDS):

The scheme started in 1975 with the objective to give special coverage to slums in urban areas. The scheme also envisages delivery of an integrated package of services consisting of immunization, health check-ups, nutrition and health education and refreshment services to child and pregnant women.

4. Support to Training and Employment Programme for Women:

It provides new skills and knowledge to poor assetless women in agriculture, animal husbandry, dairying, fisheries, sericulture, handlooms, handicrafts and khadi and village industry sectors of employment.

5. Swavlamban:

This scheme provides training and skills to women to enable them to obtain employment or become self-employed. The trades in which training is imparted include computer programming, medical transcription, electronic assembling, electronics, radio and TV repairs, garment making, handloom weaving, handicrafts, secretarial practice, embroidery and community health.

6. Creche/Day Care Centres for the Children of Working and Ailing Mothers:

It aims at providing day care services to children (0-5 years) of parents whose income does not exceed Rs. 1,800 per month. The services include sleeping and day care facilities, recreation, supplementary nutrition, immunisation and medicine.

7. Hostels for Working Women:

Under this scheme, financial assistance is provided for construction and expansion of hostel buildings for working women. It also includes provisions for safe and affordable accommodation to working women (single or married), those getting training for employment and girl students studying in professional courses.

8. Swadhar:

This scheme provides integrated services to women without support from their families such as widows living at Vrindavan and Kashi; prisoners released from jail; survivors of natural calamities; women/girls rescued from brothels and other places; victims of sexual crimes, etc. The scheme includes such services as food, clothing, shelters, health care, counselling and legal aid and rehabilitation through education awareness, skill formation and behavioural training.

9. Rashtriya Mahila Kosh:

The National Credit Fund for Women is meant to facilitate credit support or micro-finance to poor women to start such income generating schemes as agriculture, dairying, shop-keeping, vending and handicrafts.

10. Welfare of Street Children:

With the objective of weaning away street children from a life of deprivation and vagrancy and rehabilitating them, An Integrated Programme for Street Children is being implemented with a wide range of initiatives like 24 hour drop-in shelters, night shelters, nutrition, healthcare, sanitation, hygiene, safe drinking water, education, recreational facilities and protection against abuse and exploitation.

Currently, 190 organisations have been operating in 22 states benefiting 1.58 lakh street children. The special initiative of the Child-line Service, a toll free telephone service is available to children in distress which responds to the emergency needs of the children and provides referral service. This facility is now operating in 34 cities.

Role of Information Technology in Environment and Human Health

Information technology has tremendous potential in the field of environment education and health as in any other field like business, economics, politics or culture. Development of internet facilities, Geographic 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 software have been developed for environment and health studies which are used friendly and can help an early learner in knowing and understanding the subject.

Database on Environment System:

Database is the collection of interrelated data on various subjects. It is usually in computerized form and can be retrieved whenever required. In the computer the information of database and can be very quickly retrieved. The comprehensive database includes wildlife database, conservation database, forest cover database etc. database is also available for diseases like HIV/AIDS, Malaria, Fluorosis, etc.

(a) National Management Information System (NMIS):

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.

(b) 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 centres all over the country.

The ENVIS centres work for generating a network of database in areas like pollution control, clean technologies, remote sensing, coastal ecology, biodiversity, western Ghats and eastern environmental management, media related to environment, renewable energy, desertification, mangroves, wildlife, Himalayan ecology, mining etc.

(c) 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. 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 environment aspects like water logging, desertification, deforestation, urban sprawl, river and canal network, mineral and energy reserves and so on.

(d) Geographical Information System (GIS):

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 inter dependent 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 software.

Such information 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 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 many new reserves of oil; minerals etc. with the 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.

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 oils, 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, and planning and environmental impact assessment.

(e) The World Wide Web:

With resources material on every aspect, class-room activities, and 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 centre website has the following features:

(a) Student-friendly features:

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

(b) Teacher-friendly features:

These include in addition to above supplement resources charts, additional case studies, answers to web exercises, solutions to critical thinking, questions, editing facility to add or delete questions and create multiple version 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.

Part B- 2 Marks

1. What is meant by acid rain?
2. What are the objectives of value education?
3. What is rain water harvesting?

4. What is meant by Population Explosion?
5. What do you mean by sustainable development?
6. What is wasteland reclamation?
7. What is the purpose of Rain Water Harvesting?
8. Define Global Warming
9. List out the salient features of Forest (Conservation Act), 1980.
10. How do we control the Acid Rain?

Part C- 6 Marks

1. What is rainwater harvesting? What are the purposes served by it?
2. Discuss various issues and measures for women and child welfare at International and National level.
3. "Population, consumerism and waste production are interrelated"- Comment.
4. What are the major implications of enhanced global warming?
5. What is a watershed? Critically discuss the objectives and practices of watershed management.
6. What are the objectives and elements of value education? How can the same be achieved?
7. Discuss the salient features of (a) Wildlife (Protection) Act, 1972 (b) Forest (Conservation Act),
8. 1980.
9. Briefly discuss HIV/AIDS, mode of its spread and its effects on environment.
10. Discuss various measures for wasteland reclamation?
11. What are the major impacts of acid rain and how can we control it?

KARPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE						
DEPARTMENT OF MANAGEMENT						
UNIT 5 Social Issues and the Environment (Each Question Carries ONE Mark)						
S.NO	**QUESTIONS**	**OPT 1**	**OPT 2**	**OPT 3**	**OPT 4**	**ANSWER**
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	potential energy	Enbedded Energy	embodied energy.
2	_____depends on energy mainly from fossil fuels.	rural transport	Urban transport	Metro transport	Semiurban 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	deforestation and afforestation	desertification and afforestation	deforestation and desertification

4	Urban residential and commercial facilities are responsible for approximately _____ of greenhouse gas emissions	25%	35%	45%	65%	35%
5	_____is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.	Sustainable development	Economic development	Social development	Environment development	Sustainable development
6	_____supplies water to plants near its roots through a system of tubes, thus saving water.	Drip irrigation	Well irrigation	Tube irrigation	Submersible irrigation	Drip irrigation

7	The management of a single unit of land with its water drainage system is called _____	Watershed management	Rainwater harvesting	Land recreation	Drainage management	Watershed management
8	_____ deals with issues related to the rights of individuals that are fundamental to life and well being.	Environmental ethics	Human values	Human rights	Consumer rights	Environmental ethics
9	_____will be enhanced only if we can arrest and reverse the growing alienation between the people and the common property resources.	Gross Nature Product	Gross National Product	Gross Domestic product	Net Domestic product	Gross Nature Product

10	_____ begins by taking control over a degraded site through local participation.	pollution	energy	Watershed management	potential energy	Watershed management
11	Changes in climate may affect the distribution of _____ which in turn will increase the spread of disease, such as malaria and filariasis,	vector species	vetebral species	fungi species	bacterial species	vector species
12	There are _____ aspects that are closely connected with ethical issues that are related to our environment.	2	3	4	5	2

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	life	wilderness	karma
14	_____ goddesses have been associated with specific plant species.	tree	plant	animals	trees and plants	tree
15	The _____ plant is grown on the doorstep outside every home.	tulsi	moneyplant	green leaves	olive	tulsi

16	Certain species of trees have been protected as they are valued for their _____or _____	fruit or flowers	flowers or trees	trees or fruits	trees or plants	fruit or flowers
17	The _____ is protected for its fruit around most farms even when wood becomes scarce.	banyan tree	coconut tree	mango tree	peach tree	mango 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	mango tree	Mohua and madhuca indica	Mohua and madhuca indica

19	About _____ of the solar energy reaching the Earth is absorbed on the earth's surface whichincreases its temperature.	85%	75%	65%	95%	75%
20	The _____ affects plant and animal life in aquatic ecosystems.	fossil fuel	oil refining	acid rain	acidic raining	acid rain
21	The destruction of the _____ is seen to cause increased cases of skin cancer and cataracts.	troposphere	stratosphere	ozone layer	mesosphere	ozone layer

22	After _____, the ozone layer is expected to recover slowly over a period of about 50 years.	1990	1000	2000	3000	2000
23	The Montreal Protocol was signed in the year_____	1985	1986	1987	1990	1987
24	Wasteland can be reclaimed for_____ by reducing the salt content which can be done by leaching and flushing.	agriculture	forestry	agro	agroforestry	agriculture

25	_____implies integration of trees with agricultural crops or livestock management simultaneously.	afforestation	agro forestry	agriculture	forest	agro forestry
26	Wasteland can be classified into _____forms	2	3	4	5	2
27	NGO stands for _____	non-governmental organization	non govern opportunities	not good organization	non government organization	non-governmental organization

28	A Task Group set up by _____ has warned that climate change may have serious impacts on human health.	WHO	UNESCO	WTO	UNICEF	WHO
29	_____ was the first State in India to regulate the manufacture and use of plastics.	tamil nadu	andhra pradesh	karnataka	Himachal Pradesh	Himachal Pradesh
30	_____is one of the end results of consumerism.	Materialism	consumer	consumerlism	consumer	Materialism

31	_____is driven by huge sum spent on advertising, designed to create both a desire to follow trends, and a personal feeling of satisfaction based on acquisition.	matreials	Consumerism	materialism	consumer	Consumerism
32	Reduce, Reuse, Recycle, are the____ principle, is the new concept in waste management.	3P	3Rs	4Rs	3Ps	3Rs
33	_____and_____is used to make new metal products.	Metal scrap and broken glass	metal and glass	metal scrap and new glass	new glass and broken glass	Metal scrap and broken glass

34	_____ is used in sewage plant to make fuel.	gas	biogas	bio	biochemical	biogas
35	The spirit of the proclamation adopted by the United Nations Conference on Human Environment took place in Stockholm in June _____	1972	1872	1772	2002	1972
36	The Government passed Air Act in _____ to clean up our air by controlling pollution.	1991	1981	1852	1952	1981

37	VOC stands_____	volatile organic compounds	volatile of compounds	vague of compounds	non volatile if inorganic compounds	volatile organic compounds
38	(PCBs) stands for_____	popular control board	Pollution Control Boards	population control board	Prevention control board	Pollution Control Boards
39	RTO stands for_____	road transport office	railway transport office	regional transport office	railway transport origin	regional transport office

40	The Government has formulated Water Act in _____to be able to prevent pollution of water by industrial, agricultural and household wastewater that can contaminate our water sources.	1975	1974	1973	1972	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	protect and prevention	prevention and control	prevention and control
42	The Forest Conservation Act was passed in _____	1982	1980	1981	1985	1980

43	India’s first Forest Policy was enunciated in _____	1951	1952	1953	1954	1952
44	The Forest Conservation Act of 1980 was enacted to control _____	afforestation	defforestation	afforestation	prevention and control	defforestation
45	_____are not permitted to trespass into the Reserved Forest.	cattle	kinetic energy	bus	train	cattle

46	MoEF stands for_____	ministry of ecosystem and foundation	Ministry of Environment and Forests	ministry of environmental and foundation	ministry of ecosystem and forest	Ministry of Environment and Forests
47	_____ was recorded as the warmest year.	1988	1998	1996	1990	1998
48	Project that already exist but require expansion must also apply for clearance_____	green field projects	field projects	green projects	brown field projects	brown field projects

49	_____ is not intended to stop all types of development.	EIA	AMI	EMI	MMI	EIA
50	March 21 is celebrated as_____	world forestry day	world health day	world heritage day	earth day	world forestry day
51	April 07 is celebrated as_____	world forestry day	world health day	world heritage day	earth day	world health day

52	April 18 is celebrated as_____	world forestry day	world health day	world heritage day	earth day	world heritage day
53	April 22 is celebrated as_____	world forestry day	world health day	world heritage day	earth day	earth day
54	June 05 is celebrated as _____	world forestry day	world heritage day	world environment day	world population day	world environment day

55	June 11 is celebrated as_____	earth day	world health day	world environment day	world population day	world population day
56	February 2 is celebrated as_____	world wetland day	world health day	world environment day	world population day	world wetland day
57	August 6 is celebrated as_____	hiroshima day	world ozone day	green consumer day	wildlife day	hiroshima day

58	September 16 is celebrated as _____	hiroshima day	world ozone day	green consumer day	wildlife day	world ozone day
59	September 28 is celebrated as_____	hiroshima day	world ozone day	green consumer day	wildlife week	green consumer day
60	October 1-7 is celebrated as_____	hiroshima week	world ozone week	green consumer week	wildlife week	wildlife week

KARPAGAM ACADEMY OF HIGHER EDUCATION			
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KARPAGAM ACADEMY OF HIGHER EDUCATION			
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20	17BAU021	Nagoor mohideen. S	
21	17BAU022	Nagulan. R. V	
22	17BAU023	Natarajan. S	
23	17BAU024	Naveen. N	
24	17BAU025	Naveeth.R	
25	17BAU026	Pandiyan. S	
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27	17BAU028	Pradeesh. P	
28	17BAU029	Praveenkumar. P	
29	17BAU030	Rajagopal. P	
30	17BAU031	Rajeshwari . K	
31	17BAU032	Ramasamy Ahilan	
32	17BAU033	Riyazuddin.b	
33	17BAU034	Ruban Raj Kumar. K	
34	17BAU035	Sakthivel. E	
35	17BAU036	Santhosh. N	
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51	17BAU052	Vignesh.C	
52	17BAU053	Vigneshwaran. M	
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[17AEC201]

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed University Established Under Section 3 of UGC Act 1956)

COIMBATORE – 641021

(For the candidates admitted from 2017 onwards)

I B.Com/B.Com (BPS)/B.Com (PA)/B.com(CA)/BBA

I Internal Examination, January 2018

ENVIRONMENTAL STUDIES

Time: 2 Hours **Maximum: 50 Marks**

Date: 20.01.18

PART – A (20x1 = 20 Marks)

Answer all the questions

1. Decomposers are otherwise called as _____
   a) Primary consumers b) Organic matter c) deteriorates d) Secondary consumers
2. Light energy is transformed into chemical energy by _____
   a) Photosynthesis b) respiration c) recycling d) productivity
3. In grazing food chain the living plants are directly_____
   a) Destroyed b) Consumed c) Grown d) made to decay
4. The unit that includes the interaction of all the organisms that interact with the physical environment is called_____
   a) Ecosystem b) Biosphere c) Community d) Population
5. All food chains start with _____and end with decayed matter.
   a) Fungi b) Photosynthesis c) organisms d) environment
6. All species on earth together with their environments collectively comprise_____
   a) Lithosphere b) Hydrosphere c) Biosphere d) Atmosphere
7. The first tropic level refers to _____
   a) All herbivores b) all green plants c) sunlight d) all animals
8. The surrounding physical and biological factor with which organisms closely interact and remain adapted is called _____
   a) Environment b) nature c) ecology d) forest
9. Solar energy stored in materials such as wood, grains, sugar and municipal waste is called_
   a) fossil fuels b) biomass c) natural gas d) geothermal energy
10. Organisms that feed upon other living organisms as a source of energy and nutrients are called as _____
    a) consumers b) producers c) decomposers d) pests
11. Floods are caused by _____
    a) afforestation b) cutting the forests c)tilling the land d)constructing dams
12. The main source of water in India is _____
    a) Rain water b) ground water c) surface water d) sea water
13. A pond serves as a good example for a _____water ecosystem.
    a) Brackish b) fresh c) marine d) salt
14. _____water is also known as portable water.
    a) Irrigation b) surface c) drinking d) raw
15. _____is a non-renewable resource.
    a) Water b) oxygen c) sunlight d) coal
16. Atomic energy is obtained using the ores of _____
    a) Copper b) uranium c) lithium d) radium
17. _____is the major raw material for biogas
    a) Plant leaves b) cow dung c) grass d) minerals
18. The study of minerals is called _____
    a) Mineralogy b) mining science c)geology d) Geology
19. Both power and manure provided by plants_____
    a) Biogas b) nuclear c) thermal d) hydroelectricit
20. The death of the last individual of a species is called _____
    a) Climax b) vanishing c) clearing d) extinction

PART B (3x2=6 Marks)

ANSWER ALL THE QUESTIONS

21. Define ecosystem.
22. Mention some of the mineral resources available in nature.
23. What do you mean by food web?

PART C (3x8=24 Marks)

ANSWER ALL THE QUESTIONS

24. a) Explain the different types of ecosystems with examples.

    (or)

    b) Write a detailed note on water resources.

25. a) Describe the different components of the environment.

    (or)

    b) Explain ecological succession with an example?

26. a) Describe the different food chains. Give examples.

    (or)

    b) Explain the path of energy flow in an ecosystem.

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COIMBATORE – 641021
(For the candidates admitted from 2017 onwards)
First Internal Examination, January - 2018
BBA – II Semester
17AEC201- ENVIRONMENTAL STUDIES

Answer Key

PART – A (20 X 1 = 20 Marks)

SI.No	Answer
1	c. deteriorates
2	a. Photosynthesis
3	b. consumed
4	a. Eco system
5	b. Photosynthesis
6	c. Biosphere
7	b. all green plants
8	a. Environment
9	b. Biomass
10	a. consumers

SI.No	Answer
11	b. cutting the forest
12	a. Rain water
13	b. fresh
14	c. drinking
15	d. coal
16	b. uranium
17	b. cow dung
18	a. Mineralogy
19	a. biogas
20	d. extinction

PART – B (3 X 2 = 6 Marks)

ANSWER ALL THE QUESTIONS

21. Define Ecosystem:

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

22. Mention Some of the Mineral Resources Available Nature:

Gold, Silver, Oil, Iron

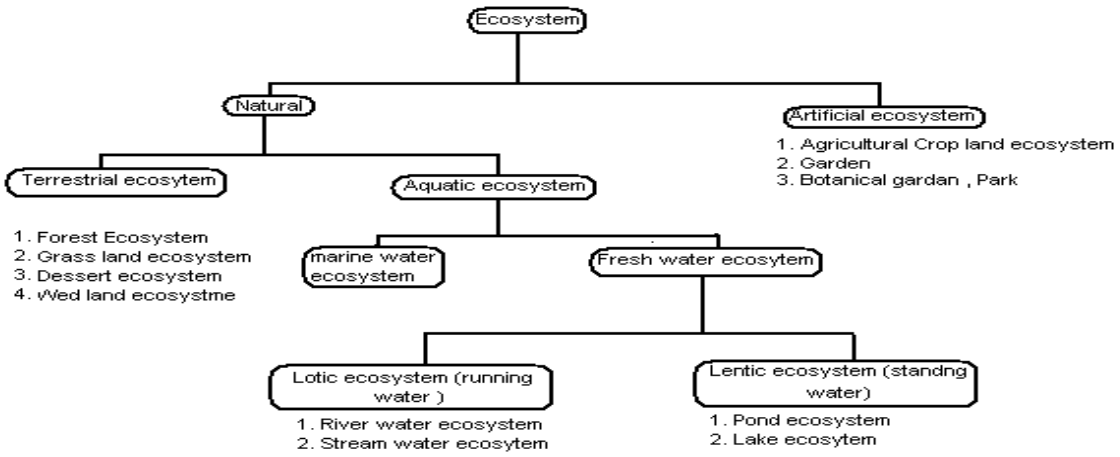
23. What do you mean by food web:

- In an ecosystem the various food chains are interconnected with each other to form a net work called food web.

PART – C (3X 8 = 24 Marks)

ANSWER ALL THE QUESTIONS

24. a. Explain the different types of Ecosystem with examples.



(OR)

b. Explain about the usage of water resources.

1. Domestic purposes and urban management
2. Industrial water supply
3. Agriculture
4. Navigation and shipping
5. Hydroelectricity
6. Minerals

7. Mineral oil

25. a) Describe the different components of the environment.

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.

b. Explain Ecological Succession with an example?

- 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.

26.a. Describe the different food chains . Giveexamples..

Food Chain: The biotic factors of the ecosystem are linked together by food.

- The sequence of the eaters being eaten is called food chain.

Producers ----------> Herbivores ----------> Carnivores

Pond Ecosystem

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

Grassland Ecosystem

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

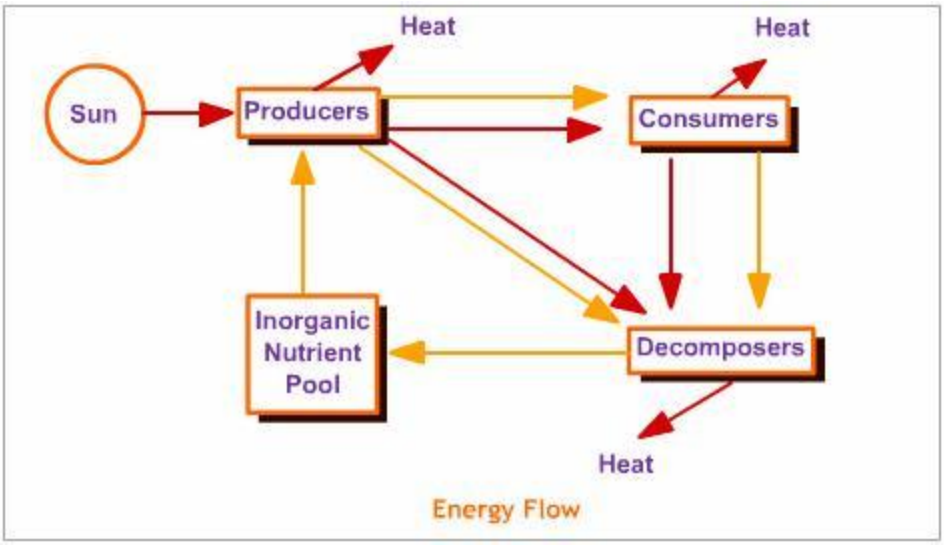
Forest Ecosystems

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

Types of food chains

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

b. Explain the path of energy flow in an Ecosystem.



Register No.:_____

[17AEC201]

KARPAGAM ACADEMY OF HIGHER EDUCATION
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COIMBATORE – 641 021
(For the candidates admitted from 2017 onwards)
B.COM/B.COM(BPS)/B.COM(PA)/B.COM(CA)/BBA SECOND INTERNAL EXAMINATION- FEBRUARY 2018
SECOND SEMESTER
ENVIRONMENTAL STUDIES

Time: 2 Hours **Maximum: 50 Marks**

Date: 01/03/18

PART - A (20X1 = 20 Marks)
CHOOSE THE CORRECT ANSWER

1.The death of last individual of a species is called _____

a) extinction b) cla c) vanished d) climax

2.Red data books provide a list of _____

a) advanced plants b) rare, endangered or endemic species

c) disease resistant animals d) minerals

3.The areas of sociology that covers the size, compensation and distribution of population is called _____

a) environmental sociology b) geography

c) Anthropology d) demography

4. Both power and manure are provided by _____plants

a) thermal b) nuclear c) biogas d) hydroelectric

5._____ is diffused into the ground by gravitational force

a) Rain water b) Ocean c) River water d) Sea

6._____is one of the following is the non-renewable resource

a) Water b) Coal c) Oxygen d) Sunlight

7. _____ soil is the best for plant growth.

a) Sandy soil b) Clay c) Gravel d) Loamy Soil

8._____ of stratosphere provides protection to our life

a) Nitrogen b) Hydrogen c) Ozone d) Argon

9.Atomic energy is obtained by using the ores of _____

a) Copper b) uranium c) lithium d) radium

10.The total number of major languages in India are _____

a) 18 b) 17 c) 16 d) 15

11.The resources that are derived from bio-mass of living organisms are called _____

a) Resources b) renewable

c) Non-renewable d) environmental natural

12._____ is the major raw material for biogas

a) Plant leaves b) Cow dung c) Mg d) Grass

13.Bio gas generation is mainly based on the principle of _____

a) fermentation b) degradation c) purification d) sedimentation

14.The number of lives births per 1000 people in a population in a year is known as ___

a) Fecundity b) the crude birth rate

c) Fertility d) the basic demographic equation

15. Nitrate when present in excess in drinking water causes

a) Bioaccumulation b) biomagnification

c) fluorosis d) blue baby syndrome

16. The most serious pollutant to rubber tyres is _____

a) CO2 b) CO c) O3 d) NO

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 _____

a) resources b) natural resource c) environment d) forest

18. Water which is an universal solvent for most of the biochemical and biological process, constitutes about the total volume of _____ billion kilometers

a) 15 b) 20 c) 25 d) 30

19.The complete failure of monsoon rainfall with a dry climate accompanied by acute shortage of water causes _____

a) soil erosion b) flash flood c) loss of bio-diversity d) drought

20.The resources that are derived from bio-mass of living organisms are called _____

a) resources b) renewable

c) purification d) sedimentation

PART B (3x2=6 Marks)
Answer All the Questions

21. Give a short note on biodiversity.

22. Give a note on renewable resources.

23. Mention any two hotspots of biodiversity.

PART C (3x8=24 Marks)

Answer All the Questions

24.a) Explain about the various food resources and the problems related to it.

(Or)

b) Environmental degradation can change renewable resources into non-renewable resources- Discuss.

25. a) Explain about the ill effects of fireworks.

(Or)

b) Explain about the threats to biodiversity.

26. a). Describe biodiversity at global, national and local levels.

(Or)

b) Explain the values of Biodiversity

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Third Internal Examination, March - 2018
First Year BBA – Second Semester
ENVIRONMENTAL STUDIES
Part-A (20×1=20 Marks)
Answer All the Questions

SI.No	Answer
1	c. Nitrogen Gas
2	a. 1st October to 7th October
3	c. Human activities against nature
4	c. the amount of sulfur dioxide absorbed by a person in a given time
5	b. CO2
6	b. Hydrogen
7	c. 2400 kJ
8	b. Liver
9	b. Nicotine
10	d. Dumping in sealed containers
11	b. Urban transport
12	a. tulsi
13	a. fruit or flowers
14	c. World environment day
15	b. Ministry of Environment and Forests
16	c. ozone layer
17	c. 2000
18	c. acid rain
19	a. Agriculture
20	a. Drip irrigation

Part-B (3×2=6 Marks)

Answer All the Questions

21. Define Environmental pollution.

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.

22. State the effects of industrial wastes.

Industrial waste is the waste produced by industrial activity which includes any material that is rendered useless during a manufacturing process such as that of factories, industries, mills, and mining operations. It has existed since the start of the Industrial Revolution.

23. What are the objectives of value education?

i. Human values:

ii. Social values:

iii. Cultural and religious values:

iv. Ethical values:

v. Global values:

vi. Spiritual values:

Part-C (3×8=24 Marks)

Answer All the Questions

24. a. Enumerate various methods for control of air pollution.

The emission of exhaust from automobiles can be reduced by devices, such as positive crankcase ventilation valve and catalytic converter.

- 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

- 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 O2 in water causing the suffocation and death of aquatic flora and fauna.

Water-borne diseases

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.
- A finepray of water in the device called scrubber can separate many gases like NH3, SO2, 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.

b. Discuss various sources of marine pollution. How can you prevent pollution of our oceans?

1. Sewage:
2. Toxic Chemicals From Industries
3. Land Runoff
4. Large Scale Oil Spills
5. Ocean Mining
6. Littering

25. a. Describe the role to be played by an individual in prevention of environmental pollution.

- Individuals should minimize wastage of resources such as electricity. Every unit of electricity saved is equivalent unit of electricity produced as it not only saves the fuel that would be used to produce that electricity, but also help to prevent pollution that is accompanied by burning of that fuel. Therefore, person should always switch off appliances when not in use.
- Individuals should prefer walking or use cycles instead of using motor vehicles, especially when distances to be travelled are small.
- Individuals can make considerable contribution by using mass transport (buses, trains, etc) instead of using personal vehicles.
- When going to workplace, colleagues from nearby localities should pool vehicles instead of going in individual personal vehicles.
- Taking personal vehicles for periodic pollution checks at centres approved by authorities.
- Individuals should reuse items whenever possible.
- Products that are made of recycled material should be given preference.
- Use gunny bags made of jute instead of plastic bags.
- Take part in environment conservation drives such as tree planting drives.
- Use water resources efficiently.
- Use renewable resources by installing equipment such as solar heaters and using solar cookers.

b. What are the major implications of enhanced global warming?

Global warming is defined as the increase in temperature of Earth, that causes change in climate. The last few centuries have seen an increase in industrial, agricultural and other human activity resulting in release of more *green house gases* in the atmosphere. These gases cause the atmosphere to trap increasing amounts of heat energy in the Earth's surface making the planet warmer than usual.

1. More heat waves
2. Expansion of desert area
3. Natural fires in forest lands
4. More evaporation of water from oceans and water bodies
5. Melting of Ice caps in Arctic and Antarctic regions
6. More cloud formation in the atmosphere
7. Shorter and warmer winters coupled with longer and hotter summers
8. Changes in rainfall pattern
9. Rise in sea level
10. Flooding and submergence of low lying coastal areas
11. Disruption in farming
12. More drought
13. Impact on plants, animals and humans

26. a. What is rainwater harvesting? What are the purposes served by it?

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

o By storing in tanks or reservoirs above or below ground.

o By constructing pits, dug-we., lagoons, trench or check-dams on small rivulets

o By recharging the groundwater.

b. What are the objectives and elements of value education? How can the same be achieved?

The principles of ecology and fundamentals of environment can really help create a sense of earth-citizenship and a sense of duty to care for the earth and its resources and to manage them in a sustainable way so that our children and grand children to inherit a safe and clean planet to live on.

i. Human values:

Preparation of textbooks and resource materials about environmental education can play an important role in building positive attitudes about environment. The basic human value ‘man in nature’ rather than ‘nature for man’ needs to be infused through the same.

ii. Social values:

Love, compassion, tolerance and justice which are the basic teachings of most of our religions need to be woven into environmental education. These are the values to be nurtured so that all forms of life and the biodiversity on this earth are protected.

iii. Cultural and religious values:

These are the values enshrined in Vedas like "Dehi me dadami te" i.e. "you give me and I give you" (Yajurveda) emphasize that man should not exploit nature without nurturing her. Our cultural customs and rituals in many ways teach us to perform such functions as would protect and nurture nature and respect every aspect of nature, treating them as sacred, be it rivers, earth, mountains or forests.

iv. Ethical values:

Environmental education should encompass the ethical values of earth- centric rather than human-centric world-view. The educational system should promote the earth-citizenship thinking. Instead of considering human being as supreme we have to think of the welfare of the earth.

v. Global values:

The concept that the human civilization is a part of the planet as a whole and similarly nature and various natural phenomena over the earth are interconnected and inter-linked with special bonds of harmony. If we disturb this harmony anywhere there will be an ecological imbalance leading to catastrophic results.

vi. Spiritual values:

Principles of self-restraint, self-discipline, contentment, reduction of wants, freedom from greed and austerity are some of the finest elements intricately woven into the traditional and religious fabric of our country. All these values promote conservationism and transform our consumerist approach.

(i) Among students through formal 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

(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.

Register No.: …….

[17AEC201]

KARPAGAM ACADEMY OF HIGHER EDUCATION
(Deemed to be University Established Under Section 3 of UGC Act, 1956)
COIMBATORE – 641021
(For the candidates admitted from 2017 onwards)
Third Internal Examination, March - 2018
I BBA – II Semester
ENVIRONMENTAL STUDIES

Time: 2 Hours **Maximum: 50 Marks**

Date & Session: .03.2018

PART – A (20 X 1 = 20 Marks)
ANSWER ALL THE QUESTIONS

1. Which of the following is not an air pollutant?

a. Smoke b. Carbon Dioxide c. Nitrogen Gas d. Sulphur Dioxide

2. Wildlife Week is celebrated on……..

a. 1st October to 7th October b. 15th October to 2 1st October

c. 1st June to 7th June d. 15th June to 21st June

3. Global warming is caused due to …….

a. Lack of rainfall b.Presence of a hole in ozone layer

c. Human activities against nature d.Extinction of animals and plants

4. The dosage of sulphur dioxide is best described as……

a. a measure of the harm sulfur dioxide does to a person.
b. the amount of sulfur dioxide a person experiences in a given time.
c. the amount of sulfur dioxide absorbed by a person in a given time
d. the amount of sulfur dioxide entering the environment in a given time

5. The most abundant green house gas is……

a. NO_2 b. CO_2 c. O_3 d. SO_2

6. Which is considered as a future source of power, that can meet our unlimited demand?

a. Hydel power b. Hydrogen c. Thermal power d. Solar power

7. How much of the energy contained in the diesel-oil fuel is not converted to electricity when burnt in the power station?

a. 4800 kJ b. 3200 kJ c. 2400 kJ d. 1200 kJ

8. The biochemical laboratory of human body is……

a. Stomach b. Liver c. Intestine d. Kidney

9. Tobacco addiction is caused due to……

a. Cocaine b. Nicotine c. Caffeine d. Histamine

10. High level radioactive waste can be managed in which of the following ways?

a .Open dumping b. Composting c. Incineration d. Dumping in sealed containers

11. …….depends on energy mainly from fossil fuels.

a. rural transport b. Urban transport c. Metro transport d. Semiurban transport

12. The …….plant is grown on the doorstep outside every home.

a. tulsi b. moneyplant c. green leaves d. Olive

13. Certain species of trees have been protected as they are valued for their ……or ……..

a. fruit or flowers b. flowers or trees c. trees or fruits d. trees or plants

14. June 05 is celebrated as …….

a.World forestry day b.World heritage day

c.World environment day d.World population day

15. MoEF stands for…….

a.Ministry of Ecosystem and Foundation b.Ministry of Environment and Forests

c.Ministry of Environmental and Foundation d.Ministry of Ecosystem and Forest

16. The destruction of the ……..is seen to cause increased cases of skin cancer and cataracts.

a.troposphere b. stratosphere c. ozone layer d. mesosphere

17. After……,the ozone layer is expected to recover slowly over a period of about 50 years.

a. 1990 b. 1000 c. 2000 d. 3000

18. The …… affects plant and animal life in aquatic ecosystems.

a. fossil fuel b. oil refining c. acid rain d. acidic raining

19. Wasteland can be reclaimed for…….. by reducing the salt content which can be done by leaching and flushing.

a. Agriculture b. Forestry c. Agro d. Agro forestry

20. ……..supplies water to plants near its roots through a system of tubes, thus saving water.

a. Drip irrigation b. Well irrigation c. Tube irrigation d.Submersible irrigation

PART – B (3 X 2 = 6 Marks)

ANSWER ALL THE QUESTIONS

21. Define Environmental pollution.

22. State the effects of industrial wastes.

23. What are the objectives of value education?

PART – C (3X 8 = 24 Marks)

ANSWER ALL THE QUESTIONS

24. a. Enumerate various methods for control of air pollution.

(OR)

b. Discuss various sources of marine pollution. How can you prevent pollution of our oceans?

25. a. Describe the role to be played by an individual in prevention of environmental pollution.

(OR)

b. What are the major implications of enhanced global warming?

26. a. What is rainwater harvesting? What are the purposes served by it?

(OR)

b. What are the objectives and elements of value education? How can the same be achieved?

Reg. No.....

[16AEC101]

KARPAGAM UNIVERSITY

Karpagam Academy of Higher Education
(Established Under Section 3 of UGC Act 1956)
COIMBATORE – 641 021
(For the candidates admitted from 2016 onwards)

BCA., B.Sc., DEGREE EXAMINATION, NOVEMBER 2016

First Semester

COMPUTER APPLICATIONS/COMPUTER SCIENCE/INFORMATION TECHNOLOGY/COMPUTER TECHNOLOGY/ELECTRONICS AND COMMUNICATION SYSTEMS

ENVIRONMENTAL STUDIES

Time: 3 hours Maximum : 60 marks

PART – A (20 x 1 = 20 Marks) (30 Minutes)
(Question Nos. 1 to 20 Online Examinations)

PART B (5 x 2 = 10 Marks) (2 ½ Hours)
Answer ALL the Questions

21. Define Ecology and Eco system.
22. What are floods?
23. Define Biodiversity consumptive use.
24. What is Solid waste Management?
25. What is Wildlife Protection Act?

PART C (5 x 6 = 30 Marks)
Answer ALL the Questions

26. a. What are the Eco system explain its concepts?

Or

b. Discuss about the Energy flow in a Eco System.

27. a. What is Food Resources? Explain in detail.

Or

b. Explain in detail about equitable use of resources for sustainable lifestyle.

28. a. List out the value of biodiversity at global, National and Local levels.

Or

b. Enlighten on the Threads to biodiversity.

29. a. Elucidate the effects and control measures of Soil pollution.

Or

b. Discuss in detail about the Role of an individual in prevention of pollution.

30. a. Discuss in detail about Climate change and global warming.

Or

b. Elaborate about the Value Education.

Reg. No.....

[14VAE201]

KARPAGAM UNIVERSITY

(Under Section 3 of UGC Act 1956)
COIMBATORE – 641 021
(For the candidates admitted from 2014 onwards)

B.Com, B.Com (CA), B.Com (PA), BBA, BCA, BA, B.Sc. DEGREE EXAMINATION, APRIL 2015

Second Semester

ENVIRONMENTAL STUDIES

Time: 3 hours Maximum : 60 marks

PART – A (10 x 2 = 20 Marks)
Answer any TEN Questions

1. What is ecosystem? Mention its types.
2. What is environment?
3. Define pollution.
4. Write short notes on Biodiversity and types.
5. List out biogeographical area of India.
6. What is consumptive value of biodiversity?
7. What is meant by environmental education?
8. What are the uses of energy in an urban area?
9. Define watershed management.
10. How will you reduce the risks of disaster management?
11. Write short notes on human health.
12. Write a note on EPAct.
13. What is global warming?
14. Define Hazard.
15. What are types of disaster?

PART B (5 X 8= 40 Marks)
Answer ALL the Questions

16. a) Explain in detail about water pollution – causes, effects and control measures

Or

b) Illustrate various components of ecosystem in detail

17. a) Explain in detail about the rainwater harvesting system.

Or

b) As an individual in this biosphere how will you conserve natural resources?

18. a) Explain in detail about environment and human health

Or

b) Explain in detailed account on landslides and its disaster and rehabilitation management.

19. a) Define disaster management. Explain the disaster management cycle.

Or

b) Elaborate the causes, consequence and mitigation measures of man-made disaster.

20. **Compulsory : -**

Discuss in detail about major threats to biodiversity.

Reg. No.....

[16AEC201]

KARPAGAM UNIVERSITY

Karpagam Academy of Higher Education
(Established Under Section 3 of UGC Act 1956)
COIMBATORE – 641 021
(For the candidates admitted from 2016 onwards)

B.Sc., DEGREE EXAMINATION, APRIL 2017

BIOTECHNOLOGY/BIOCHEMISTRY/MICROBIOLOGY/ PHYSICS/CHEMISTRY/MATHEMATICS
Second Semester

ENVIRONMENTAL STUDIES

Time: 3 hours Maximum : 60 marks

PART – A (20 x 1 = 20 Marks) (30 Minutes)
(Question Nos. 1 to 20 Online Examinations)

PART B (5 x 2 = 10 Marks) (2½ Hrs)
Answer ALL the Questions

21. Define ecosystem.
22. Give in short the uses of forest resources.
23. Differentiate: Ex-situ and in-situ conservation.
24. Briefly state the reasons for floods.
25. What are the objectives and elements of value education?

PART C (5 x 6 = 30 Marks)
Answer ALL the Questions

26. a. Explain in detail the structure and function of the ecosystem.
Or
b. Describe in detail the process of ecological succession.

27. a. Discuss the major uses of water and associated problems.
Or
b. How can you as an individual conserve different natural resources?

28. a. What are the major causes of man-wildlife conflicts? Discuss the remedial steps that can curb the conflict.
Or
b. Explain about the threats to biodiversity.

29. a. Discuss adverse effects and control of water pollution.
Or
b. Discuss in detail how you would manage the solid wastes in urban areas.

30. a. "Population, consumerism and waste production are interrelated"- Comment.
Or
b. What are the major implications of enhanced global warming?

Reg. No.....

[17AEC201]

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University Established Under Section 3 of UGC Act 1956)
Pollachi Main Road, Eachanari Post, Coimbatore – 641 021.
(For the candidates admitted from 2017 onwards)

B.Com,B.Com(CA),B.Com(PA),B.Com(BPS),BBA,B.Sc(BT),B.Sc(BC), B.Sc(MB),B.Sc(PHYSICS),B.Sc(CHEMISTRY),B.Sc(MATHEMATICS)

DEGREE EXAMINATION, APRIL 2018

Second Semester

ENVIRONMENTAL STUDIES

Time: 3 hours Maximum : 60 marks

PART – A (20 x 1 = 20 Marks) (30 Minutes)
(Question Nos. 1 to 20 Online Examinations)

PART B (5 x 2 = 10 Marks) (2 ½ Hours)
Answer ALL the Questions

21. Differentiate between biotic and abiotic factors.
22. List any two problems faced in conserving land resources.
23. Mention any two hotspots of biodiversity.
24. What are natural disasters?
25. What is ozone depletion?

PART C (5 x 6 = 30 Marks)
Answer ALL the Questions

26.a. Explain the different components of the environment.

Or

b. Describe the structure of an ecosystem.

27.a. Explain the importance of land resources.

Or

b. Discuss the effects of over-utilisation of water resources.

28.a. Explain the bio-geographical classification of India.

Or

b. Describe biodiversity at global, national and local levels.

29.a. What are the causes and effects of air pollution?

Or

b. How will you control the effects of industrial wastes?

30.a. Write a detailed note on wildlife protection act.

Or

b. Write a note on the forest conservation act.
