Bachelor of Science

(B.Sc. - PCM)

Environmental Sciences
(DBSPAE101T24)

Self-Learning Material

(SEM 1)

Jaipur National University

Centre for Distance and Online Education

Established by Government of Rajasthan

Approved by UGC under Sec 2(f) of UGC ACT 1956

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PREFACE

Welcome to the world of Environmental Sciences! In this book, we delve into the fascinating realm of environment, ecosystem, and various issues related to the environment. The study of interactions between organisms and their biophysical environment is known as ecology. While ecosystem are dynamically interacting networks of living things, the communities they inhabit, and the inanimate objects that make up their surroundings

This book serves as a comprehensive guide to global diversity, its importance and conservation It also focuses on anthropogenic activities leading to environmental pollution and its effect on the environment. Our aim is to provide students, researchers, and professionals with a comprehensive knowledge for various environmental ethics and issues and governmental policies for the protection of natural resources as well.

Additionally, the book aims to create a thorough awareness of environmental processes and the vital role that sustainable practices play. It also provides insights into how different environmental concerns are being tackled globally via., case studies, current research, and practical examples.

We hope that this book instills a sense of urgency and responsibility towards mother nature. This information is not merely intellectual; rather, it is a call to action for safeguarding and maintaining the delicate balance of our natural environment and use of natural resources. It is our responsibility to ensure the ability of next generations to meet their needs without jeopardizing the environment.

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Unit - 1

Ecosystem

Objectives:

- Explain the concept of an ecosystem.
- Define energy flow in the ecosystem.
- Understand the structure and function of an ecosystem.
- Describe the food chains, food webs and ecological pyramids.
- Know about the producers, consumers and decomposers.

Fundamental of Ecology and Ecosystem

The study of interactions between organisms and their biophysical environment—which consists of both biotic and abiotic elements—is known as ecology (from Greek: o□κος, "house", or "environment"; -λογία, "study of"). Interest-worthy subjects include species coexistence and competition both within and across species, as well as biodiversity, biomass, and population sizes of organisms.

Ecosystems are dynamically interacting networks of living things, the communities they inhabit, and the inanimate objects that make up their surroundings. Primary production, pedogenesis, nutrient cycling, and niche building are examples of ecosystem processes that control the movement of matter and energy through an ecosystem. Organisms possessing distinct life histories are responsible for maintaining these processes.

Ecology is not the same as natural history, environmentalism, or environmental science. It shares similarities with the closely related fields of genetics, ethology, and evolutionary biology. Increasing our understanding of how biodiversity influences ecological function is a key goal for ecologists. Ecologists try to explain:

• The interactions, processes, and adaptations of life

• The flow of resources and energy inside inhabited areas

• The distribution and quantity of species, as well as biodiversity, within the framework of the environment; the successional evolution of ecosystems.

Ecosystems consist of creatures and resources that support biophysical feedback mechanisms that regulate processes impacting the planet's biotic (living) and abiotic (non-living) components. Ecosystems that produce biomass—food, fuel, fiber, and medicine—maintain their life-sustaining processes in addition to producing natural capital, which includes water filtration, soil formation, erosion control, flood protection, and many other naturally occurring features with historical, scientific, or commercial value.

Ernst Haeckel, a German scientist, first used the word "ecology" ("Ökologie") in 1866. Political and ethical philosophy are the main sources of influence for ecological thinking. Through their research on natural history, ancient Greek thinkers like Hippocrates and Aristotle established the groundwork for ecology. In the latter part of the 1800s, modern ecology developed into a far more rigorous discipline. Natural selection and adaptation-related evolutionary ideas served as the foundation for contemporary ecological theory.

Components of Ecosystem

An Ecosystem includes all of the living things (plants, animals and organisms) in a given area, interacting with each other, and also with their non-living environments (Weather, Earth, Sun, Soil, Climate, Atmosphere).

The primary focus of ecosystem science is the examination of specific mechanisms that connect the biotic—or living—and abiotic—or non-living—components of an ecosystem. Biogeochemical cycles and energy transformations are the primary processes that make up ecosystem ecology.

Structure of the Ecosystem:

Structural Aspects

Components that make up the structural aspects of an ecosystem include:
1) Inorganic aspects – C, N, CO_2, H_2O.
2) Organic compounds – Protein, Carbohydrates, and Lipids – link Abiotic to biotic aspects.
3) Climatic regimes – Temperature, Moisture, Light & Topography.
4) Producers – Plants.
5) Macro consumers – Phagotrophs – Large animals.
6) Micro consumers – Saprotrophs, absorbers – Fungi.

Types of Ecosystems

Terrestrial Ecosystems	Aquatic Ecosystems
Forest	Pond
Grassland	Lake
Semi arid areas	Wetland
Deserts	River
Mountains	Delta
Islands	Marine

Abiotic Components

These comprise the inanimate or physico-chemical components of the environment, such as the air, soil, and water, as well as the fundamental substances. Abiotic influences can be roughly categorized into three groups: Climate variables, which comprise the physical aspects of the surroundings including light, humidity, wind, and air temperature; Edaphic variables include things like soil type, soil profile, organic matter, minerals, soil water, and soil organisms. They also have to do with the structure and composition of the soil, including its chemical and physical qualities. substances that are not organic, such as water, carbon, sulfur, nitrogen, phosphorus, and so on. organic materials such as lipids, proteins, carbohydrates, and humic compounds, among others.

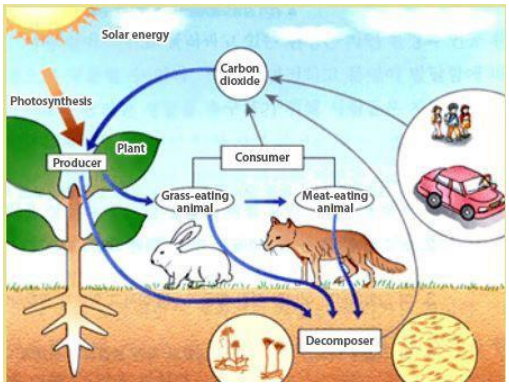
Biotic Components

It is made up of all the elements that make up the living world, such as the numerous interconnected populations of various species coexisting in the same area. The animal, plant, and microbial populations are the ones that comprise the populations. The three groups that make up the biotic community are autotrophs, saprotrophs, and heterotrophs. In Greek, autotrophs (auto = self, trophos = feeder) are sometimes referred to as producers, transducers, or convertors. These are photosynthetic plants, often chlorophyll-bearing ones, that use the sun's assistance to create a high-energy complex organic molecule, or food, from inorganic basic materials. This process is known as photosynthesis. The foundation of every biotic system is the autortoph.

Autotrophs in terrestrial environments are often rooted plants. The primary producers in aquatic environments are the shallow-rooted, floating plants known as macrophytes and the floating plants known as phytoplankton.

The consumers, or heterotrophs (Greek: heteros, other; trophs, feeder), are often creatures that devour other species. The term "phagotroph" also refers to consumers (phago = to swallow or eat), whereas herbivores and carnivores are often macro consumers. Since herbivores consume only green plants, they are sometimes referred to as first order or main consumers. Cattle, deer, grasshoppers, rabbits, and other animals are examples of consumers in the terrestrial environment. Protozoans, crabs, etc. are consumers in the aquatic environment.
Animals that hunt or consume other animals are known as carnivores. Animals that devour herbivorous species are classified as primary carnivores or second order consumers. For instance, foxes, frogs, tiny fish, raptors, snakes, etc.

Animals that consume primary carnivores are known as third order consumers or secondary carnivores. Like wolves, owls, peacocks, etc. Prey for certain bigger predators is secondary carnivores. Animals that consume secondary carnivores are referred to as quaternary consumers or tertiary carnivores. Take the tiger, lion, etc. as examples. There are no other animals that consume them. The term "top carnivores" also refers to bigger carnivores that are incapable of being further preyed upon.



Saprotrophs are also known as reducers or decomposers (from the Greek sapros, which means rotting, and trophos, which means feeder). They disintegrate the intricate organic components

found in dead stuff, such as animals and plants. They do not consume the food, decomposers. Rather, they break down the organic material by secreting a digestive enzyme into the rotting remnants of deceased plants or animals. The complex organic chemicals in the dead matter are broken down by the enzymes. To sustain themselves, decomposers take in some of the byproducts of decomposition. During the mineralization process, the residual material is added to the substratum as minerals. Plants, who are the producers, employ the released minerals as nutrients again or as needed.

Food-chain, food-web, trophic levels, energy flow, cycling of nutrients,

An ecosystem's functional characteristics enable the interdependence of its constituent elements. The natural events or energy exchanges that occur in living organism across the globe's many biomes are known as ecosystem functions. For instance, green leaves produce food that is subsequently ingested by herbivores and carnivores, while roots collect nutrients from the ground. Decomposers perform the operations that reduce complicated organic components into simply comprehended inorganic products that manufacturers can employ.

The flow of nutrients and energy within the food chain is the essence of ecosystem activities. These exchanges sustain the planet's plant and animal life as well as the decomposition of organic materials and the production of biomass. The ecosystem's many functions are all made possible by well-regulated and balanced processes.

Food chain

A food chain is the arrangement of living things in a community wherein one creature feeds on the others and is fed by them in return to exchange energy. Another definition of a food chain is "a chain of organisms that exists in any natural community and transfers energy through them."

All living things, regardless of their size or environment, require food in order to thrive, from microscopic algae to enormous blue whales. In many ecosystems, the structure of the food chain varies depending on the species. Every food chain serves as an essential conduit for nutrients and energy within the environment.

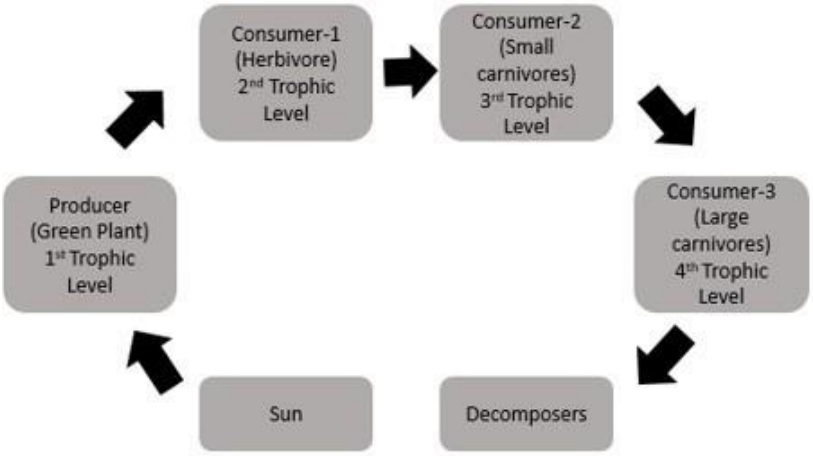


Figure 1: Food chain

The African-Arab scholar and philosopher Al-Jahiz originally described food chains in the ninth century. Charles Elton popularized the concept in a book he wrote in 1927.

A producer, like plants, is the first link in a food chain. The foundation of the food chains is the producer. Next, there are several order consumers. species that consume other species are called consumers. With the exception of the initial organism, every creature in a food chain is a consumer.

Because they employ photosynthesis to create their own food, plants are known as producers while consumers depends on plants or other animals for food. Every creature receives energy from the ones at the levels below it in a particular food chain. There is consistent energy transmission at every link in a food chain. The body does not absorb all of the energy at a given level of the cycle in the following stage.

Trophic Levels in a Food Chain

The various groupings of organisms in a food chain are referred to as trophic levels. They are listed below.

Producers (First Trophic Level) − Also referred to as autotrophs, synthesize their own food via photosynthesis. In every food chain, they make up the base. Autotrophs include plants, single-celled animals, certain kinds of bacteria, algae, etc.

Consumers (second trophic level) depends upon others for food.

Primary Consumers (Second Trophic Level) − eat the producers. They are called herbivores. Deer, turtle, and many types of birds are herbivores.

Secondary Consumers (Third Trophic Level) − eat herbivores. They can be carnivores (meat eaters) and omnivores (animals that eat both animals and plants).

Tertiary Consumers (Fourth Trophic Level)− eat other carnivores.

Decomposers − Decomposers, who are sometimes absent from the visual depiction of the food chain, are crucial to its completion. These creatures decompose garbage and dead organic matter. The primary decomposers in many ecosystems are bacteria and fungi, which derive their metabolic energy from the chemical energy found in waste products and dead matter.

Knowing the food chain facilitates our understanding of the interactions and feeding relationships that exist between an organism and its environment. It also makes it possible for us to understand how energy moves across an ecosystem.

Food Web

The term "web" refers to a network. "A network of interrelated food chains so as to form multiple feeding relationships among different organism of a biotic community" is the definition of a food web.

In an ecosystem, a food chain cannot exist in isolation. There might be many chains that include the same food source. At the lower tropic level, the resource is capable of doing this.

Every food chain within an ecosystem is referred to as a food web. Understanding that every organism in an ecosystem is a link in a network of food chains is crucial

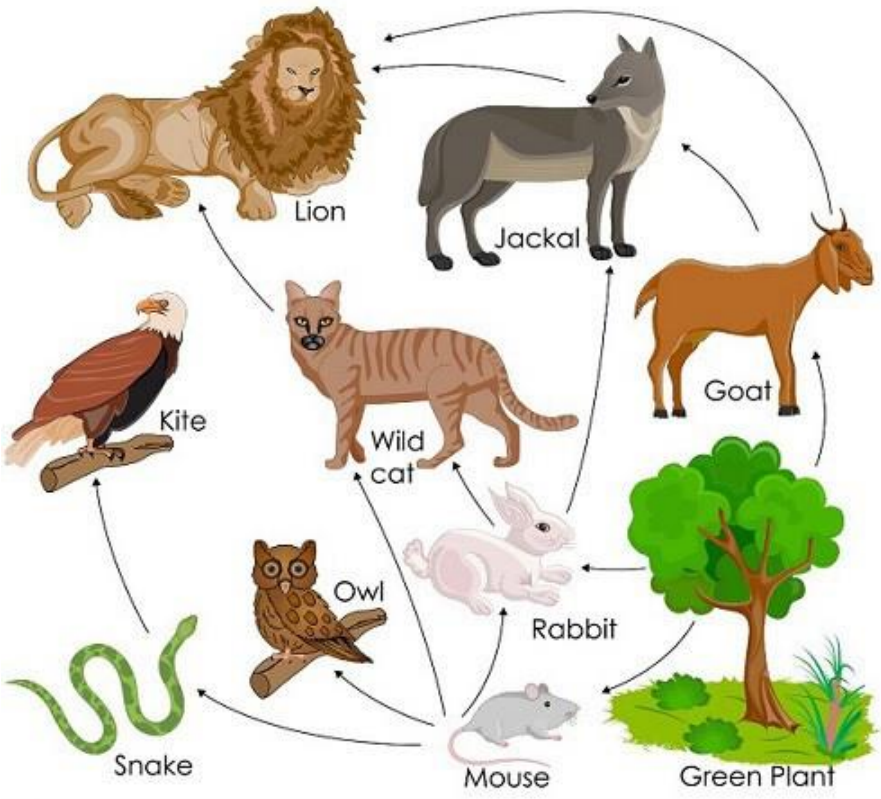


Figure 2: Food web

Food Web

The only viable route for energy and nutrients to travel through the ecosystem is via a single food chain. A food web is made up of all the linked and overlapping food systems within an ecosystem.

Food webs are important resources for comprehending how plants support all ecosystems and food chains by giving the necessary nutrients and oxygen for life to exist and reproduce. The ecology is stabilized by the food web.

Quaternary consumers devour the tertiary consumers. Consider a hawk that preys on owls. Every food chain has an apex predator and an animal without natural enemies at the bottom (such as an alligator, hawk, or polar bear).

Ecological Pyramid

It is a graphical (pyramidal) representation of the number of organisms, biomass, and productivity at each trophic level. It is also known as Energy Pyramid. They are as follows −

Pyramid of Biomass

This displays the quantity of live biomass at each trophic level that is present per unit area. The top predators are at the tip, while the producers are at the base of the drawing.

Typically, to determine the biomass pyramid, all organisms belonging to each trophic level are gathered independently and their dry weight is measured. Standing crop, defined as the mass of living creatures (biomass) or the number in a unit area, is the specific mass of living material at a given moment in each trophic level.

Upright Pyramid of Biomass

The majority of terrestrial ecosystems are composed of erect biomass pyramids with a sizable base of primary producers and a smaller trophic level positioned on top.

Producers or autotrophs have the highest biomass. The principal consumers at the next trophic level have a lower biomass than the producers. Comparatively speaking, secondary and tertiary customers make up a smaller portion of the market than its lowest level. There is remarkably little biomass at the apex of the pyramid.

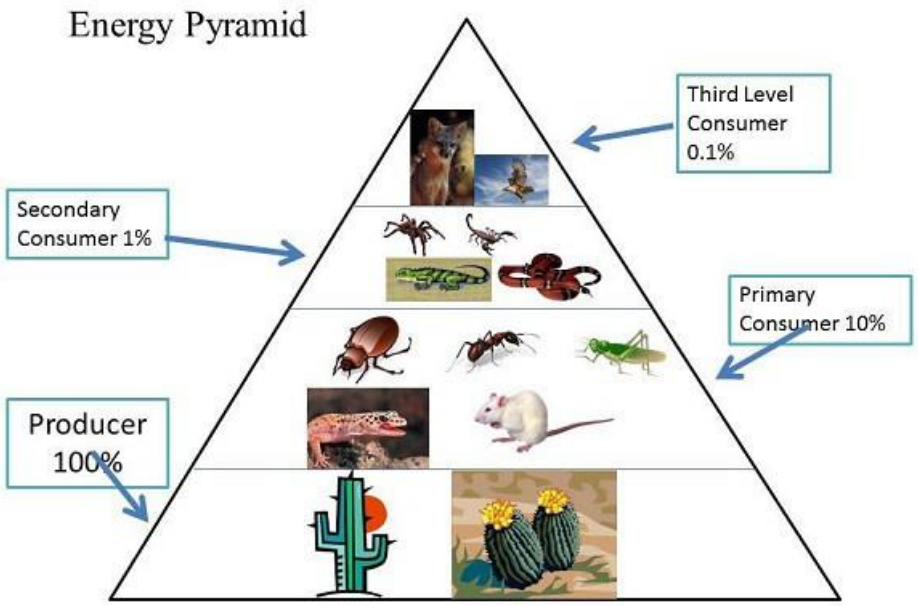


Figure 3:Upright pyramid of biomass

Inverted Pyramid of Biomass

However, the majority of aquatic ecosystems have a reverse pyramidal shape. In this case, the biomass pyramid can take on an inverse shape. On the other hand, the aquatic ecosystem's numerical pyramid is erect.

The producers in a body of water are microscopic phytoplankton, which multiply and expand quickly. Under these circumstances, the base of the biomass pyramid is modest, with the producer biomass supporting the heavier consumer biomass. It takes on an inverse form as a result.

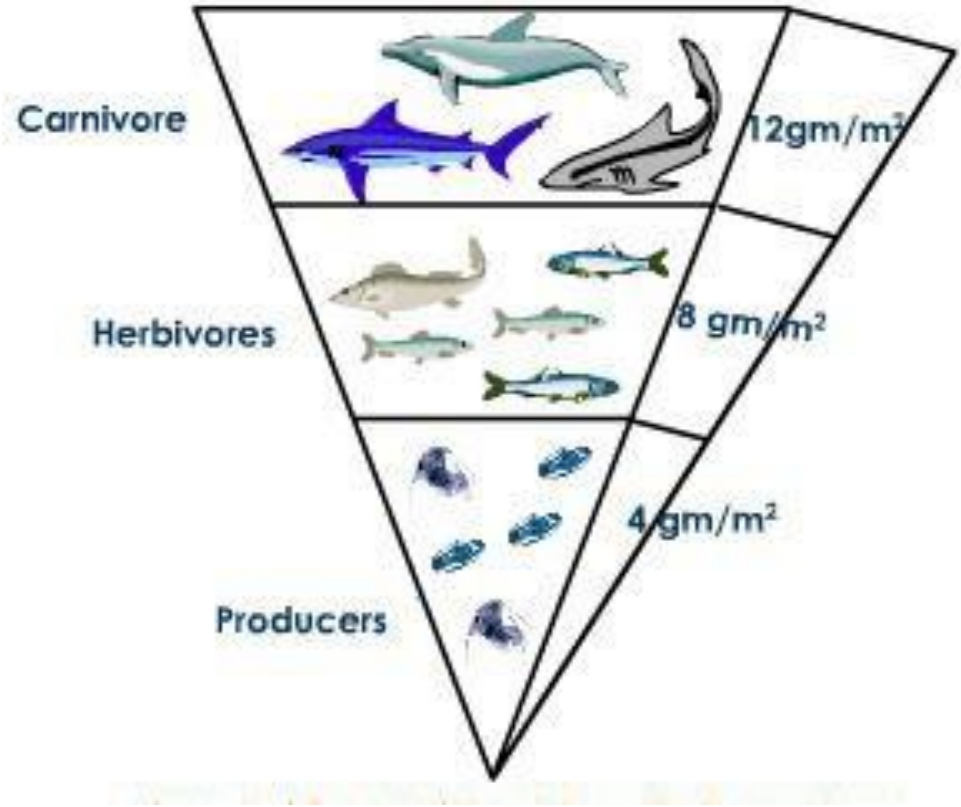


Figure 4: Inverted pyramid of biomass

Pyramid of Numbers

It is a graphical representation of the number of people in each trophic level per unit area. A greater number of producers often make up the base, whereas fewer top predators or carnivores tend to occupy the tip. The numerical pyramid's form differs depending on the ecology.

For instance, there are many autotrophs or producers per unit area in grassland or aquatic environments. Less herbivores are supported by the producers, and fewer carnivores are supported as a result.

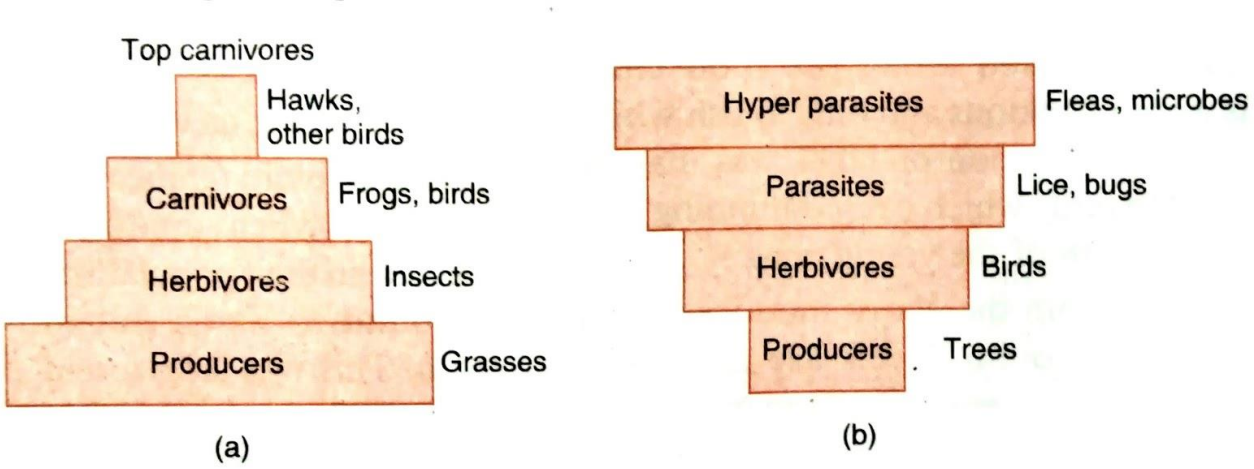


Figure 5: pyramid of number a) Upright b) Inverted

Upright Pyramid of Numbers

The number of people falls from the lower level to the upper level in an upright pyramid of numbers. The environments of ponds and grasslands are often home to this kind of pyramid. Because of its abundance, grass in a grassland environment is at the lowest trophic level, followed by herbivores (such as grasshoppers). The number of grasshoppers is quite less than that of grass. Then there are the main carnivores, such rats, which are far less common than grasshoppers. The secondary consumers, such snakes that eat rats, make up the next trophic level. Subsequently, there are apex predators like hawks, who consume snakes and have a smaller population than snakes.

Inverted Pyramid of Numbers

From the lower to the higher trophic levels, there are more individuals in this area. The environment of trees, for instance.

Pyramid of Energy

It is a diagram that shows how energy moves through the trophic levels of a food chain in a specific area of the natural world. Each trophic level's energy content is represented as an energy pyramid, with energy loss at each level moving to a higher trophic level.

The energy pyramid, also known as the trophic or ecological pyramid, is a helpful tool for calculating the amount of energy that moves up the food chain from one creature to another.

Moving up the trophic pyramid from the base to the top results in a reduction in energy. The energy pyramid is therefore continuously pointing upward.

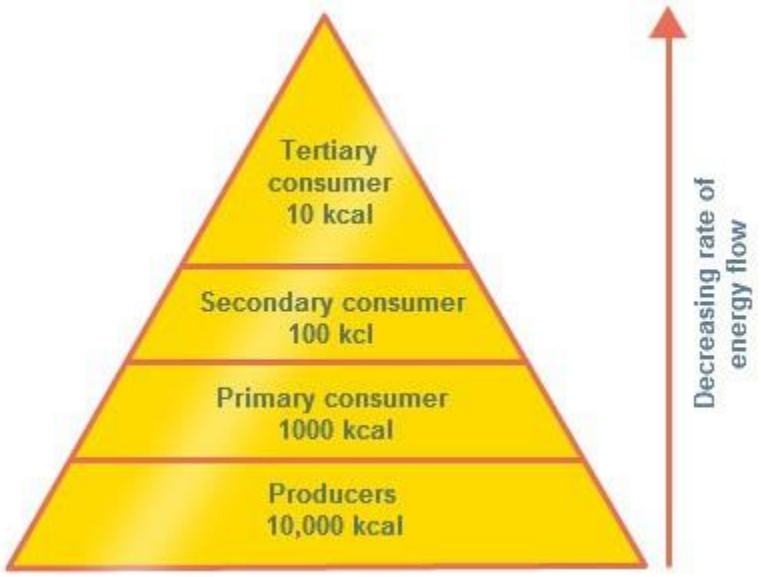


Figure 6: Upright pyramid of energy

Summary

A range of biotic and abiotic elements that work in concert with one another make up ecosystems. A few of the most crucial elements include soil, atmosphere, solar radiation, water, and living things. Both live things, or biotic factors, and non-living things, or abiotic factors, are present in an ecosystem. The environment's physical and chemical features are the non-living elements, also referred to as biotic factors. Energy may be shown moving sequentially from one tropic level to another within an ecosystem. Such a food chain places an immediate demand on ecosystems for solar radiation. The study of the food chain aids in our comprehension of the interactions and eating patterns amongst creatures within an ecosystem.

Keywords

Detritivores: These are scavengers which feed on dead plants and animals or their waste.

Ecosystem: It is a community of living and non-living elements with their surroundings.

Microorganisms: Found all throughout the planet, microorganisms are little single-celled creatures that include bacteria, fungus, and viruses.

Reproduction: A basic characteristic of all known life is reproduction, which is the reason behind the existence of each individual organism.

Saprotrophs: A saprophyte or saprotroph is an organism which gets its energy from non-living organic matter.

MCQs

1. Which one is the important biotic factors in ecosystems:

    I. Temperature.

    II. Water.

    Wind.(a) I only. (b) II only. (c) III only. (d) I, II, and III.

All of the following statements about ecology are correct except:(a) The study of ecology examines how biotic and abiotic elements of the ecosystem interact.(b) The study of ecology is distinct from the study of natural selection and the history of evolution.(c) Ecologists may research organismal populations and communities.(b) Ecology encompasses a progressively wider range of organizational levels, from people to ecosystems.

Choose the correct sequence of arrangement from most to least inclusive:(a) Ecosystem, community, population, individual.(b) Community, ecosystem, individual, population.(c) Individual, population, community, ecosystem.(d) Population, ecosystem, individual, community.

Choose the correct biotic factors that can affect the structure and organization of biological communities:(a) Nutrient availability, soil pH, light intensity.(b) Precipitation, wind, temperature.(c) Predation, competition, disease.(d) None of these.

Landscape ecology is best described as the study of:(a) The array of interacting species within a community.(b) A biotic factor and the community of species that exist in a particular area.(c) The factors affecting the abundance of single species.(d) Related arrays of ecosystems.

Answers:

1. (d) 2. (b) 3. (a) 4. (c) 5. (d)

Important Questions

1. Explain the concept of an ecosystem.
2. Discuss the energy flow in the ecosystem.
3. Explain about structure and function of an ecosystem.
4. What are the functions of management?
5. Explain about food chains, and food webs.
6. What are ecological pyramids?
6. Discuss about the producers, consumers and decomposers.
7. What are difference between consumers and decomposers?
8. Define the ecological succession.

Unit - 2

Classification of Ecosystem

Objectives:

- Identify the ecosystem.
- Define structure and function of forest ecosystem.
- Understand about structure and function of grassland ecosystem.
- Describe the desert ecosystem.
- Discuss about the aquatic ecosystems.

Major Ecosystem types:

Ecosystems can be divided into two categories: terrestrial and aquatic. Both of these categories include all other sub-ecosystems.

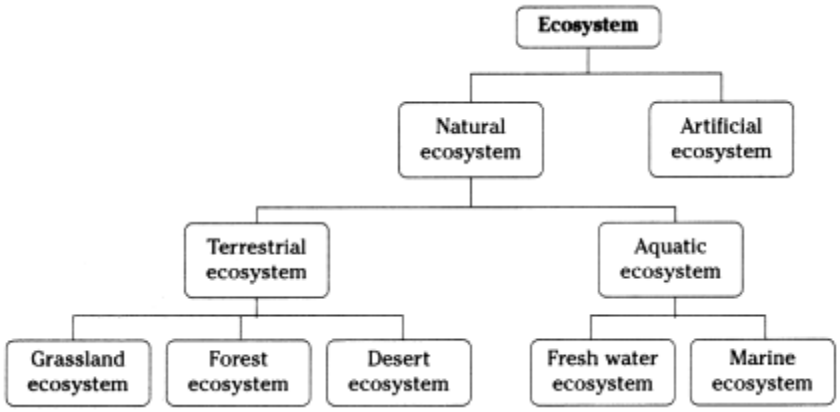


Figure: 1 Classification of Ecosystem

Terrestrial ecosystem

Except for highly populated areas, terrestrial ecosystems can be found anywhere. Consequently, there are a lot of living things in forest ecosystems at a high density. Terrestrial ecology refers to an ecosystem that is found on land. One category of ecosystems is aquatic, which are further divided into four categories after they form outside of bodies of water.

a. Forest ecosystem

It consists of every wild animal, bird, and bug that inhabits woods, as well as trees and various types of grass that grow there. To survive in this ecosystem, all of the biotic and abiotic elements work in concert with one another.

Rainfall in tropical evergreen woods averages 80 inches per 400 inches of yearly precipitation. Dense vegetation made up of tall trees at various heights is what gives the woodlands their distinctive appearance. Animals of many kinds find refuge on each floor.

Tropical deciduous forest: A wide variety of trees coexist with dense bushes and shrubs as the predominant vegetation. This kind of forest is widespread around the world and is home to a wide range of animals and plants.

Temperate evergreen forests: They have a large number of trees because ferns and mosses make up for their lack of trees. Spikes on leaves are a result of trees trying to reduce transpiration.

Temperate deciduous forest: The forest is found in damp, temperate regions with enough rainfall. There is a distinct difference between summer and winter, and in the winter, trees lose their leaves.

Taiga: The taiga, which lies just before the arctic areas, is characterized by evergreen conifers. The remaining months are humming with migratory birds and insects because the temperature stays below zero for nearly six months.

b. Grassland ecosystem

Grasslands can be found worldwide in both tropical and temperate locations, though their ecosystems differ somewhat. The grasses and herbs are essential to the grassland ecology. Savanna habitats, as well as tropical and temperate regions, are examples of grassland ecosystems. The primary vegetation consists of plants, legumes, and grasses in the composite family. The grasslands are home to several herbivores, insectivores, and grazing animals. The two main kinds of grasslands ecosystems are:

Savanna: The tropical grasslands feature few individual trees and are arid during certain seasons. They provide food for numerous grazers and predators.

Prairies: It's a temperate grassland with no big trees or plants in sight. There are three types of prairies: mixed grass, tall grass, and short grass.

c. Desert ecosystem

Deserts cover an area that receives less than 25 inches of rainfall. Approximately 17% of the planet's land area is occupied by them. Fauna and vegetation are rare and poorly developed because to the great heat, scarcity of water, and strong sunshine. Most of the vegetation is made up of bushes, bushes, a few unusual trees, and grasses. To save as much water as possible, the plants have altered their stems and leaves. Succulents like spiky-leaved cacti are the most well-known types of desert plants. In such an environment, there is not much vegetation. Desert animals include foxes, camels, and kangaroos, among others.

d. Tundra ecosystem

Trees can be found in colder regions, in an ecosystem called the tundra. Snow covers this area of the ecosystem for the majority of the year. Mountain tops and polar regions are home to this ecology.

Aquatic Ecosystems

An aquatic body of water contains an ecology known as the aquatic ecosystem. It also includes water qualities, aquatic plants, and wildlife. Aquatic ecosystems are primarily classified as freshwater or marine.

1. Biotic or Living Components

Microorganisms, plants, and animals are examples of biotic components in ecosystems. The Producers or Autotrophs, Consumers or Heterotrophs and Decomposers or Detritus are ecosystem’s biotic components.

2. Abiotic or Non-living Components

The term "abiotic components" refers to the climate or the elements that influence it, including temperature, light, humidity, precipitation, gases, wind, water, soil, salinity, topography, minerals, and habitat. For every ecosystem on Earth to function, energy flow and the cycling of nutrients and water are essential. The foundation for ecosystem function is provided by non-living elements.

3. Aquatic Ecosystem

The term "aquatic ecosystem" refers to an ecosystem found in water. The aquatic environment in which they live and depend determines the nature and characteristics of the communities of living, or biotic, organisms and non-living, or a biotic, components that interact and involve one another. Marine ecosystems and freshwater ecosystems are the two basic categories into which aquatic ecosystems fall.

i. Marine Ecosystem

These ecosystems, which make up about 71% of the planet's surface and hold 97% of its water, are the largest ecosystems on Earth. The deep water, the sea bottom, mangroves, coral reefs, estuaries, lagoons, and salt marshes are all found there.

The marine environment supports a huge kingdom of species and has a distinctive flora and fauna. Both the terrestrial and marine habitats depend on these ecosystems for their general health. Mangrove forests, seagrass wetlands, and salt marshes are some of the most productive ecosystems. The world's coral reefs support the greatest diversity of marine life by offering food and shelter. The biodiversity of the marine environment is high.

ii. Freshwater Ecosystem

The freshwater ecosystem is made up of ponds, rivers, streams, and lakes. Large freshwater bodies encircled by land are called lakes.
The freshwater ecosystem depends on plants and algae for food and oxygen production through photosynthesis, which they accomplish. Estuaries are home to a special kind of plant life that has evolved to withstand both freshwater and saltwater conditions. Two types of estuarine plants are

pickle weed and mangroves. Freshwater ecosystems support a wide variety of animals. For human use as a source of drinking water, energy, transportation, recreation, and other necessities, freshwater ecosystems are vital. 0.009% of Earth's total water content and 0.8% of its surface are made up of freshwater ecosystems, in contrast to marine habitats.

Freshwater habitats can be divided into three fundamental types:
Lentic: Tilled or slowly moving water in lakes, ponds, or pools.
Lotic: Water that moves quickly, as rivers and streams.
Wetlands are areas where the soil is flooded or wet for an extended length of time.

Around 41% of the world's fish species live in these settings, along with amphibians and reptiles. In comparison to slow-moving pools, faster-moving turbulent waters usually have higher quantities of dissolved oxygen, which supports a higher level of biodiversity.

Summary

An ecosystem is a group of living things that work together and with inanimate objects to develop sustainably and adapt to changing environmental conditions. Therefore, because they provide the foundational meals for other organisms in food chains and food webs, plants are referred to as the primary producers.

When there is more rain than is necessary for deserts but insufficient for forests, grasslands grow. Although the desert sand was once rock, it has become dunes over time as a result of wind and water erosion. An aquatic ecosystem is a community of living things that live in close proximity to one another and rely on the water environment for shelter and nutrients like phosphorus and nitrogen.

Keywords

Biodiversity: The variety and distinctions among living things from all sources, such as terrestrial, marine, and other aquatic environments as well as the ecological complexes in which they are embedded, is known as biodiversity.

Estuaries: A partially contained body of water along the coast where freshwater from streams and rivers combines with ocean saltwater is known as an estuary.

Landscape: Landscapes are a live representation of the synthesis of people and place that is essential to local and national identity. They combine the physical origins of a region with the cultural overlay of human presence, frequently formed over millennia.

Physiology: Anatomy and physiology are closely related fields of study; anatomy is the study of form, and physiology is the study of function.

Pond Ecosystem: The relationship between biotic factors—plants, animals, and microorganisms—and their physical environment that is abiotic factors forms the foundation of the ecology, known as the ecosystem.

MCQs

A. What kind of environment would be categorized as a biome?

i. Lake
ii. Bay
iii. Meadow
iv. Desert

B. Which of the following describes a correct organizational hierarchy?

i. Ecosystem- landscape –community- biome
ii. Biome- community- landscape- ecosystem
iii. Community -ecosystem -landscape -biome
iv. Landscape –community- ecosystem –biome

C. In a boreal forest, what kind of trees is present?

i. Coniferous
ii. Deciduous
iii. Temperate
iv. Hardwoods

D. Which of the following is not present in tropical rain forests but is present in temperate rainforests?

i. Amphibians
ii. Epiphytes
iii. Evergreen trees
iv. Relatively constant temperature

E. Which biome among these has the highest biodiversity?

i. Boreal forest
ii. Temperate grassland
iii. Temperate rain forest.
iv. Tropical rain forest.

Answers

1. (iv) 2. (iii) 3. (i) 4. (iv) 5. (iv)

Important Questions

1. Explain how ecosystems are categorized.
2. Explain the composition and operation of the forest ecosystem..
3. Describe the composition and purposes of the ecology of grasslands.
4. What kinds of desert ecosystems are there?
5. Describe the aquatic ecosystem..
6. Describe rivers and streams.
7. Discuss about the pond ecosystem.

Unit - 3

Biodiversity and its conservation

Objectives:

- Recognize what is meant by species, ecological, and genetic diversity.
- Recognize the importance of biodiversity
- Evaluate national, international, and local biodiversity; see India as a nation with mega diversity.
- Determine biodiversity hotspots Examine the risks to biodiversity

Introduction:

The variety and distinctions among living things from all sources—including terrestrial, marine, and other aquatic habitats as well as the ecological complexes in which they are embedded—are referred to as biodiversity. It is almost a synonym for "Life on Earth."The "totality of genes, species, and ecosystems of a region" is the definition of "biological diversity" or "biodiversity" that biologists most frequently use. After roughly 3.5 billion years of evolution, the biodiversity that exists on Earth today is made up of millions upon millions of different biological species.

Types or Level of Diversity:

Genetic Diversity:

- Differentiated genetic characteristics among species
- Genetic variations among species, or diversity within species.
- Variations slightly amongst species
- Variations resulting from a combination of genetic variants
- Fundamental components of heredity that are passed down from generation to generation.
- Eg. Rice varieties, teak wood varieties, etc

Species Diversity:

- Distinct grouping of the same kind of organisms
- Variability among species
- Total variation between species in living things
- Eg. Plant- Mango, Apple, Grapes, Wheat, Rice and Animal- Deer Lion Tiger

Ecosystem and Community Diversity

Diversity within ecosystems is the term used to describe a location's diversity. There are three opinions on this:

Alpha Diversity: Within the diversity of the community. The variety of species that coexist in the same community or habitat is referred to as alpha diversity.

Beta Diversity: In between the diversity of the neighborhood. It speaks of the variety of living things that coexist in two different ecosystems.

Gamma Diversity: Gamma diversity refers to the diversity of the environment across the entire landscape or geographic region.

Bio geographical Classification of India:

- India possesses immense diversity, with disparate climates and topographies in its various regions.
- Variations resulting from the diversity of flora and fauna
- The distribution, evolution, and interaction of plants and animals to their environments are vital to research and understand.
- India was categorized into ten biogeographic zones by biogeographers to understand the relationship between the flora and fauna.
- Every zone possesses unique soil, fauna, and climate.
- Major biogeographical environments in India include the Trans-Himalayan region, the Himalayan mountain range, Deserts, Semi-arid regions, The Deccan Peninsula, The Gangetic Plain, Northeast coasts, and Islands.

Value of Diversity:

- A variety of distinct organisms, each with its own significance, are supported by the biosphere.
- The Biosphere is stable and functions properly when there is biodiversity.
- Every creature in the biosphere provides benefits to us.

Classification and importance of value of Diversity:

Value of Diversity is classified as:

Consumption Use Value

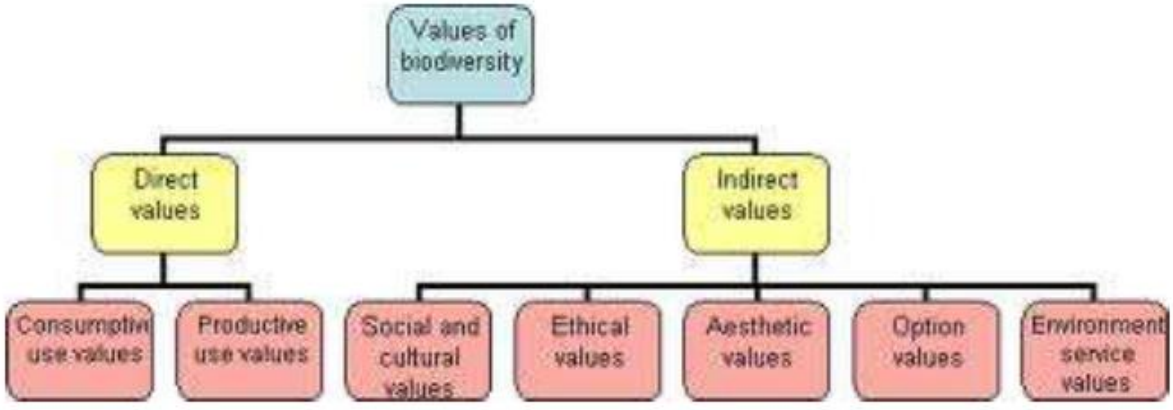
Productive Use Value

Ethical Value

Social Use Value

Option Value

Aesthetic Value



a. Consumption Use Value

- This is direct use, directly harvested and consumed value.
- 80–90% of the food comes from tropical wild plants, such as Cereoptegia bulbosa, Codonopisis, and Cereophyllum.
- 70% of contemporary medications come from plants. • Conventional methods: Sidha and Ayurveda.

- Firewood, fossil fuels such as coal, oil, and natural gas, and fuel

b. Productive use value: The value acquires a business value. Products are offered for sale. and derived from plants and animals. For example:

Animal	Animal Product
Silk-Warm	Silk
Sheep	Wool
Fish and Animal	Food
Elephant	Tusk

PLANT & ANIMAL PRODUCT	INDUSTRY
Wood	Paper and pulp industry
Cotton	Textile industry
Fruits, vegetables	Food industry
Leather	Leather industry

c. Ethical Value: It is important to uphold ethical issues. India's cultural and religious foundation is excellent. This value indicates that Offers pleasure whether utilized or not. Example: River Ganga, Tulsi, Vembu, kangaroo, zebra, giraffe, etc.

d. Social Value: Social life, religion, and spiritual aspects are valued. Bioresources are used for the benefit of society. Example Holy Plants: lotuses, tulips, etc. Holy Animals: rat, peacock, cow, snake, etc.

e. Aesthetic Value: The most significant benefit of biodiversity is ecotourism, which is enhanced by the beautiful nature of plants and animals.

f. Optional values: Unknown biodiversity that needs to be understood.

Global Biodiversity: Only 1.5 million of the approximately 20 million extant species have been identified and given names. Each year, the biodiversity is declining by 0.5% due to tropical

deforestation alone.

Terrestrial biodiversity or Biomass: Tropical Rainforests and Temperate rain forests and Marine Diversity part of global diversity.

Terrestrial biodiversity or Biomass: The largest ecological units found in various regions. The largest repository of biodiversity on Earth, tropical rain forests are home to millions of plants, insects, birds, amphibians, and mammals.

Around 50–70% of the diversity in the world.

- This region produces 25% of the world's medicinal plants. It also produces roughly 1,30,000 flowering plants, of which 1-3 percent are known.

Temperate Forest: Significantly reduced biodiversity in which 1,70,000 plants with flowers, thirty thousand vertebrates and 2,50,000 additional species groups.

Marine Diversity: It is less well-known and described, but its biodiversity is far higher than that of terrestrial environments. Oceans, coastal waters, and estuaries have a variety of biological features. Every known animal phylum originated in the sea, including 35 extant phylum of multicellular animals, 34 marine species, and 16 exclusively marine species.

National Level of Biodiversity in Level

India, which occupies 2% of the planet's surface and 5% of its biodiversity, is the second-largest country in the world in terms of biodiversity.

- ✓ Rank of India 11th place among endemic species of higher vertebrates, 10th place among plant-rich species, 6th place among centers of diversity and origin of agricultural crops.
- ✓ India is a country primarily focused on agriculture, with its economy heavily dependent on crop production. Due to its abundant flora and fauna, India is regarded as a mega-diversity nation. India's species are highly demanded overseas.

- ✓ More than 2000 medicinal plants, like tulsi, neem, turmeric, etc., are used to treat a wide range of illnesses.
- ✓ The demand for ornamental plants, flowers, and fruits has led to the development and formulation of over 100 species of tobacco, nicotine, wild edible mushrooms, and Indian sandal wood, all with a high commercial value.

Biodiversity at local level: The local biodiversity is categorized according to its spatial distribution as follows:

a. Richness of points: species that are unique to a particular location
b. Diversity or richness of Alpha: number of species in a compact, uniform area
c. Diversity or richness of beta: The rate at which species change increases with the number of diverse habitats
d. Gamma diversity or richness: alterations throughout a vast landscape

Hot-Spot of Biodiversity: Hot spots of biodiversity are places that have high species richness and high species endemism.

- ✓ There are two hotspots for biodiversity in India: the Eastern Himalayas and the Western Ghats. There are 25 hotspots for biodiversity worldwide.
- ✓ These areas are highly prioritized for conservation on a global scale because lost species cannot be recovered or replaced.
- ✓ 50% of terrestrial biodiversity is found in hotspots that make up less than 2% of the planet's surface.
- ✓ Roughly 40% of land plants and 25% of animal species are native to specific regions and can only be found in hotspots.

Standards by which hotspots are identified:

- The number of endemic species, or those that are unique to a single location.
- The degree of threat is determined by the loss of habitat.

Threats to Biodiversity

From a geological standpoint, extinction is a common occurrence and a natural event. Due to the extreme impact of human activity over the past century, thousands of species and varieties are going extinct every year. Several primary reasons include: Degradation, fragmentation, and loss of habitat.89% of all threatened birds, 83% of all threatened mammals, and 91% of all threatened plants worldwide are affected by habitat loss and degradation, which is one of the main causes of species extinction (IUCN, 2000).

The development of human settlement, mining, industry, and agriculture are the primary causes of habitat degradation. In 49 of the 61 old world tropical countries, the UNEP and ICUN report states that over 50% of wildlife habitat has been destroyed.

Risks to biodiversity and their causes:

a. **Habitat loss:** The single biggest factor causing biodiversity loss is the destruction and loss of natural habitat.
b. **Poaching (over harvesting):** Trading wildlife products illegally through the killing of protected species
c. **Human-wildlife conflicts:** It occurs when animals begin to seriously harm and endanger people.

Factors affecting Biodiversity:

- Affected by human activities, such as building dams in forested areas, releasing industrial waste, applying pesticides and insecticides to agricultural fields, moving cities, etc.
- Over-exploitation, poaching, and degradation
- Oil spills and wastewater pollution the marine ecosystem
- Acid rain, global warming, and ozone layer depletion

Need of Biodiversity Conservation:

- Immediate advantages for tourism and recreation in society.

- The accessibility of unprocessed elements maintains genetic diversity.
- Ensures long-term use Preservation of the Natural Variety.
- It is imperative to preserve biodiversity because its loss leads to degradation of the environment and ecology.

Conservation of Biodiversity: Biological Diversity was emphasized as a necessity for sustainable development and the continued existence of humans on Earth in the June 1992 convention.

According to its definition, conservation is "the management of human use of the biosphere so that it may yield the greatest sustainable benefit to the present generation while maintaining its potential to meet the needs and aspirations of future generations."

In protected habitats, there are two fundamental methods for conserving wildlife. Conservation that occurs 1) in-situ and 2) Ex-situ.

In-situ conservation: The term refers to the preservation of a species within its native environment or within artificial ecosystems. The focus of this strategy is to safeguard the entire ecosystem by establishing a network of "protected areas." A protected area is a specific area of land or sea that is managed legally and effectively to preserve and protect biological diversity. Protected areas are managed with varying goals and fall into different categories. These consist of Wild Life Sanctuaries, National Parks, and Biosphere Reserves. As of right now, our nation contains 420 wildlife sanctuaries, 80 national parks, and 11 significant biosphere reserves, making up 4% of the total land area. India's first national park was created, called JIM CORBETT National Park.

Ex-situ Conservation: The preservation of a component of biological diversity (a sample of genetic diversity, especially of endangered species) outside of their natural habitats" is its definition. It entails the partial or complete control of the maintenance and breeding of endangered plant and animal species. For example, aquariums, nurseries, zoos, botanical gardens, DNA banks, seed banks, and gene banks. In the world, there are more than 1500 botanical gardens with over 80,000 species. Around 3,000 different species of mammals, birds,

reptiles, and amphibians can be found in more than 800 zoos worldwide.

Summary:

The diversity of species, ecosystems, and genetic makeup that exists on Earth is referred to as biodiversity. Spread across its multiple biogeographical zones, such as the Deccan Plateau, the Western Ghats, and the Himalayas, India is a mega-diverse country with a wide variety of flora and fauna. Ecological services, economic benefits, and cultural significance are all provided by biodiversity, making it invaluable. Global biodiversity is necessary for both human survival and ecological balance. In addition to supporting local livelihoods and cultural practices, India's rich biodiversity is a national testament to the country's distinctive environmental legacy. Areas with exceptionally high species richness and endemism, known as biodiversity hotspots, are the Western Ghats and Eastern Himalayas. However, these areas are seriously threatened by invasive species, pollution, habitat destruction, overexploitation, and climate change. In India, laws like the Wildlife Protection Act, protected area creation, community involvement, sustainable practices, and participation in international agreements like the Convention on Biological Diversity are all part of the country's conservation efforts. The survival of all living forms depends on biodiversity protection in order to preserve ecological balance.

Keywords:

- Biodiversity: The range of life forms found in a specific ecosystem, biome, or on Earth overall.
- Genetic Diversity: The range of genes found in a specific species.
- Diversity of Species: The quantity of various species and their relative abundance
- Ecosystem Diversity: A given area's range of ecosystems
- Biodiversity Hotspots: Areas with exceptionally high levels of endemism and species richness that are seriously threatened by human activity are known as biodiversity hotspots.

MCQ

1. ..... is a recently established field of study that aims to conserve natural resources by investigating every facet of biodiversity.

i. The biology of humans
ii. Biology of conservation.
iii. Agronomy.
iv. Management of wildlife.

2. According to conservation biology, which ethical principle is backed?
   i. All living things, including humans, should strive for biodiversity.
   ii. Human activity should not result in extinctions.
   iii. The value of biodiversity is unavoidable.
   iv. Every one of these.

3. If species conservation measures are not implemented, what proportion of all extant species will become extinct due to human activity within the next 20 to 50 years?
   i. Between 1 and 2%.
   ii. Between 5 and 10%.
   iii. 10 to 20 percent
   iv. 50–75%.

4. Why does a population's genetic diversity matter?
   i. Making the populace less prone to illness.
   ii. To enable population members to endure environmental changes.
   iii. In order for collections in museums to be more realistic.
   iv. A and B are both right.

5. Typically, habitats with a large number of species are called...
   i. Heterogeneous
   ii. Divergent
   iii. Hotspots for biodiversity
   iv. Multipliform

Answers

1. (ii) 2. (iv) 3. (iii) 4. (iv)

Important Questions

1. Define species, genetic, and ecological diversity.
2. Describe India's bio geographical classification.
3. By "value of biodiversity," what do you mean?
4. Explain local, national, and global biodiversity.
5. Give an explanation of India's mega diversity.
6. Briefly discuss the hottest biodiversity sports.
7. Describe the risks to biodivers

Unit - 4

Environmental pollution

Objectives

- Understand the idea of pollution and pollutants.
- Explore different types of environmental pollutions.
- Identify the marine pollution
- Explain the thermal and the radioactive pollution and its effect on health.

Introduction

Environmental pollution is a serious worldwide problem that endangers biodiversity, human health, and ecosystems. It is the release of dangerous pollutants into the environment that have a negative impact on both the natural world and living things. Numerous factors, such as human activity, industrial operations, transportation, and natural events, can produce pollution. To effectively reduce the consequences of pollution and maintain environmental quality, it is important to have a thorough understanding of the nature, sources, and implications of pollution.

Definition of Pollution and Pollutants

Pollution refers to the presence of substances or agents in the environment that cause adverse effects on living organisms, ecosystems, and natural processes. These substances, known as pollutants, can originate from both natural and anthropogenic sources. Common pollutants include chemical compounds, particulate matter, biological agents, and energy emissions.

Pollutants can be classified into several categories based on their origin, chemical composition, and environmental impact. Here are some common classifications:

1. Primary Pollutants: These contaminants come from identified sources and are released into the environment directly. Examples include emissions from cars, factories, and power plants of carbon monoxide (CO), sulfur dioxide (SO2), nitrogen oxides (NOx), particulate matter (PM), and volatile organic compounds (VOCs).

Secondary Pollutants: Chemical interactions between primary pollutants and atmospheric elements result in the formation of secondary pollutants in the atmosphere. Ozone (O3), which is created when NOx and VOCs react photochemically in the presence of sunlight, and secondary aerosols, which are created when gaseous precursors oxidize and condense, are two examples.

2. Criteria Pollutants: These pollutants are regulated by environmental agencies due to their widespread presence, adverse health effects, and environmental significance. The criteria pollutants identified by regulatory authorities typically include carbon monoxide (CO), sulfur dioxide (SO2), nitrogen dioxide (NO2), ozone (O3), particulate matter (PM), and lead (Pb).
3. Toxic Pollutants: Toxic pollutants are substances that pose significant risks to human health and the environment due to their toxicological properties. Examples include heavy metals (e.g., lead, mercury, cadmium), persistent organic pollutants (e.g., polychlorinated biphenyls, dioxins), pesticides, and industrial chemicals (e.g., benzene, formaldehyde).
4. Biological Pollutants: Biological pollutants include microorganisms, pathogens, and biological agents that contaminate air, water, and soil, posing risks to human health and ecosystem integrity. Examples include bacteria, viruses, fungi, protozoa, and parasites responsible for waterborne diseases, foodborne illnesses, and infectious diseases.
5. Particulate Matter (PM): Particulate matter refers to tiny particles suspended in the air, ranging in size from coarse particles (PM10) to fine particles (PM2.5) and ultrafine particles (PM0.1). PM originates from combustion processes, industrial emissions, vehicle exhaust, dust storms, and natural sources, posing respiratory and cardiovascular health risks.
6. Greenhouse Gases (GHGs): Greenhouse gases are compounds that absorb and emit infrared radiation, contributing to the greenhouse effect and climate change. Major greenhouse gases include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), fluorinated gases, and water vapor.

Understanding the classification of pollutants is essential for assessing their sources, transport mechanisms, environmental fate, and health impacts, thereby informing pollution control strategies and regulatory measures.

Different Types of Environmental Pollution

Environmental pollution manifests in various forms, each posing unique challenges and impacts on ecosystems and human well-being. The primary types of environmental pollution include:

1. Air Pollution:The discharge of toxic gasses, particulate matter, and other pollutants into the atmosphere results in air pollution. Vehicle emissions, industrial processes, the burning of fossil fuels, and agricultural practices are some of the causes of air pollution. Carbon monoxide (CO), sulfur dioxide (SO2), nitrogen oxides (NOx), ozone (O3), volatile organic compounds (VOCs), and particle matter (PM) are among the main air pollutants. Climate change, respiratory ailments, cardiovascular disorders, and environmental damage can all be caused by air pollution.
2. Water Pollution:The term "water pollution" describes the release of toxic compounds into bodies of water, including lakes, rivers, seas, and groundwater. Water contamination can arise from several sources, such as inappropriate waste disposal, sewage effluents, agricultural runoff, and industrial discharges. Common water pollutants include heavy metals, pesticides, pathogens, nutrients, and synthetic chemicals. Water pollution threatens aquatic ecosystems, compromises drinking water quality, and poses risks to human health through waterborne diseases and toxic exposures.
3. Soil Pollution: Soil pollution occurs when contaminants accumulate in the soil, adversely affecting soil health, fertility, and productivity. Sources of soil pollution include industrial activities, mining operations, improper waste disposal, and agricultural practices. Soil pollutants include heavy metals, pesticides, petroleum hydrocarbons, and hazardous chemicals. Soil pollution can impair plant growth, contaminate food crops, degrade ecosystems, and pose risks to human health through exposure pathways such as ingestion, inhalation, and dermal contact.
4. Noise Pollution: Excessive or unwelcome sound that interferes with human activity, the natural environment, or bodily functions is referred to as noise pollution. Transportation, industrial machinery, construction, urbanization, and leisure activities are some of the sources of noise pollution. Noise pollutants can cause annoyance, stress, hearing impairment, sleep disturbances, and adverse effects on wildlife behavior and communication.

Additional Forms of Pollution

In addition to the primary types mentioned above, several other forms of pollution warrant attention due to their specific impacts and environmental implications:

1. Marine Pollution: Marine pollution involves the introduction of pollutants into marine environments, including oceans, seas, and coastal areas. Sources of marine pollution include oil spills, plastic debris, chemical contaminants, sewage discharge, and marine litter. Marine pollution poses significant threats to marine ecosystems, biodiversity, fisheries, and coastal communities, affecting both aquatic organisms and human livelihoods.
2. Thermal Pollution: Thermal pollution occurs when human activities, such as industrial processes and power generation, increase water temperatures in natural water bodies. Elevated water temperatures can result from the discharge of heated effluents or the removal of riparian vegetation, leading to thermal stratification, reduced oxygen levels, and disruptions to aquatic habitats. Thermal pollution adversely impacts aquatic ecosystems, particularly cold-water species, and can contribute to fish kills and algal blooms.
3. Radioactive Pollution: Radioactive pollution involves the release of radioactive materials into the environment, posing risks to human health and environmental stability. Sources of radioactive pollution include nuclear accidents, radioactive waste disposal, industrial processes, and medical applications. Radioactive pollutants emit ionizing radiation, which can cause genetic mutations, cancer, birth defects, and ecosystem disturbances. Controlling radioactive pollution requires stringent regulations, safe handling practices, and proper disposal methods to prevent long-term environmental and health impacts.

Causes, Effects, and Control of Air Pollution

Causes of Air Pollution:

1. Fossil fuel combustion: One of the main causes of air pollution is the burning of coal, oil, and natural gas for transportation, industrial activities, and energy generation. As a result,

the atmosphere is exposed to contaminants such particulate matter (PM), sulfur dioxide (SO2), nitrogen oxides (NOx), and carbon monoxide (CO).

2. Vehicle Emissions: Particulate matter (PM), carbon monoxide (CO), nitrogen oxides (NOx), volatile organic compounds (VOCs), and other motor vehicles release pollutants from their tailpipes that contribute to urban air pollution.
3. Industrial Activities: Pollutants including sulfur dioxide (SO2), nitrogen oxides (NOx), volatile organic compounds (VOCs), heavy metals, and particulate matter (PM) are released into the atmosphere during industrial activities like manufacturing, refining, and power generation.
4. Agricultural Practices: Agricultural activities such as livestock farming, crop burning, and fertilizer application release ammonia, methane, and nitrous oxide, contributing to air pollution and greenhouse gas emissions.
5. Construction and Demolition: Construction activities generate dust and particulate matter (PM), while demolition activities release hazardous materials such as asbestos and lead into the air, contributing to localized air pollution.

Effects of Air Pollution:

1. Cardiovascular and Respiratory Conditions: Breathing in air pollutants like particulate matter (PM), sulfur dioxide (SO2), nitrogen dioxide (NO2), and ozone (O3) can cause heart attacks and strokes in addition to respiratory conditions like asthma, bronchitis, and chronic obstructive pulmonary disease (COPD).
2. Degradation of the Environment Because air pollution damages plant tissues, lowers agricultural yields, and interferes with ecological processes, it can affect ecosystems, vegetation, and animals. When sulfur dioxide (SO2) and nitrogen oxides (NOx) mix with atmospheric moisture, acid rain is produced. This can acidify soils, lakes, and rivers, which can have an impact on aquatic life and biodiversity.
3. Climate Shift A few types of air pollution, namely greenhouse gases like carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O), trap heat in the atmosphere and cause climate change. This causes the temperature to rise, the weather to change, glaciers to melt, the sea level to rise, and other environmental effects.

4. Visibility Reduction: In metropolitan areas, picturesque landscapes, and national parks, particulate matter (PM), sulfur dioxide (SO2), and other air pollutants can scatter and absorb sunlight, resulting in haze, smog, and impaired visibility.
5. Costs of Economy: Society bears heavy financial burdens from air pollution in the form of medical bills, missed wages, property damage, and environmental remediation expenses. The detrimental effects of air pollution on business, tourism, agriculture, and public health can jeopardize quality of life and economic growth.

Control of Air Pollution:

1. Regulatory Measures: Governments can implement regulations, standards, and emission limits to control air pollution from industrial facilities, power plants, vehicles, and other sources. These measures may include emission standards for vehicles, pollution permits for industries, and regulations on fuel quality and combustion processes.
2. Technological Solutions: New developments in pollution control technologies, such scrubbers, electrostatic precipitators, catalytic converters, and selective catalytic reduction (SCR) systems, can lower the amount of pollutants released by power plants, automobiles, and industrial sources.
3. Alternative Energy Sources and Fuels: By switching to greener and sustainable energy sources like nuclear, solar, wind, hydroelectric, and hydropower, air pollution and greenhouse gas emissions may be reduced and dependency on fossil fuels can be minimized.
4. Transportation Policies: Promoting public transportation, encouraging fuel-efficient vehicles, implementing vehicle emission standards, and investing in clean transportation infrastructure can reduce emissions from the transportation sector and alleviate urban air pollution.
5. Public Awareness and Education: Raising awareness about the health impacts of air pollution, promoting sustainable lifestyle choices, encouraging energy conservation, and fostering community engagement can empower individuals and communities to take action to reduce air pollution and protect public health.

Causes, Effects, and Control of Water Pollution

Water Pollution Causes:

1. Industrial Discharges: Effluent discharges from industrial processes including mining, manufacturing, and chemical processing introduce contaminants into water bodies. Surface water and groundwater sources may be contaminated by these contaminants, which can also include organic compounds, heavy metals, hazardous chemicals, and suspended particles.
2. Municipal Wastewater: Disposal of untreated or inadequately treated sewage and wastewater from urban areas contributes to water pollution. Municipal wastewater contains pathogens, nutrients (e.g., nitrogen and phosphorus), organic matter, and pollutants such as heavy metals and synthetic chemicals, which can degrade water quality and pose risks to human health and aquatic ecosystems.
3. Agricultural Runoff: Agricultural practices such as fertilizer and pesticide application, livestock farming, and soil erosion contribute to water pollution through runoff and leaching of nutrients, pesticides, herbicides, and sediment into rivers, lakes, and streams. Agricultural runoff can cause eutrophication, algal blooms, and contamination of drinking water supplies.
4. 4Stormwater Runoff: As impermeable surfaces like parking lots, roofs, and roadways grow due to urbanization and land development, stormwater runoff and nonpoint source pollutants rise. Pollutants include oil, grease, heavy metals, bacteria, and trash can enter water bodies through stormwater runoff, affecting aquatic ecosystems and water quality.
5. Illegal Dumping and Littering: Improper disposal of waste materials, including trash, plastics, chemicals, and hazardous substances, through illegal dumping, littering, and improper waste management practices, can contaminate water bodies and degrade aquatic ecosystems.

Effects of Water Pollution:

1. Health Risks: Water pollution can pose significant risks to human health through the consumption of contaminated drinking water, recreational activities in polluted water bodies, and exposure to waterborne pathogens, toxins, and pollutants. Waterborne

diseases such as cholera, typhoid, dysentery, and hepatitis can result from microbial contamination of water sources.

2. Ecosystem Degradation: Water pollution harms aquatic ecosystems, including rivers, lakes, wetlands, and coastal areas, by disrupting ecological processes, impairing water quality, and depleting biodiversity. Pollution can degrade habitats, harm fish and wildlife populations, and lead to declines in aquatic species diversity and abundance.
3. Eutrophication: Excessive nutrient runoff, particularly nitrogen and phosphorus from agricultural and urban sources, can cause eutrophication in water bodies. Eutrophication leads to algal blooms, oxygen depletion, and ecological imbalances, resulting in fish kills, habitat loss, and degraded water quality.
4. Habitat Destruction: Pollution from industrial discharges, urban runoff, and sedimentation can degrade aquatic habitats and destroy critical ecosystems such as coral reefs, mangrove forests, and freshwater wetlands. Habitat destruction reduces biodiversity, impairs ecosystem services, and diminishes the resilience of aquatic ecosystems to environmental stressors.
5. Economic Costs: Water pollution imposes economic costs on society through impacts on public health, fisheries, tourism, recreation, and water-dependent industries. The costs of treating contaminated drinking water, restoring polluted ecosystems, and mitigating pollution-related damages can be substantial and place burdens on local communities and governments.

Control of Water Pollution:

1. Regulatory Measures: Governments can enact laws, regulations, and standards to control water pollution from industrial, municipal, agricultural, and other sources. These measures may include discharge permits, effluent standards, water quality criteria, pollution prevention plans, and enforcement mechanisms to ensure compliance with environmental regulations.
2. Wastewater Treatment: Implementing wastewater treatment technologies such as primary, secondary, and tertiary treatment processes can remove pollutants from sewage and industrial effluents before discharge into water bodies. Wastewater treatment plants

remove contaminants such as suspended solids, organic matter, nutrients, pathogens, and toxic substances to protect water quality and public health.

3. Best Management Practices (BMPs): Promoting BMPs for agricultural and urban land management can reduce nonpoint source pollution and mitigate runoff of sediment, nutrients, pesticides, and other pollutants into water bodies. BMPs may include conservation tillage, cover cropping, buffer strips, stormwater management practices, and erosion control measures to protect water resources.
4. Pollution Prevention: Adopting pollution prevention strategies and technologies can minimize the generation and release of pollutants into the environment. Source reduction, product substitution, recycling, reuse, and pollution control measures can help industries, businesses, and individuals reduce their environmental footprint and prevent pollution at its source.
5. Public Awareness and Education: Educating the public, stakeholders, and decision-makers about the importance of water quality protection, pollution prevention, and sustainable water management practices can foster environmental stewardship and promote community engagement in water pollution control efforts.

Causes, Effects, and Control of Soil Pollution

Causes of Soil Pollution:

1. Industrial Activities: Industrial processes such as manufacturing, mining, and waste disposal release pollutants into the soil through spills, leaks, and improper disposal practices. Contaminants from industrial sources may include heavy metals, organic chemicals, solvents, petroleum hydrocarbons, and toxic substances.
2. Agricultural Practices: Agricultural activities such as pesticide and fertilizer application, livestock farming, irrigation, and soil erosion contribute to soil pollution through the introduction of agrochemicals, nutrients, pathogens, and sediment. Pesticides, herbicides, and fertilizers contain toxic chemicals and nutrients that can accumulate in soil and contaminate groundwater.
3. Waste Disposal: Improper disposal of municipal solid waste, hazardous waste, and electronic waste in landfills, dumpsites, and open burning sites can contaminate soil with

toxic substances, heavy metals, organic pollutants, and leachate. Landfills and dumpsites may release pollutants into the soil and groundwater, posing risks to human health and the environment.

4. Mining Activities: Mining operations, including extraction, processing, and disposal of minerals and ores, can release pollutants such as heavy metals, metalloids, and acid mine drainage into the soil and surrounding environment. Mining activities can disturb soil, disrupt ecosystems, and create barren landscapes with elevated concentrations of toxic substances.
5. Urbanization and Construction: Urban development, construction activities, and infrastructure projects can lead to soil compaction, erosion, and contamination through soil disturbance, land clearing, and disposal of construction debris. Urban runoff and stormwater discharge can transport pollutants such as sediment, heavy metals, and petroleum products into soil and water bodies.

Effects of Soil Pollution:

1. Degraded Soil Quality: Soil pollution degrades soil quality by altering its physical, chemical, and biological properties, including texture, structure, fertility, pH, organic matter content, and microbial diversity. Contaminants such as heavy metals, pesticides, and industrial chemicals can persist in soil for long periods, impairing its ability to support plant growth and ecosystem functions.
2. Crop Contamination: Soil pollution can contaminate food crops, vegetables, fruits, and livestock feed with toxic substances, heavy metals, and pesticides, posing risks to human health through dietary exposure. Contaminated soils may accumulate pollutants in plant tissues, leading to bioaccumulation and biomagnification of contaminants in the food chain.
3. Groundwater Contamination: Soil pollution can leach pollutants into groundwater sources, contaminating aquifers and drinking water supplies. Contaminants such as nitrates, pesticides, volatile organic compounds (VOCs), and petroleum hydrocarbons can migrate through soil pores and fractures, leading to groundwater contamination and risks to human health.

4. Ecological Impacts: Soil pollution harms terrestrial and aquatic ecosystems by disrupting soil biodiversity, impairing habitat quality, and affecting plant and animal communities. Pollutants can accumulate in soil organisms, disrupt soil food webs, and cause declines in soil-dwelling organisms such as earthworms, microorganisms, and beneficial insects.
5. Human Health Risks: Soil pollution poses risks to human health through direct contact, inhalation, and ingestion of contaminated soil, dust, and food crops. Exposure to toxic substances, heavy metals, and carcinogens in soil can cause adverse health effects such as cancer, respiratory illnesses, neurological disorders, and reproductive problems.

Control of Soil Pollution:

1. Contaminated Site Remediation: Remediation of contaminated sites involves the cleanup and restoration of soil and groundwater contaminated with hazardous substances. Remediation technologies such as excavation, soil washing, thermal treatment, bioremediation, and phytoremediation can remove or immobilize pollutants and restore soil quality.
2. Pollution Prevention: Preventing soil pollution requires implementing pollution prevention measures and best management practices (BMPs) to minimize the generation, release, and migration of pollutants into soil. Source reduction, recycling, waste minimization, and proper waste management practices can prevent pollution at its source and reduce environmental impacts.
3. Regulatory Measures: Governments can enact laws, regulations, and policies to regulate soil pollution and protect soil quality. Soil protection measures may include soil quality standards, land use planning, zoning regulations, environmental permits, and enforcement mechanisms to prevent soil contamination and ensure compliance with environmental laws.
4. Sustainable Land Management: Adopting sustainable land management practices such as conservation tillage, cover cropping, crop rotation, organic farming, and agroecological approaches can improve soil health, fertility, and resilience to pollution. Sustainable agriculture practices can reduce reliance on agrochemicals, minimize soil erosion, and promote soil conservation and regeneration.

5. Public Awareness and Education: Educating the public, stakeholders, and communities about the importance of soil health, pollution prevention, and sustainable land management practices can raise awareness and promote behavior change. Outreach programs, training workshops, and educational campaigns can empower individuals and organizations to take action to protect soil resources and promote environmental stewardship.

Causes, Effects, and Control of Noise Pollution

Causes of Noise Pollution:

1. Transportation: Traffic from cars, trucks, buses, airplanes, and trains contribute significantly to noise pollution.
2. Industrial Activities: Factories, construction sites, and mining operations produce loud machinery and equipment noises.
3. Urbanization: Rapid urban development leads to increased noise from residential and commercial areas, including honking, loud music, and construction.
4. Social Events: Concerts, festivals, and gatherings can generate high levels of noise pollution.
5. Technological Advancements: Use of loud equipment, appliances, and electronic devices contribute to noise pollution.
6. Natural Sources: Some natural sources like thunderstorms, earthquakes, and volcanic eruptions also produce loud sounds.

Effects of Noise Pollution:

1. Health Effects: Prolonged exposure to loud noises can lead to hearing loss, stress, hypertension, sleep disturbances, and cardiovascular diseases.
2. Psychological Effects: Noise pollution can cause irritability, anxiety, depression, and decreased concentration and productivity.
3. Interference with Communication: Excessive noise makes it difficult to communicate effectively, leading to misunderstandings and decreased social interaction.
4. Impact on Wildlife: Loud noises disrupt wildlife habitats, communication, mating rituals, and navigation, affecting their survival.

5. Economic Impact: Noise pollution can reduce property values, increase healthcare costs, and affect tourism and productivity in affected areas.

Control Measures for Noise Pollution:

1. Legislation and Regulations: Governments can implement noise control laws, zoning regulations, and building codes to limit noise levels in different areas.
2. Urban Planning: Proper urban planning can help in minimizing noise pollution by designing soundproof buildings, creating buffer zones between residential and industrial areas, and controlling traffic flow.
3. Noise Barriers: Constructing physical barriers like walls, berms, and fences along highways and railways can reduce noise levels.
4. Use of Quieter Technologies: Encouraging the use of quieter machinery, vehicles, and equipment through regulations and incentives can help in controlling noise pollution.
5. Public Awareness and Education: Educating the public about the harmful effects of noise pollution and promoting responsible behavior can encourage people to adopt quieter practices.
6. Noise Monitoring and Management: Regular monitoring of noise levels and implementing effective noise management strategies can help in identifying and addressing sources of noise pollution.

Causes, Effects, and Control of Marine Pollution

Causes of Marine Pollution:

1. Plastic Pollution: Improper disposal of plastic waste, such as plastic bags, bottles, and microplastics, leads to their accumulation in marine environments.
2. Oil Spills: Accidental or deliberate discharge of oil from ships, offshore drilling rigs, and oil refineries contaminates marine ecosystems.

3. Chemical Pollution: Industrial discharges, agricultural runoff, and improper waste disposal introduce pollutants such as heavy metals, pesticides, and fertilizers into marine ecosystems.
4. Sewage and Wastewater: Inadequate sewage treatment and runoff from urban areas carry untreated sewage, pathogens, and pollutants into coastal waters.
5. Shipping Activities: Ballast water discharge, antifouling paints, and litter from ships contribute to marine pollution.
6. Noise Pollution: Underwater noise from shipping, seismic surveys, and construction activities can disrupt marine life and affect their behavior and communication.

Effects of Marine Pollution:

1. Ecosystem Degradation: Marine pollution disrupts marine ecosystems, leading to loss of biodiversity, habitat destruction, and imbalances in marine food chains.
2. Harm to Marine Life: Pollutants can harm marine animals through ingestion, entanglement, habitat degradation, and exposure to toxic substances, leading to population declines and species extinction.
3. Human Health Risks: Contaminated seafood, harmful algal blooms, and pathogens from polluted waters pose risks to human health through consumption and recreational activities.
4. Economic Impact: Marine pollution impacts fisheries, aquaculture, tourism, and coastal economies, resulting in loss of revenue and livelihoods for communities dependent on marine resources.
5. Ocean Acidification: Pollution, particularly CO2 emissions, contributes to ocean acidification, harming marine life with calcium carbonate shells and skeletons, such as corals and shellfish.

Control Measures for Marine Pollution:

1. Regulations and Enforcement: Implementing and enforcing laws and regulations to control pollution from shipping, industries, and coastal development.
2. Waste Management: Promoting proper waste management practices, recycling, and reducing single-use plastics to minimize marine debris.

3. Sewage Treatment: Upgrading sewage treatment facilities and implementing wastewater treatment technologies to prevent untreated sewage from entering marine environments.
4. Oil Spill Response: Developing and implementing oil spill response plans, training personnel, and deploying cleanup equipment to minimize the impact of oil spills.
5. Marine Protected Areas: Establishing marine protected areas and marine reserves to conserve biodiversity and protect sensitive habitats from pollution.
6. International Cooperation: Collaborating at regional and international levels to address transboundary marine pollution through agreements, conventions, and partnerships.

Certainly! Thermal pollution is the elevation or decrease in temperature of natural water bodies caused by human activities. Here's an outline covering its causes, effects, and control measures:

Causes, Effects, and Control of Thermal Pollution

Causes of Thermal Pollution:

1. Industrial Activities: Discharge of heated water from power plants, industrial facilities, and manufacturing processes into water bodies raises their temperature.
2. Power Generation: Power plants that use water for cooling purposes, such as nuclear, coal-fired, and thermal power plants, release heated water back into rivers, lakes, or oceans.
3. Urbanization: Urban development leads to the replacement of natural land cover with impervious surfaces, such as roads and buildings, which absorb and retain heat, raising the temperature of nearby water bodies.
4. Agricultural Practices: Agricultural runoff containing fertilizers and pesticides can increase water temperature due to the heat generated by microbial decomposition of organic matter.
5. Deforestation: Removal of vegetation along riverbanks and streams reduces shading, exposing water bodies to direct sunlight and increasing water temperature.
6. Climate Change: Global warming can lead to increased air temperatures, which in turn raise water temperatures in rivers, lakes, and oceans.

Effects of Thermal Pollution:

1. Habitat Alteration: Elevated water temperatures can alter aquatic habitats and disrupt ecosystems, affecting the distribution and abundance of aquatic plants and animals.
2. Changes in Oxygen Levels: Higher water temperatures reduce the solubility of oxygen in water, leading to decreased oxygen levels and potential hypoxia (low oxygen) or anoxia (absence of oxygen) conditions, which can harm aquatic organisms.
3. Altered Reproductive Cycles: Thermal pollution can disrupt the reproductive cycles of aquatic organisms, leading to changes in breeding behavior, reduced reproductive success, and population declines.
4. Migration Patterns: Changes in water temperature can affect the migration patterns of fish and other aquatic species, impacting their ability to find suitable habitats and food sources.
5. Increase in Disease Susceptibility: Elevated water temperatures can weaken the immune systems of aquatic organisms, making them more susceptible to diseases and parasites.
6. Loss of Biodiversity: Thermal pollution can lead to the loss of sensitive species and reduce overall biodiversity in affected water bodies.

Control Measures for Thermal Pollution:

1. Cooling Technologies: Implementing cooling technologies such as cooling towers, spray ponds, and natural draft cooling systems in industrial and power plant facilities to reduce the temperature of discharged water.
2. Effluent Limitations: Establishing and enforcing regulations and effluent limitations on water temperature for industrial and power plant discharges to prevent excessive heating of receiving water bodies.
3. Vegetative Buffer Zones: Maintaining vegetative buffer zones along riverbanks and streams to provide shading and reduce the impact of urbanization and deforestation on water temperature.
4. Water Conservation: Promoting water conservation practices to reduce the volume of water withdrawn for cooling purposes by industrial and power plant facilities.

5. Restoration and Rehabilitation: Restoring degraded habitats, reforesting riverbanks, and implementing watershed management practices to improve water quality and reduce thermal pollution.
6. Public Awareness and Education: Educating the public about the impacts of thermal pollution and promoting sustainable water management practices to mitigate its effects on aquatic ecosystems.

In conclusion, environmental pollution represents a complex and multifaceted challenge that demands urgent attention and concerted action at local, national, and global levels. By understanding the causes, impacts, and consequences of pollution, society can develop innovative solutions and adopt sustainable practices to safeguard environmental quality, protect human health, and promote ecological resilience for future generations.

Summary

A polluted environment is one in which pollutants have been introduced and are causing physical systems or living things in it instability, chaos, injury, or discomfort. Chemical compounds or energy, such as heat, light, or sound waves, can be considered forms of pollution. In addition to naturally occurring chemicals or energies, pollutants are aspects of pollution that are deemed to be too high amounts of naturally occurring substances or energies. The issue of environmental pollution is considerably more widespread than we realize; in many of our cities, issues with air pollution, noise pollution from traffic, and other disruptive noises are common. The introduction of chemical, physical, or biological materials into freshwater or oceanic environments that deteriorate the water's quality and have an impact on the species that inhabit it is known as water pollution. Nonconventional pollutants include degradable and persistent organic carbon compounds that are released into water as a byproduct of industry or as an essential component of products that are sold, as well as dissolved and particulate forms of metals, both hazardous and benign.

Keywords:

Environmental Pollution: any release of materials or energy into the air, water, or land that degrades the quality of life or threatens the Earth's ecological balance either permanently or temporarily.

Pollution:describe the introduction of pollutants into an ecosystem that results in physical systems or living species experiencing instability, disorder, damage, or discomfort.

Secondary Pollutants:which, in the environment, are unable to keep their shape. It contains peroxyacyl nitrate, which is produced when main contaminants such hydrocarbons and nitrogen oxides react.

Water Pollution: introduction of physical, chemical, or biological materials into freshwater or ocean environments that deteriorate the water's quality and have an impact on the species that inhabit there.

MCQs

1. A natural phenomenon that becomes harmful due to pollution is.....

(a) Global warming. (b) Ecological balance. (c) Greenhouse effect. (d) Desertification.

2. One of the best solutions to get rid of non-biodegradable wastes is.....

(a) Burning. (b) Dumping. (c) Burying. (d) Recycling.

3. Animal dung is .....waste.

(a) Biodegradable. (b) Non-biodegradable. (c) Hazardous. (d) Toxic.

4. The largest amount of usable water found on earth is used for.....

(a) Recreation. (b) Crop irrigation (c) Industrial uses. (d) Household use.

5. Which two of the following might apply to acid rain pollution?

(a) Secondary pollutant (b) Primary pollutant

(c) May be derived from a chemical reaction between sulphur dioxide, sulphur trioxide or nitrogen dioxide with rainwater

(d) Derived from aerosol cans and refrigerators.

Answers

1. (c) 2.(d) 3.(a) 4.(b) 5.(c)

Important Questions

1. Explain the natural pollution.
2. Explain the man-made pollution.
3. What do you mean by radioactive pollution?
4. What are differences between water pollution and land pollution?
5. Discuss about the air pollution.
6. Explain the soil misuse and solid waste.
7. What do you mean by marine pollution?
8. Explain the control of various types of pollution
9. What is the role of an individual in prevention of pollution?

Unit - 5

Human Population and the Environment

Objectives

- To examine the function of health care systems
- Study the relationships between human health and environmental factors
- Explore the strategies for achieving sustainable development

Population Growth

Droughts and disease outbreaks have historically resulted in significant human casualties. In the 14th century, a devastating plague swept through Asia and Europe, claiming the lives of approximately half the population in these regions.

Advances in science and technology have led to an increase in human life expectancy. With improved sanitation, access to nutritious food, and better medical care, populations have grown exponentially. In agrarian societies, children are valued as assets, aiding their parents in agricultural labor. Consequently, in developing nations, population growth occurs at a rate of 3.4% annually.

Factors contributing to rapid population growth

- The accelerated population growth arises from a combination of declining mortality rates and increasing birth rates.
- Access to antibiotics, immunization, enhanced food production, as well as clean water and air, mitigates fatalities stemming from famine.
- In agricultural-dependent nations, children contribute to their parents' work in the fields, leading to population growth in developing regions.

Population; It refers to a collection of individuals belonging to the same species inhabiting a specific area at a particular time.

Density of population; It is quantified as the number of individuals within a population per unit area or volume.

Constraints affecting population extent;

(i) **Birth Rate;** In a given year, it is the number of births per 1000 individuals in a population.

(ii) **Death Rate;** In a particular year, it is the number of fatalities per 1000 individuals in a population.

(iii) **Immigration;** It indicates the entry of a person from a nearby population.

(iv) **Emigration**; this is the term used to describe the movement of people from their original population to new locations.

Characteristics of Population Growth: Exponential growth; Doubling time; In fan mortality rate; Total fertility rate; Replacement level; Male /female ratio; Demo graphic transition**.**

Deviation of population grounded on age structure

Pre-productive population (0-14 yrs); Reproductive population (15 – 44 yrs); Post reproductive population (above 45 yrs)

- **Pyramid-shaped**; Bangladesh, Ethiopia and India.(A large number of young people reach reproductive age, which contributes to population expansion).
- **Bell-shaped**; UK, France, and USA (Because the numbers in the pre-productive and reproductive age groups are about equal, population growth is steady).
- **Urn-shaped; Italy, Japan and Germany**(The pre-productive population is smaller than the re-productive age group, which causes a decline in population increase).

Explosion of Population-The significant population surge results from a combination of low mortality rates and high birth rates.

- **Time of Replication-**The time required for a population to double in size**.**
- **Reasons of population blast:** Modern medical facilities decrease death rates and

increase birth rates, resulting in an increase in life expectancy, while illiteracy also plays a role in shaping demographic trends.

- **Things of population explosion;** Population explosion exacerbates poverty, environmental degradation, over-exploitation of natural resources, threats to renewable resources like forests, heightened disease prevalence and communal conflict, proliferation of slums, and inadequate provision of basic amenities such as water, education, and healthcare.
- **Population features and variant among nations;** Population characteristics and variations among nations encompass diverse demographic profiles, including differences in population size, age distribution, birth rates, mortality rates, migration patterns, cultural norms, economic conditions, and access to resources and healthcare services, reflecting unique social, political, and environmental contexts across different countries.

Family-welfare programme; A family welfare program typically refers to a set of initiatives and policies aimed at promoting the health, well-being, and reproductive rights of families. These programs often include services such as access to contraception, maternal and child health services, family planning education, prenatal care, postnatal care, and support for reproductive health rights. The goal is to empower individuals and families to make informed decisions about their reproductive health and to improve overall family health and welfare.

By WHO estimates, 300 million married couples are not assessed for family planning, while 50% of married couples worldwide have implemented family planning techniques.

Family Planning Programme;

- Decrease infant mortality rates.
- Attain universal registration of births, deaths, marriages, and pregnancies.
- Promote delayed marriages and childbirth.
- Enhance women's health, education, and employment opportunities.
- Prevent and control communicable diseases.
- Advocate for smaller family sizes.
- Ensure free and mandatory education up to the age of 14 and curb the spread of AIDS.

Fertility control methods:

- Contraceptive pills: Oral medications containing hormones to prevent ovulation.
- Condoms: Barrier devices used during intercourse to prevent sperm from reaching the egg.
- Intrauterine devices (IUDs): Small, T-shaped devices inserted into the uterus to prevent pregnancy.
- Contraceptive implants: Small rods inserted under the skin that release hormones to prevent ovulation.
- Sterilization: Permanent surgical procedures like vasectomy for males and tubal ligation for females.
- Injectable contraceptives: Hormonal injections administered periodically to prevent pregnancy.
- Diaphragms and cervical caps: Barrier devices placed inside the vagina to cover the cervix and prevent sperm from entering.
- Natural family planning methods: Tracking menstrual cycles and avoiding intercourse during fertile periods.
- Emergency contraception: Hormonal pills taken after unprotected intercourse to prevent pregnancy.

Environment and Human Health

An environment is described as a person and his physical and social surrounds, including biotic and abiotic elements. Because of this, when we put these elements in danger, they also endanger our health. There are numerous environmental risks that humans have caused, including the use of pesticides in agriculture, deforestation, desertification, unchecked urbanization, pollution of the air, water, and land, and an increase in population. Each of these has an impact on both an individual's and society's overall health. The likelihood of disasters is growing every day, thus none can be disregarded.

Health risks can arise from various sources, including water contamination or pollution, air pollution, pesticide use that enters the food chain, radiation from nuclear water, diseases brought on by incorrect handling of solid waste, and noise exposure.

Human Rights;The concept of human rights is enshrined in various international agreements and documents, such as the Universal Declaration of Human Rights adopted by the United Nations General Assembly in 1948. Many countries have also incorporated human rights principles into their national constitutions and legal frameworks.

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

Value Education; It is just gaining expertise in the specific subject through study. Knowledge and experience help us recognize who we are and what our values are.

Types;

- ✓ Formal-education-Self related learning process, all will read, write, get jobs, tackle any problem with formal education.
- ✓ **Value-education** –Examine our actions, teach young people the right lessons, and understand right from wrong.
- ✓ **Value-based environment education**-understanding of the fundamentals of the environment, biodiversity, protecting natural resources, and maintaining a healthy and secure atmosphere.

Value-centered environmental teaching;It is imperative that everyone has a solid understanding of the ecology. An appreciation for the earth and its resources, as well as a sense of earth citizenship and commitment to managing the resources sustainably so that future generations can live in a safe and clean world, are fostered by the concepts of ecology and environmental fundamentals. Environmental studies are now a part of the curriculum at all educational levels, from university to school, as a result of 1998 Supreme Court orders. Making everyone's environment more conducive is its goal.

1. The creation of environmental-related text book contents, which aim to foster a favorable mindset toward environmental factors.
2. Social ideals such as compassion, tolerance, and love can permeate an area. Learning. Every aspect of life and diversification will benefit from this.
3. Values derived from culture and religion: Both cultures and faiths instruct us to carry out tasks that honor and revere nature rather than abusing it. As a result, an environmental value scan should be added. Knowledge.
4. The surroundings In order to incorporate ethical ideals, education should place more emphasis on earth-centric viewpoints than human-centric ones.
5. Universal values: Emphasize that all natural processes are interconnected and harmonious, and that humans are a part of nature. A disruption of this balance could have disastrous effects on the ecosystem.
6. Spirituality morals: emphasizes decrease of needs, self-satisfaction, discipline, etc. This will lessen how consumerist we are. It will be simple to achieve sustainable development and environmental protection if the aforementioned ideals are included in environmental education. Education centered around values can completely alter our mindset, attitudes, and way of life in order to save the environment.

Approaches of Communicating Value-Education-

- Expressive
- Giving thoughts to leaner’s through model;
- Performance of a role of any other (Role-play);
- Inquiring of the students on their choice in the dilemma (Problem-solving);
- Making use of a great man's acts of kindness and noble ideas.

Womans-welfare-Women's welfare is a crucial aspect of any society's development for several reasons:

1. Gender Equality: Women's welfare ensures that women have equal opportunities and rights as men. This is fundamental for achieving gender equality, which is not only a basic human right but also a necessary foundation for a peaceful, prosperous, and sustainable world.
2. Healthcare: Women's welfare programs often focus on reproductive health, maternal health, and access to healthcare services. Ensuring women's health not only benefits them individually but also has broader societal implications, including healthier families and communities.
3. Education: Providing education to women is essential for their empowerment and economic independence. Women who are educated are more likely to participate in the workforce, contribute to the economy, and make informed decisions about their lives and families.
4. Economic Empowerment: Women's welfare initiatives often include measures to promote women's economic empowerment, such as access to credit, entrepreneurship training, and support for women-owned businesses. Empowering women economically not only improves their own lives but also has positive ripple effects on families and communities.
5. Legal Rights and Protection: Women's welfare encompasses efforts to ensure that women have access to legal rights and protections, including laws against gender-based violence, discrimination, and harassment. This is crucial for creating a safe and supportive environment for women to thrive.
6. Social Support and Safety Nets: Women's welfare programs often provide social support services, such as shelters for victims of domestic violence, childcare assistance, and support for single mothers. These services help women facing various challenges to access the support they need to rebuild their lives.
7. Cultural and Social Norms: Women's welfare efforts also aim to challenge and change harmful cultural and social norms that perpetuate gender inequality and discrimination against women.

Various Organizations towards Women Welfare:

- The National Network for Women & Mining **(NNWM) ?** fighting for gender audit of India's mining companies
- United Nations Decade for Women **?** inclusion of women welfare related issues on international agenda.
- International Convention on the Elimination of All Forms of Discrimination Against Women **(CEDAW) ?** Protection & Promotion of women's upliftment
- **Non-Government Organizations (NGO's) ?** Empower, educate village women & making self- dependent
- **Ministry for Women and Child Development ?** work for upliftment of women by family planning, health, education & awareness

Child-welfare:

Purpose for child Exertions

Poverty-work in unhealthy conditions

Want of Money-parents need money for their family

Various Organizations towards Child Welfare:

1. **UN Conventions on Rights of Child or International Law** ? promote & protect children in our society

Rights of the Child:

The right to survival- emphasizes on good health, nutrition, standard of living The right to participation-freedom of thought to the child

The right to development- ensures education, care, support, social security & recreation

The right to protection- freedom from exploitation, inhuman treatment & neglect

2. **World summit on children ?** well being of the children is targeted
3. **Ministry of Human Resource Development (MHRD)** ? concentrate on childs health, education, nutrition
4. **Center for Science & Environment (CSE)** - keeping environment clean for healthy life of children

HIV or AIDS;

The acronym AIDS stands for Acquired Immuno Deficiency Syndrome, which is brought on by the HIV virus 'Human Immunodeficiency Virus'. When an illness is considered immune deficient, it indicates that the immune system is compromised.

HIV/AIDS's genesis

1. From chimpanzees or 'African monkeys' to humans.

2. Via the 'Vaccine Program'
    - Polio: a little pox vaccine made from 'African monkey' kidney.
    - b. Dispersed throughout 'New York and Los Angeles' with the Hepatitis-B viral vaccination.
    - Through Africa's smallpox vaccination program.

Control and Preventive measures

1. **Education. ?** health education, avoid sharing razors, needles and syringe
2. **Prevention of Blood borne HIV transmission**. **?** screening of blood for HIV before transmission & following strict sterilization in hospitals
3. **Primary health care ?** AIDS awareness programme, participation of voluntary health agengies].
4. **Counseling services ?** Counseling through phone or through telephone].
5. **Drug treatment ?** Early medical care, taking nutritious diet, maintaining stress free mind].

Dengue –fever; (Arbovirus is the culprit behind dengue fever).

- Every year, the dengue virus (DENV) affects between 50 million (WHO) and 100 million (NIH) persons.
- The dengue virus can cause dengue fever, dengue hemorrhagic fever, dengue shock syndrome, and even death
- .Approximately 40% of the world's population, mostly in the tropics and sub-tro

What causes Dengue?

- Dengue (DF) and dengue haemorrhagic fever (DHF) are caused by one of four closely related, but antigenically distinct, virus serotypes (DEN-1, DEN-2, DEN-3, and DEN-4), of the genus Flavivirus.
- Infection with one of these serotypes provides immunity to only that serotype for life.

How Mosquitos spread the infection

- The disease starts during the rainy season, when vector Mosquito Aedes aegypti is abundant
- The Aedes breeds in the tropical or semitropical climates in water holding receptacles or in plants close to human dwellings
- A female Aedes acquires the infection feeding upon aviremic human.
- After a period of 8 – 14 days mosquitoes are infective and remain infective for life. (1- 3) months.

Summary:

The startling rate at which the world's population has increased is truly concerning. It is astounding to think that it took roughly 39,000 years for the human race to reach 1 billion, 130 years for it to reach 2 billion, and 45 years for it to reach 4 billion. By 2050, India's population is expected to reach 1.63 billion if its current growth rates persist. An explosion in population needs to be dispersed quickly, much like a time bomb. The legal minimum age for marriage was raised by the government in 1978 from 18 to 21 for men and from 15 to 18 for women. It is known that radiation can alter different organs over the short and long terms. An estimated one in five people worldwide suffers from malnutrition, lacks access to clean drinking water, inadequate hygienic conditions, and inadequate health facilities, according to estimates from the World Health Organization. Developing practical understanding of various natural principles through value education helps one arrive at value-based judgments in life instead of forming certain prejudices. It was in 1983 that AIDS was found. Women are typically the targets of workplace and home discrimination based on their gender. The estimated number of children employed as child laborers in India is 20 million.

Keywords:

Diet: Eating a healthy diet is crucial to preserving one's health. Hunger increases a person's susceptibility to other illnesses.

Family planning: It gives couples the ability to choose the number of children they want and the interval between them.

Infectious organisms: These organisms are major environmental health hazards, particularly in developing nations with tropical climates.

Society: Individuals within society are directly impacted by these wage structure modifications. Also, society starts to focus more on money.

The Clock of Population: A net gain of almost 2.5 people is achieved every second when two people die and four children are born on average.

MCQ:

1. By 1800, there were roughly. billion people on the planet.
   i. Two
   ii. One
   iii. Three
   iv. Four

2. A billion people have already been crossed by now.
   i. Eight
   ii. Five
   iii. Six
   iv. 10

3. The rate of population growth reached previously unimaginable heights, reaching a whopping..% annually.
   i. 2–3
   ii. 1.5-3
   iii. 5-6
   iv. 3-4

4. There were... billion people on the planet in 2000.

i. 6.7
ii. 7.1
iii. 6.3
iv. 5.7

5. On average, a child is born every second.
   i. 5–6
   ii. 7-8
   iii. 4-5
   iv. 6-7

Answers:

1. (ii) 2.(iii) 3.(iv) 4.(iii)

Importance Questions

1. How is population growth doing right now? Describe.
2. What does "Population Clock" mean to you?
3. What are two key points of view regarding population growth?
4. Compose a brief memo regarding: a) Family Welfare Program; b) Family planning
5. How do you mean human health and the environment?
6. What rights do people have? Describe family values as well.

Unit -6

Role of information in Information Technology in Environment and Human Health

Objectives:

- Discuss the role of information technology in human health.
- Understand the role of information technology in environment.

Introduction

The study of information technology involves the use of computer systems for information retrieval, storage, and transmission. Technological advancements have the ability to affect healthcare and the environment more than other related fields. The Internet's services and capabilities, such as the Geographic Information System (GIS) and satellite data transmission, have grown significantly, and this has had an increased impact on environmental education and public health. There are several user-friendly software programs on the market that have been created with consideration for environmental and health care research. Programs like Global Mapper, MapInfo Professional, and others. In an environment where digital data is available for production of maps and visual displays for analysis and presentation, remote sensing and GIS can be employed. The computation of weather and climatic conditions is done using super computers. Computers may also be used to operate the MRI machine and other scanning devices utilized in healthcare. Medicare information is made available to patients through health-related technologies. Additionally, there are websites that advise patients on a range of health-related topics, such as food plans and medications. Internet services are becoming into an effective instrument for raising public awareness of environmental challenges and advancing human understanding. Thanks to technological advancements, we can access and keep an eye on environmental challenges from anywhere in the globe. The main benefit of information technology is its highly established infrastructure, which makes it possible to access environmental science knowledge. These days, there are a number of websites and online services that inform consumers about their diagnosis and healthcare. The government has also

made significant efforts in this area by utilizing telemedicine to tell patients about their health status via their computers or mobile devices.

Because GIS is crucial for resource mapping, environmental conservation, management, and impact planning, it creates barriers for both the environment and healthcare. It also aids in the identification of different disease-affected locations. Data will also be stored and retrieved as needed using database management systems. In ecosystem system, the expanding database is utilized for protection of wastelands, animals, etc. In the field of healthcare, databases are also accessible for keeping track of patient histories. These databases are utilized for patient identification, lab systems, patient satisfaction, billing and payment processing, and other purposes.

ROLE OF IT IN ENVIRONMENT

Technology advancements have both positive and negative impacts, some of which are directly or indirectly affecting the environment. With the availability of Internet capabilities and services, environmental information is readily available as it can be obtained online. Additionally, it offers current environmental data on things like weather and climate change. The ability to store digital data that may be altered and amended as needed has been made possible by information technology. It makes a direct contribution to environmental preservation. GIS has been a useful tool for the environment and has made a significant impact. It contributes to the provision of trustworthy and corroborated data about forest coverage and conservation.

There are several contemporary technologies that enable information gathering, processing, storing, and retrieval. A number of initiatives have been launched by the government, including ENVIS, or the Environment Information System, An extensive portal with web capabilities that offers information about the environment was developed by the Ministry of Environment and Forests. This is a decentralized database network managed by the Ministry of Forests, Environment, and Climate Change. Additionally, this center serves as a conduit for the gathering, compiling, storing, and retrieval of data related to particular topic areas.

The United Nations Environment Programme (UNEP) is an additional project that helps developing nations adopt environmental policies and practices by coordinating their efforts. Information technology has significantly aided in decision-making with this initiative. In addition, remote sensing is being utilized to evaluate the environmental changes that are

occurring, which can help anticipate natural disasters such as hurricanes, earthquakes, and floods.

ROLE OF IT IN HEALTH CARE

Numerous methods exist for using information technology to enhance healthcare, including protecting patient safety and fostering positive relationships between patients and healthcare professionals. The administration of data and patient records is the most efficient application of information technology in the healthcare industry. Hospital scan patient records now securely contain all of the patient's medical history, prescription information, and diagnosis, which they may read, share, and retain against other physicians in addition to storing the data in their database. This eliminates the need for manual documentation of every detail. Patient data and safety reports are stored in electronic medical records, or EMRs. In the field of medicine, the shift from manual to computerized records is revolutionary.It offers people instantaneous electronic access and supports procedures linked to the provision of healthcare.

An interdisciplinary field of study that connects IT with nursing is called nursing informatics. IT-using nurses are more likely than the average individual to identify medical mistakes. Additionally, telemedicine is integrated into the medical record department, pharmacy, labs, and hospital departments. A hospital's information system also handles a number of other topics, including insurance, pharmacy, inpatient and outpatient billing, and reimbursement processes. The TCP/IP Protocol is the foundation of the hospital intranet, which is exclusively accessible by staff members, members of the organization, and those with permission.It offers people instantaneous electronic access and supports procedures linked to the provision of healthcare.

The first professional healthcare informatics organization was founded in Germany, with the primary goal of overseeing the tools and resources needed to optimize the storage, retrieval, and dissemination of biomedical and healthcare information.

Healthcare information systems have improved overall service, quality, affordability, and accessibility. In recent years, the use of IT in healthcare has grown significantly and become more prominent.

Summary

Technology (IT) has the ability to raise the standard, security, and effectiveness of medical treatment. Although IT adoption in the healthcare industry is typically modest (it might vary depending on the application and environment), polls show that providers intend to raise their spending. Health IT was identified by the Commission as one of the most significant system modifications required to raise quality in its recommendations to Congress. No other technology has the same potential for dematerialization—the provision of products and services with a significantly reduced environmental impact—as information and communication technologies do. These technologies offer exciting instruments for monitoring environmental change. Although mostly feasible, the paperless office has not yet achieved widespread adoption or provided sufficient services.Information technology is growing quickly and finding more uses. As a result, new opportunities are opening up for its efficient use in management, planning, and teaching in the environmental and health fields.

Keywords

Automatic dispensing machines (ADMs): This medical equipment disperses prescription drugs.

Bar Coding: Bar coding in the healthcare industry is akin to bar-code scanning in other industries, where information encoded on a product is electronically captured using an optical scanner.

Clinical Decision Support System (CDSS): CDSS offers doctors and nurses immediate advice on diagnosis and therapy.

Electronic health record: EHR, was once intended to serve as a filing cabinet for patient information gathered from many sources.

MCQs

1. Quality health care relies on physicians, nurses, patients and their families.

(a) True. (b) False.

2. CDSS does not provide physicians and nurses with real-time diagnostic and treatment recommendations.

(a)True. (b) False.

3. IT applications fall into …….. categories.

(a) One. (b) Four. (c) Two (d) Three.

4. Health care organizations use EMM to track and manage inventory of medical supplies, pharmaceuticals, and other materials.

(a)True. (b) False.

5. In …….the Institute of Medicine (IOM) released a report focusing on patient safety estimating that 44,000 to 98,000 people die in U.S. hospitals.

(a)1998. (b)2002. (c)2000 (d)2001

Answers for Self-Assessment Questions

1. (a) 2. (b) 3. (d) 4. (a) 5. (c)

Important Questions

1. Explain about human health.
2. What is health information technology?
3. Discuss about the radio frequency identification.
4. Explain the quality and health information technology.
5. What is current status of health information technology?
6. Explain about information technology in hospitals.
7. Role of information technology in environment.

Unit - 7

Natural Resources

Objectives:

- Examine both non-renewable and renewable resources.
- Explain the resources found in forests.
- Investigate water sources.
- Give an explanation of minerals.
- Talk about food sources.
- Explain the energy sources

Introduction

Uneven consumption is the primary issue pertaining to natural resources. In the "developed" world, a significant portion of natural resources are used. Because of their larger population, the so-called "developing nations" also overuse a variety of resources. On the other hand, most developing countries consume up to 50 times less resources per capita (person) than do industrialized countries. Global industrial waste and greenhouse gas emissions are produced by more than 75% of advanced countries. In developed nations, the amount of energy derived from fossil fuels is significantly higher. In addition to having far higher waste rates, they also consume far more food per person. The USA, for instance, consumes almost 25% of global resources despite having just 4% of the world's population. More land is needed for the production of animal feed for human consumption than for crop growth. Therefore, compared to nations where the majority of the population is vegetarian, those that heavily rely on non-vegetarian diets require far bigger regions for pastureland. You could liken our natural resources to banknotes. We will run out of capital if we use it quickly. However, if we just use the interest, it will be plenty to support us in the long run. We refer to this as sustainable development or usage. Two measures of a sustainable use of resources are the standard of human life and the health of Earth's ecosystems. Indicators of sustainable living are evident throughout human existence. These are: longer life expectancy, greater knowledge, and higher income. The "human development index" refers to these three taken combined. It refers to a natural resource that is

typically kept in reserve, an ecosystem unaffected by human activity, or a source of sustenance. It refers to the supply reserve that organisms can obtain from the natural world in order to survive. the natural reserve stock or supply that humans depend on for survival and well-being. The definition of natural resources is "a variety of goods and services provided by nature which are necessary for our daily lives." Examples include the living (biotic), as well as the non-living (abiotic) parts.

Renewable Resources: Renewable resources are those that are available for use but that, in the event that the natural regeneration cycle is not interrupted, can be replenished by natural processes. For example, wood and water.

Non-Renewable Resources: Those that, if we keep taking them without considering the needs of future generations, will eventually run out. Minerals and fossil fuels are examples. The details of the various resource categories—forest, water, food, energy, and land—are provided here.

- **Forestry resources**

A biotic community dominated by trees, bushes, or any other woody plants, usually in a closed canopy, is referred to as a forest. It comes from the Latin word "foris," which meaning "outside." 2,055% of India's total land, or 6, 76,000 square kilometres, is covered by forests. According to scientific estimates, 33% of India's land should be covered by forests. As of right now, just roughly 12% as a result, we must both preserve our current forest cover and expand it.

- **Forestry Functions:**

i) Protective and restorative roles are played by forests.
ii) Productive roles
iii) Recreational and educational uses
iv) Developmental processes
v) Protective and restorative roles are played by forests.
vi) Safeguarding watersheds
vii) Raising the infighter from rate in order to decrease the rate of water surface runoff. Stopping soil erosion and flash floods resulting in a lengthy, slow runoff that protects against drought.

Control of erosion: retaining soil (by stopping rain from eroding it directly)

Bank of Land: preserving the structure and nutrients of the soil.

Control of the atmosphere: sun heat absorption during evapotranspiration preserving carbon dioxide concentrations for plant development preserving the climate in the area.

Productive roles

Local usage: The use of forest products by those living nearby who gather them for food

Food: (consumptive use) foraging for plants, fishing, and forest hunting.

Cattle feed

For heating and cooking, use charcoal and fuel wood. Poles for constructing dwellings in remote and untamed regions Timber for building and household itemsfiber used in the weaving of nets, strings, ropes, baskets, etc. Silk production by sericulture.

Bee rearing for honey is known as apiculture (using bees as pollinators).

Medicinal plants used in traditional medicine and their potential as a source of novel, contemporary medications Market usage (productive use): The majority of products are utilized for consumption and provide a good source of income for those who live in forests.

NTFPs, or minor forest products: For forest inhabitants, fuel wood, fruits, gum, fiber, etc. are collected and sold in nearby markets as a source of revenue.

Significant wood exploitation for industrial, paper pulp, and building purposes. The Indian Forest Department extracts timber, but in many of the countries and the world's woods, illicit logging persists.

Recreational and educational uses

Developmental processes

The importance of forests ecologically:

- Maintains the atmosphere's CO_2 and O_2 balance,
- Regulates the hydrological cycle and the earth's temperature,

- Promote seepage to lessen runoff losses and avoid drought,
- Lessens soil erosion (root binding), stops reservoir siltation, and stops landslides, which then reduces floods
- Litter contributes to the fertility of the soil.
- A safe haven from wind, sun, and rain for birds, wild animals, and other organisms

Deforestation

Deforestation is the term used to describe the large-scale removal of trees, whether they are in forests, on bare ground, or in the trees we pass on our daily route to school. Natural forests are being destroyed so that the land may be used for farming, constructing homes and industries, logging, creating areas for livestock to graze, mining, extracting oil, building dams, or gathering wood for fuel and furnishings.

From the dawn of civilization, forest wood has been a basic human necessity and is still the primary supply for a wide range of everyday needs. In addition to providing habitat for living things, trees support the water cycle. It occurs in a region where trees are abundant, and it is often seen in a forest like the Amazon jungle. Almost 30% of the globe is covered in forests.

The loss of forest cover has an impact on biodiversity, which puts human lives at risk. Wide-ranging issues include soil erosion, less crops, floods, disturbance of the water cycle, greenhouse gas emissions, changes in climate, and biodiversity loss result from the shrinking of forests.

Causes of Deforestation

The causes of deforestation are:

Logging: The livelihoods of those who depend on forests are destroyed by widespread illegal logging operations. Industries that rely on wood, such as paper, matchsticks, and furniture, require a significant supply of wood. The most frequent fuel utilized is wood, hence a lot of trees are chopped down to provide fuel. Fuels include charcoal and firewood.

Agricultural Activities:

One of the main causes of deforestation cutting of trees for agriculture and livestock grazing because of the increasing need for food goods. In order to acquire land and satisfy the demands of agriculture and timber, more than 40% of the woods are cleared.

Mining:Large tracts of forest land are needed for the extraction of coal and oil. Since roads allow access to isolated areas, their construction causes deforestation. Mining waste contaminates the surrounding ecosystem and has an adverse effect on neighboring animals.

Forest as Habitat

Urbanization: People's needs rise along with the population, which accelerates deforestation. For the purpose of building highways, housing developments, mining operations, and industrial growth, forests are severely reduced in size. Because more space is required for homes and settlements as cities grow, an increasing population has a direct impact on forests.

Timber Production:

The manufacture of lumber is one of the main causes of deforestation. The demand for wood is high, which leads to a rise in deforestation. It serves as a source of raw materials for both building and the manufacture of paper.

Forest Fires: Every year, fires in forests throughout the globe cause us to lose a significant amount of trees. Severe summers and harsh winters are to blame for this. Man-made or natural fires cause a significant loss of forest cover.

Consequences of deforestation

Greenhouse Gas Emissions:

Climate change is caused by gases like carbon dioxide and methane that trap heat in the Earth's atmosphere. Global warming is a result of trees absorbing carbon dioxide and releasing oxygen and water into the atmosphere. Reducing carbon dioxide pollution benefits the ecosystem, but as trees disappear, there is a shortfall in absorption. The removal of forests results in the release of greenhouse gases.

Soil Erosion:

When trees are cut down, forests are cleared, which causes soil erosion. The moisture in the soil evaporates when it is exposed to the heat of the sun. The microorganisms that aid in the breakdown of organic materials are impacted when nutrients evaporate. Rain causes erosion as a result of washing the soil's surfaces. Excessive volumes of dirt damage irrigation infrastructure and hydropower installations by washing into nearby streams and rivers.

Biodiversity Losses:

Due to terrain alteration caused by deforestation, many species and animals become extinct. The entire species may go extinct if there is further deforestation. The "biodiversity loss" is this. There are still many amazing plant and animal species that are in risk of extinction. Since every species in an ecosystem depends on every other species, the extinction of one species can have a profound effect on other species. Because their habitats are being destroyed, we lose between fifty and one hundred kinds of animals every day. Deforestation has put millions of plant and animal species in danger of going extinct.

Floods:

Land erosion is a result of deforestation because trees keep the mountain tops intact. Floods are caused by the abrupt rise in river levels. Trees use their roots to help them absorb and store a lot of water when it rains. When trees are chopped down, the water flow is disturbed, and in certain places, this causes flooding.

Forest conservation

Forest conservation is the preservation and protection of forests. It also comprises the halting of deforestation and the decrease of pollutants in the pollution.

Reforestation

Planting new trees in deforested places to replenish previously damaged forests is known as reforestation. An essential step in the endeavor to protect the environment is reforestation. Large woods are continuously being harmed or destroyed for a number of causes, which makes it significant. Forest fires, human necessities, logging, mining, and agricultural requirements are only a few of the reasons why the earth's surface is losing its green cover on a regular basis. Plans for reforestation often aim to:

- Preserving ecosystems and environment
- Put an end to the loss of broad-based forests, which are essential for producing oxygen, absorbing carbon dioxide, and slowing down climate change.
- Substantial fresh tree planting is required. The enhanced greenhouse effect is the result of less trees. In addition, this issue has gradually led to desertification, or the depletion of rich, productive soil.

- Trees contribute to the recycling of atmospheric air. Whereas plants need carbon dioxide for photosynthesis, humans breathe in oxygen and exhale carbon dioxide. During this process, trees release oxygen into the atmosphere, which is good for non-photosynthetic plants and all complex living forms. Therefore, all of the heterotrophic creatures that comprise the atmospheric ecosystem rely only on autotrophic plants as their supply of oxygen.
- Wood and other plant materials have been used by humans for countless applications for thousands of years. Afforestation and reforestation are results of the dearth of trees.

Reforestation Types

Two categories of reforestation plans exist: Reforestation in urban areas

(i) and rural areas

(ii) Urban Reforestation:

Depending on the demands of the city, urban forestry helps to enhance air quality and change the climate (green spaces are good for combating the heat). While increasing the amount of covered spaces or improving the attractiveness of the surrounding region, urban congestion raises CO_2 levels.

Reforestation in rural area:

Many trees are planted in places that were formerly forests, jungles, or covered in semi-arid vegetation but have since been cleared of trees.

Another possibility is forestation, which involves the planting of trees where none had previously existed.

Depending on the goal, reforestation can take many various forms. Restoring, preserving, and safeguarding fruitful agroforestry systems.

Water Resources

One of the most essential resources for all living things is water. Even though water is a renewable resource, there are still many places in the globe where there is a severe shortage of good water. Water is necessary for us to create food, maintain cleanliness, produce energy, put out fires, and—above all—to survive.

Types of Water Resources

Saltwater Resources:

• Seawater covers the planet's atmosphere. However, saltwater is essentially inefficient when it comes to sources of drinkable water. Even while they do exist, desalination facilities are hard to come by because of their high energy costs.

• In addition to breathtaking views of the ocean, mankind have profited from saltwater possibilities. Indeed, a lot of people's diets all throughout the world include seafood. Tidal waters have also been utilized to produce hydroelectric power.

Groundwater Resources:

Groundwater is arguably the most plentiful freshwater resources.

This water is unsaturated since it is in the vadose zone. Nearly 80% of the pores in the vadose zone are filled with air rather than water.

Groundwater uses the same inputs, outputs, and storage as surface water. The important difference is that, relative to inputs, groundwater storage is usually substantially larger (in volume) than surface water storage because of the slower turnover rate.

Surface Water Resources:

- Surface water is the term for the water found in lakes and rivers. Groundwater natural resources supply more than sixty-three percent of the municipal water supply. Uses for this water include potable water, recreation, industry, agriculture, transportation, cattle, and hydroelectric generation. Five8% of the water used for irrigation comes from surface water. For 58% of its water system, irrigation depends on groundwater.
- The majority of water utilized by industry comes from surface water systems, around 98%. Maintaining and enhancing the quality of surface water is therefore essential. Streamflow and groundwater management are regularly monitored by watershed agencies.
- Despite being named the "water planet" because water makes up 75% of the planet, this water cannot be used for household use. Because it is naturally salty, ocean water is unfit for human consumption. The amount of freshwater on Earth makes up just 2.7% of the total water. Freshwater is no longer suitable for human consumption due to a number of factors, including ongoing water contamination and global warming.

Reasons For Decline Of Ground Water

- Pricing of Agricultural Crops and Water-Intensive Crops: The increasing demand for water extraction connected to agriculture is the main factor contributing to groundwater depletion.
- Groundwater resources are being used more extensively due to a move towards income crops and water-intensive crops.

- Energy Subsidies and Groundwater Extraction: One of the main causes of India's declining water levels is the practice of providing electricity subsidies to farmers.
- The availability of inexpensive or subsidized electricity in 2009 led to the use of almost 89% of extracted groundwater for irrigation.
- Such incentives encourage more groundwater resource extraction, which spreads widely.

Insufficient Groundwater Law Regulation:

- Private groundwater ownership is a widespread problem in both urban and rural areas.
- The problem of groundwater depletion has been made worse by unrestrained and excessive exploitation brought on by a lack of controls.
- Impact of the Green Revolution: In areas where water shortage was already a concern, the Green Revolution enabled the growth of crops that require a lot of water.
- This change in agriculture accelerated the depletion process by increasing groundwater extraction.
- Groundwater Quality: Pollution management and groundwater restoration efforts are still insufficient in the face of growing groundwater source contamination.
- Intervention at the federal or state levels is necessary when pollutants such as arsenic, nitrate, fluoride, and salinity are found in groundwater.
- High Minimum Support Price (MSP): Farmers are encouraged to plant crops that need a lot of irrigation when the MSP for a particular crop is high. Because of the rising demand for water, this adds to the declining conditions of the groundwater.
- Groundwater Depletion and Contamination: These two problems are related to one another.

- Contamination of groundwater occurs when some contaminants surpass the restrictions for drinking water.
- Arsenic, fluoride, nitrate, and iron are examples of frequent contaminants that come from a variety of human activities, including sewage, agriculture, and industry.
- Groundwater Contamination Sources:
- Groundwater contamination is caused by a variety of factors, including pesticide and fertilizer overuse, underground gas tank leaks, septic tank leaks, and landfill pollution.
- About 60% of the nation's districts struggle with the availability and quality of groundwater.

Food Resources

Animals and plants are food sources. Animal-based food is a mainstay in the diets of many civilizations worldwide. It contains a range of fish, meats, and dairy products, all of which are good sources of essential nutrients. Plants are dietary sources that provide vital elements for human nutrition, such as fruits, vegetables, grains, legumes, nuts, seeds, and herbs.

Fruits, vegetables, lean meats, dairy products, nuts, seeds, and whole grains are good dietary sources of vitamins, iron, calcium, zinc, and other nutrients. Plant-based foods are abundant in vitamins, minerals, fiber, and antioxidants—nutrients that are critical to overall health. Consuming a diet high in plant-based foods can reduce the chance of developing chronic illnesses. Furthermore, compared to meals generated from animals, plant-based diets are frequently more ecologically friendly and sustainable. Foods generated from animals encompass a diverse range of dietary items sourced from various animal species. These foods constitute a significant component of a balanced diet and offer an abundance of nutrients, such as protein, fat, and minerals.

World Food Problems:

Population increase: Of the 105 developing nations, 64 have food production that is not keeping up with the rate of population expansion.

Unsustainable farming methods: Degrading woods are caused by unsustainable farming methods including slash and burn, shifting crops, or "rab" (wood ash) agriculture.

Agricultural land degradation: Every year, 5 to 7 million hectares of cropland worldwide are degraded. Two of the main causes of land degradation are misuse of agricultural pesticides and nitrogen loss. One major contributing factor to subpar agricultural results is water shortage. Worldwide, a significant portion of agricultural land has been impacted by salinization and water logging.

Genetic Diversity Loss: Crop genetic variety has been severely reduced as a result of modern agricultural methods. Just the unique traditional rice types found in India are estimated to number between 30,000 and 50,000. Due to the promotion of a few commercial varieties by international seed firms, the majority of these have been lost to farmers during the past few decades. Our food security is put at danger because farmers may lose all of their product as a result of a disease that spreads quickly. A crop that grows in different places and has numerous variations prevents the spread of illness quickly.

Food security: It is the capacity for everyone to always have access to adequate food for a wholesome and active existence. An estimated 18 million people worldwide perish each year from famine or malnutrition, and many more suffer from other nutritional inadequacies. The majority of these deaths are thought to occur in children. There is only so much food that the planet can produce. Conflict and anarchy will ensue if the world's ability to produce food is not sufficient to fulfill the demands of an expanding population.

To guarantee food security, the following three requirements must be met:

There needs to be food available.

Everyone needs to be able to access it.

The food used has to meet nutritional standards.

To Achieve Food Security

Through the family welfare program, population control and food security are tightly related. It has something to do with the water availability for agricultural as well. Food security can only exist when it is divided fairly among all people. Many of us unintentionally throw away a lot of food. Our environmental resources will eventually be under a lot of stress as a result.

Institutional assistance for small farmers: Helping small farmers stay in the agricultural sector instead of moving to cities to work as unskilled industrial workers is a big problem.

Concerns pertaining to trade: Another issue that worries planners who deal with international trade issues is international trade policies about an enhanced flow of food across national boundaries from those who have excess to those who have a deficit in the developing world. The "dumping" of cheap, developed-world agricultural goods onto underdeveloped markets depresses prices and drives farmers in such nations to use unsustainable business methods in order to remain competitive.

Preserving genetic variety: Growing our Protected Areas' network and coverage is the most cost-effective approach to stop the loss of genetic variation. Other potential strategies to stop extinction include the establishment of germplasm collections, seed banks, and tissue culture facilities, however they are very costly. Using qualities from agricultural plants' wild cousins is the most efficient way to introduce desired features into crops. These kinds are quickly going extinct as the wilderness gets less. When they are gone, their excellent qualities cannot be reintroduced when it becomes required later on.

Eco-friendly agricultural practices include using integrated pest management (IPM) and integrated nutrient management (INM) instead of chemical agriculture.

Urban environments may support a variety of crops, such as fruit and vegetables that can be produced using leftover home water and vermi-composting pit fertilizer.

Preventing the deterioration of water and land: Desertification, land degradation, and water source pollution need to be quickly stopped. The key to agricultural output to meet future demands is adopting soil conservation measures, utilizing proper farming practices, especially on hill slopes, improving the soil with organic matter, crop rotation, and micro-level management of watersheds.

Population control: Most significantly, there is a direct correlation between the global efficacy of population control initiatives and the availability of food.

Education: Supporting the food requirements and security of many developing nations requires educating women about nutrition, as they are more directly involved in feeding the family.

evolving eating habits: Dietary patterns are evolving globally these days. Individuals are consuming more non-vegetarian cuisine as living levels rise. The global need for agriculturally based animal feed rises as people switch from consuming grains to meat. The conclusion is that the world's poor do not have enough food because this requires more land and water per unit of food produced. Women are essential to the production of food, both in the kitchen and in feeding

the family. The majority of rural areas lack access to technical training and health professionals who are skilled in nutrition-related teaching and learning.

Land Resources

The earth's land supply is as limited as that of all other natural resources. In order to preserve nature and its resources over the long run, scientists now think that each ecosystem's land and water bodies need to retain at least 10% of them as wilderness. There are several sorts of soil, such as desert soil, laterite soil, black cotton soil, red soil, and so on.

India is the fastest-moving continent in nature, moving 5 cm/yrnortheastward, which causes the Eurasian plate to flex and compress India by 4 mm annually.

Degradation of land refers to a drop in the quality of the land or a decrease in its output or productivity.

Mechanisms that initiate land degradation include

Physical processes include decertification, compaction, erosion, crusting, contamination of the environment, and unsustainable use of natural resources.

Chemical processes include loss of nutrients, acidification, leaching, and a reduction in the ability of calcium to be retained.

Biological processes: Decline in land biodiversity and total and biomass carbon.

Crops cannot grow on salinized soil or water logging caused by heavy irrigation.

The soil is eventually poisoned by the continued application of chemical fertilizers, rendering the area unusable.

Causes for land degradation:

Deforestation: As a result of the rising demand for fuel, timber, and other forest products, deforestation is happening more quickly, which is causing land resources to deteriorate.

Overgrazing: occurs when cattle consume an excessive amount of grass and other green vegetation. Reduced vegetation growth, a decrease in plant species variety, an increase in the establishment of undesirable plant species, soil erosion, and land degradation are all brought on by cattle movement.

Agricultural Practices: The natural fertility and quality of the agricultural land have been degraded by the overuse of pesticides and fertilizers in contemporary agriculture.

Industrialization: The expansion of industries for the nation's economic growth causes excessive land consumption and deforestation, resulting in the loss of the land's natural upgrading quality.
Urbanization: The need for more residential and commercial space due to population increase is one of the factors contributing to land degradation.

Land use planning:

The requirement needed to accomplish a sort of land use that is economically viable, socially and ecologically acceptable, sustainable, and attractive is created by land use planning. Implementation methods and global models are used mechanically and without critical thought, which is why planning techniques frequently fail. The process of land use planning is not one that is universally applied and standardized. An original regional or local scenario study served as the foundation for its content. Planning for land use should take these guidelines into account.
It should consider local environmental knowledge and conventional practices.
Two fundamental ideas of land use planning are the gender approach and the differentiation of state holders.
Because of the land use's ecological, economical, technological, financial, social, and cultural dimensions, an interdisciplinary approach must be used.
It should seek to address current issues (such as poor yield, soil erosion, and low income in rural households) while preparing for long-term preservation and sustainable land resource use.
Desertification: In arid, semiarid, and dry subhumid regions of the world, it is land degradation. It's a process wherein climate change or poor land management causes productive areas to turn desert. The planet is home to several man-made deserts.
The needs of growing people that live on the land to cultivate food and graze animals typically result in desertification, which is happening much more quickly now than it did in the past. Over 1 billion people rely on these areas for existence, and 40 percent of the earth's surface is made up of these vulnerable dry regions.
According to UN EP estimates, some 800 million people are at risk of desertification and that almost 80% of the arable land in the world's dry and semi-arid regions is turning into deserts. In the last 50 years, around 2 billion acres of land have been turned into deserts worldwide. Approximately 15 million acres of desertification occur annually, with sub-Saharan Africa seeing the highest rate. The RajasthaniThar desert spans an area of around 12,000 hectares.

Causes of desertification:

1) Overgrazing: Livestock compaction increases the amount of fine debris in the soil, decreases the pace at which the soil percolates, and compacts the substrate with their hooves, all of which promote erosion by wind and water. Plants that aid in binding the soil are diminished or eliminated by grazing and timber harvesting.

2) Growing population: The strain of livestock on marginal soils quickens the process of desertification.

3) Deforestation practices: When there are no longer any plants to bind the soil, there is surface runoff, which causes nutrient depletion and soil erosion.

4) A rise in food production on marginal lands in semi-arid or dry regions.

5) Watering initiatives in regions lacking a drainage infrastructure.

Effects: Loss of productivity, such as the shift from grasslands dominated by perennial grasses to ones dominated by perennial shrubs, and loss of biodiversity are two of the main effects of desertification. The ability of a place to support life is eliminated when severe circumstances are fulfilled.

How to control of desertification

1. Soil erosion, flooding, and water logging can be prevented by planting soil-binding grasses and reforesting areas.

2. Mixed cropping and crop rotation increase the soil's fertility. Production would rise, supporting a sizable population.

3. Artificial bunds or mechanical measures that cover the region with the right kind of vegetation might be used to check for desertification.

4. Sand shifting can be managed by mulching (applying a man-made covering).

5. Better drainage allows one to examine the soil's salinity. More water can be added to the leaching process to restore saline soil, especially in areas with low groundwater tables.

Preservation of natural resources

Until recently, humans believed that they could continue to exploit the ecosystems and natural resources found on Earth's surface, such as soil, water, forests, and grasslands, as well as mine the subsurface for minerals and fossil fuels. However, over the past several decades, it has

become more and more clear that the world environment can support only a certain amount of use. When biological systems are abused or overworked, their capacity to replace resources is compromised. Pressure builds to a point where it upsets their equilibrium. Even biological resources that have historically been categorized as "renewable," like those found in our wetlands, meadows, seas, and forests, are being irreversibly lost due to abuse.

No natural resource is infinite, either. If we keep using "non-renewable" resources as heavily as we do now, they will quickly run out.

The two most detrimental elements contributing to the current, rapid depletion of all natural resources are "rapid population growth" and rising "consumerism" among the wealthier segments of society. Both elements are the outcome of the decisions each of us makes.

Energy conservation

- As soon as you exit a room, turn off the fans and lights.
- Instead of using bulbs, use energy-saving tube lights and bulbs. The light output of a 40-watt tube light is equivalent to a 100-watt bulb.
- Maintain the tubes and bulbs clean. Dust on tubes and lightbulbs reduces illumination by 20 to 30 percentage.
- As soon as the interesting show ends, turn off the radio or television.
- Cooking energy may be reduced by up to 75% with a pressure cooker. It is also quicker.
- During cooking, keeping the pot covered with a lid promotes speedier cooking and lowers energy use.

Water conservation:

- When brushing your teeth or taking a bath, keep the taps closed.
- In agricultural regions, use drip and sprinkler irrigation.
- Incorporate rainwater gathering techniques.
- Reuse bath and kitchen waste water for gardening

Soil conservation:

- Use contour farming, agroforestry, and strip cropping;
- Avoid cutting trees and causing soil erosion;

- Use no-till farming to cause the least amount of soil disturbance.
- Use organic fertilizers and vermicompost; •
- Steer clear of overusing insecticides and fertilizers; • Adopt integrated pest control techniques.

Summary

An organism's environment is everything that surrounds it and has an impact on its life in many ways. Both biological and physical elements are present. The environment's physical elements include the soil, water, air, light, and temperature. We refer to these as biotic constituents. Since gasoline is a non-renewable resource, it will eventually run out. There won't be any fuel left at some point. Natural resources, including coal, oil, and natural gas, are limited because they take millions of years to develop and cannot be replenished after they are used up. Resources found in forests are crucial to the growth of governments, regions, and countries. Variations in growth, harvest, and land use conversions of these resources make them susceptible to change.

Keywords

Environment: The term "environment" refers to everything that surrounding an organism and has an impact on its life in many ways. It consists of both biological and physical elements.

Mineral Resources: Iron, copper, cobalt, zinc, fluorine, and selenium are among the minor minerals found in mammals. Plants have two types of minerals: macronutrients and micronutrients.

Non-Renewable Resources: Because they originated from plant photosynthetic activity millions of years ago, non-renewable resources have a high carbon content.

Physical Components: The physical components of the environment are soil, water, air, light and temperature.

Renewable Resources: Renewable resources are those resources that can be replaced as they are used up.

MCQs

1..... of stratosphere provides protection to our life.

(a) Nitrogen. (b) Hydrogen. (c) Ozone. (d) Argon.

2. Which of the following soil is the best for plant growth?

(a) Sandy soil. (b) Clay. (c) Gravel. (d) Loamy soil.

3. Both power and manure are provided by.....

(a) Thermal plants. (b) Nuclear plants. (c) Biogas plants. (d) Hydroelectric plants.

4. Atomic energy is obtained by using ores of.....

(a) Copper. (b) Uranium. (c) Neither (a) nor (b). (d) Both (a) and (b).

5. Which one of the following is not a fossil fuel?

(a) Natural gas. (b) Petrol. (c) Coal .

Answers :

1. (c) 2.(d) 3.(c) 4.(b) 5.(d)

Important Questions

1. Role of an individual in conservation of natural resources. Discuss.
2. Explain the equitable use of resources for sustainable lifestyles.
3. What do you understand about the renewable resources?
4. Explain the non-renewable resources?
5. Discuss the importance of forest resources in India.
6. What are the uses of forest resources in India?
7. Give a detailed overview of the water resources?
8. Explain about the mineral resources in India.

Unit - 8

Social issue and the environment

Objectives:

- Understand the concept of green house effect
- Elucidate the source and consequence of acid rain
- Designate in element the idea of global warming
- Discover nuclear accidents and holocaust

Greenhouse effect

This concept explains the election of gases from earth to atmosphere through the greenhouse gas that absorbs UV light from sun. this help the earth to maintain optimum temp and in-trun protect earth surface from sun

This insulates the surface of the earth and prevents it from freezing."

- Plant growth can be enhanced using glass house where radiation from the sun haet up the plants and air inside green house. This heat is trapped and is not allowed to move out. This condition is essential for increasing the growth for plants
- Same concept is followed with earth's atmosphere, where the temp rises at day and after the heat is radiated back at night the temp fall. The green house gas absorb the heat. This enhances the temp at earth surface and make it optimum for the growth of animals
- But due to continuous increase in greenhouse gas temp of the globe is increasing leading to various ill effects

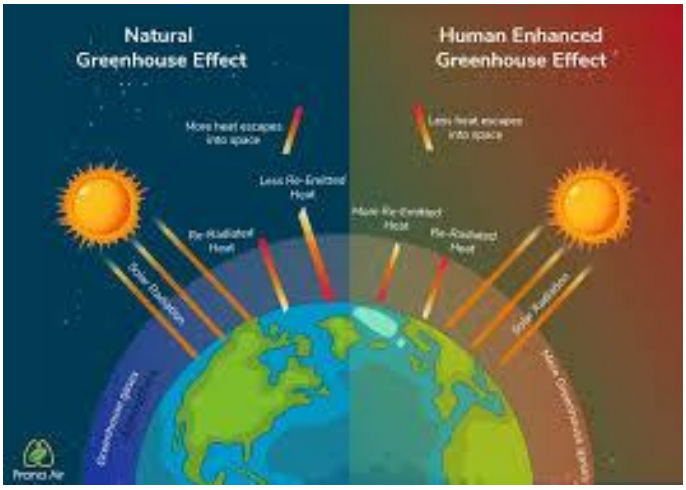


Fig 1 Green house gases

Greenhouse Gases

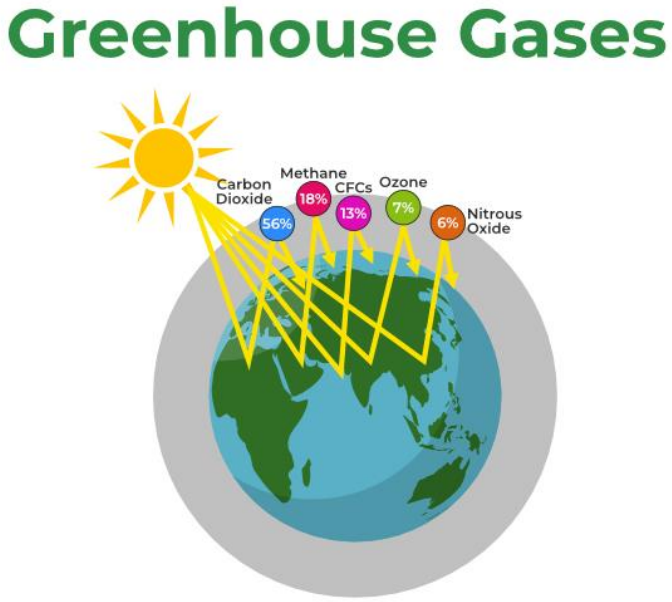


Fig 2 examples of green house gases

- gases that absorb the infrared radiations producing greenhouse effect. For eg., CO2 andCFC."

- Sources that release those gases ate mainly factories, automobiles. Increase in which enhance the temp because green house gases never allow the radiation to move out of earth

Causes

Greenhouse gas	Main cause
Carbon dioxide (CO_2)	Burning fossil fuels Cement manufacture Deforestation (release of CO_2 and reduction in absorption by plants)
Methane (CH_4)	Burning fossil fuels Burning biomass Fossil fuel mining and distribution Waste disposal in landfills Animal husbandry (e.g. cattle and sheep) Rice agriculture
Nitrous oxide (N_2O)	Agricultural fertilisers Burning biomass Animal husbandry Industrial activities (e.g. nylon manufacture)
Tropospheric ozone (O_3)	Burning fossil fuels Burning biomass Land use change
Halocarbons	Refrigerants Manufacturing processes
Aerosols	Burning fossil fuels Burning biomass Mining Industrial processes

Source: IPCC (2007a).

Table 1 Causes of global warming

Sequence of Greenhouse effect

Step 1: Earth's atmosphere gets theSolar radiation few isreplicated back into interstellar region.

Step 2: Earth is heated when radiation is absorbed by earth

Step 3:Earth radiates heat back to space.

Step 4: Few Radiations Is Trapped Back, Increasing the Temp

Step 5: Anthropogenic Activity Increase the Green House Gas.

Step 6: This increase the temperature due to trapping of extra gases

GLOBAL WARMING

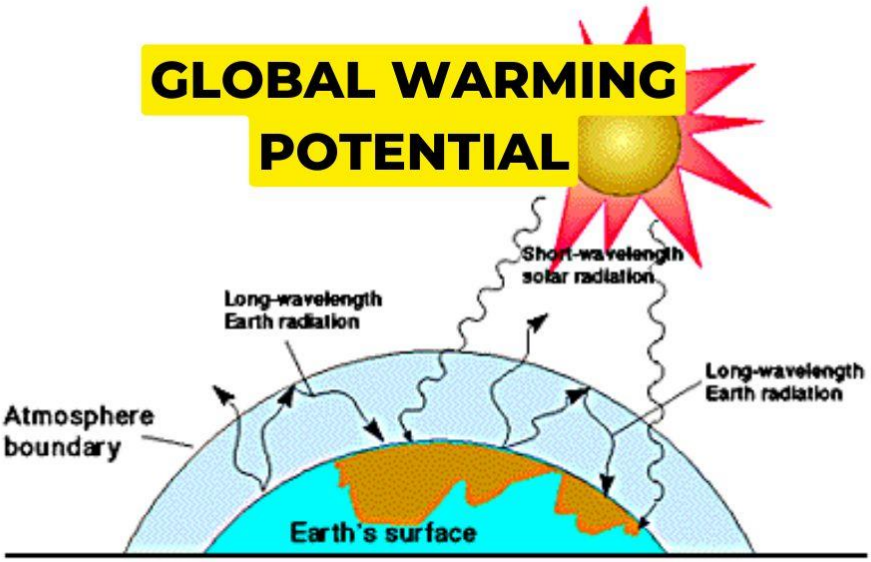


Fig 4 process of global warming

CAUSES OF GLOBAL WARMING :

CO2 and Nitrous oxide released by oil and gas from burning of coal. Since tree absorb CO2, deforestation add to increase of green house gases. Methane produced by livestock farming increase green house gas nitrous oxide emissions caused by fertilizers containing nitrogen

Fig 5 reason of Global warming

CONSEQUENCES

- Rain-fed agriculture, in the main source of freshwater. 80% of total rain in plain region in India occurs during June to September. In four months
- Disasters, including storms, heat waves, floods, and droughts raises the temp of earth
- Majorly hydrology is effected changing water resources and agriculture of the country. thermal expansion of sea water increases sea level. Climate change is again a side effect
- Ice-fed rivers like Himalayan rivers are very vulnerable to climate change.

Precipitation Patterns:

near the Equator rainfall increases and reduced in subtropics. Precipitation and evaporation will increase which can ultimately lead to flooding

Drought:

- increase in droughts is lacking of insufficient amount of rain for an extended period of time.

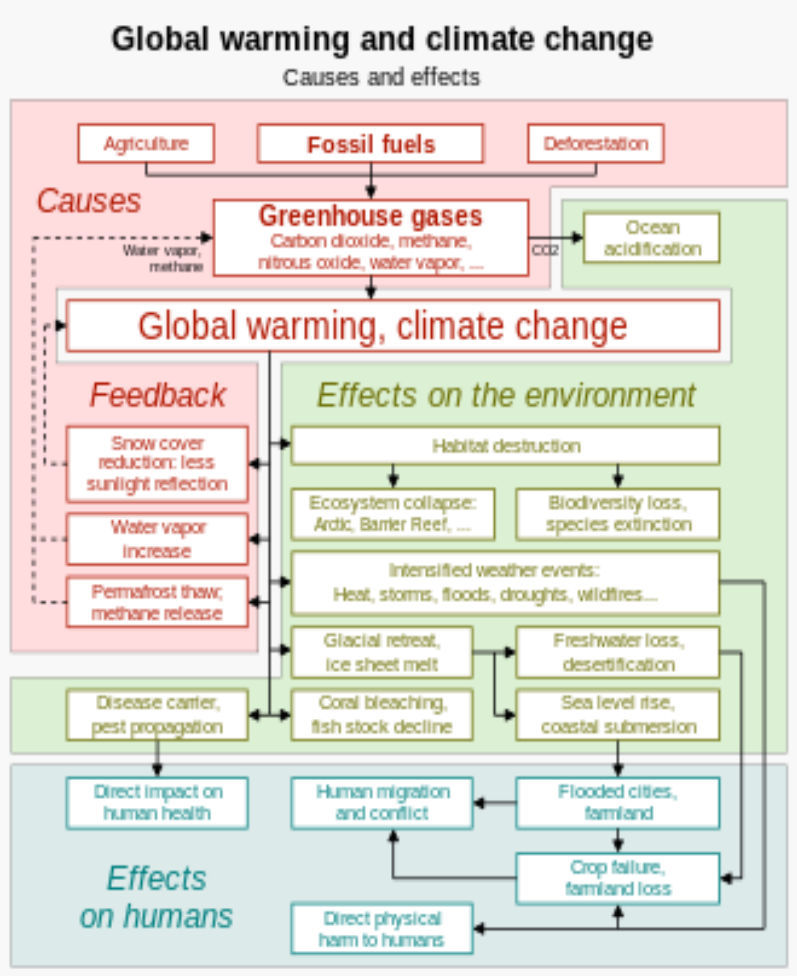


Fig 6 effect on environment

9.2.6 Agriculture:

- from mid to high temperature upsurges (1-3ºC), shared with higher (CO2) levels and changes in rainfall, can slightly benefit crop yields.
- Global agricultural manufacture might see an increase due to the doubling of the CO2 fertilization effect. However, rising sea levels can increase salinity, pushing back the freshwater interface and affecting the supply of fresh groundwater along coastal areas. Some regions will experience drying conditions, while others will see increased precipitation, altering the extent and types of species in forests. Meteorological analysis predicts anrisingdrift in mean temperature, a descending trend in comparative humidity, annual rainfall, and No of wet days per year in India.

- Warming is also projected to reduce agricultural output in India, making small and marginal farmers more vulnerable. Agrawal (2008) indicated that agricultural productivity could decline by up to 25%, and by as much as 50% in rainfed agriculture.

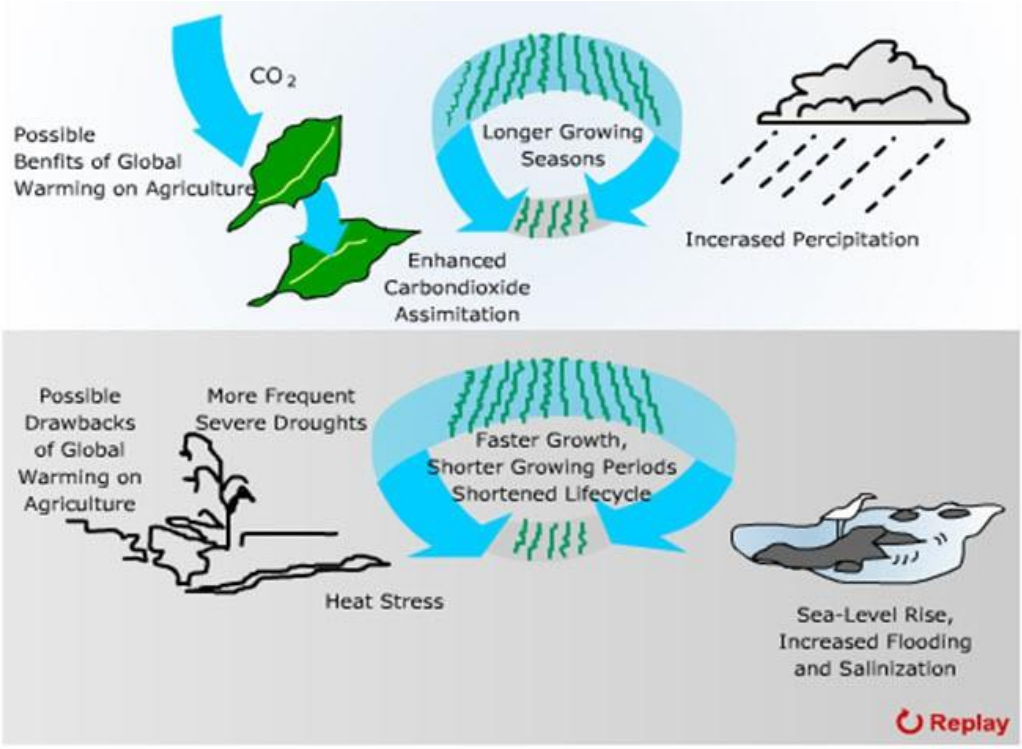


Fig 7 Water level and global warming

Acidification Of Ocean:

Process of calcification is effected which pose a risk to animal like reef.

Ozone Depletion:

greenhouse effect, damages plants, and damages lung tissue can increase with Ozone in the lower atmosphere. Ozone in atmosphere reflect excess rays from the sun. carbon dioxide from the atmosphere is naturally absorbed by ocean.

Carbonic acid reacts with carbonate ions present in seawater, which are crucial for the formation of corals and the shells like phytoplankton, forming the foundation. Thus, increased levels of carbon dioxide in the atmosphere lead to a decrease in the necessary components for the creation of calcium carbonate skeletons in corals and other calcium carbonate-dependent organisms.

Ocean acidification, along with ocean waters, is expected to have numerousinfluences on coastal and ocean resources:

- Potential breakdowns in marine food webs
- Inhibited or slowed growth of corals, calcifying phytoplankton, and zooplankton
- Habitat loss due to the decline of coral reefs
- Loss of aquatic plants and animals intolerant to increased salinity levels.

Ozone Depletion

Ozone, a form of oxygen comprising three atoms, is normally absent in reduced atmosphere and primarily in stratosphere, spanning 20 to 50 km above the Earth's surface.

Ozone plays a critical role as it filters UV radiation, serving as a shield contrary to UV radiation that can elevate the risk of skin cancer, cataracts, and other eye diseases. Moreover, it affects the humandefense mechanisms, heightening susceptibility to infectious diseases. AugmentedUV radiation can severely impact plant and fish productivity.

It is also referred to the reduction or breakdown of ozone in the stratosphere, initially identified in the 1970s with the rise of supersonic aircraft emitting nitrogen oxides in the lower stratosphere.

Ozone-Depleting Substances

Ozone-depleting substances encompass various compounds responsible for ozone layer degradation. Chlorofluorocarbons (CFCs) are identified as the primary cause. CFCs find wide application in refrigerants, foaming agents, plastic manufacturing, and other industrial processes. Other substances controlled by the Montreal Protocol include halons, carbon tetrachloride,

methyl chloroform, hydrobromofluorocarbons, hydrochlorofluorocarbons, methyl bromide, and bromochloromethane.

Ozone depletion carries severe consequences, such as varying impacts on plants and animals' tolerance to ultraviolet rays. These rays damage DNA, particularly affecting crops like soybeans.

The UVB radiation is absorbed by all forms of life, melanoma can be a result of ozone layer depletion which is cancer that has turned to epidemic in UN

Acid Rain-

Wet or dry from of sulfuric or nitric acid when forms on ground from the atmosphere, such acidic precipitation is acid deposition

Forms of Acid Rain

2 forms wet and dry

- Wet Deposition: wind blows the acidic chemicals in the air and air has moisture, the acids fall to the ground in the form of rain
- Dry Deposition: on the other hand, when the weather is dry, the acidic pollutants slip into dust or smoke and fall to the ground as dry particles.

Causes of Acid Rain

Both natural and anthropogenic sources are recognized to play a role in the formation of acid rain. But, it is mostly caused by combustion of fossil fuels which results in emissions of SO2and NOx.

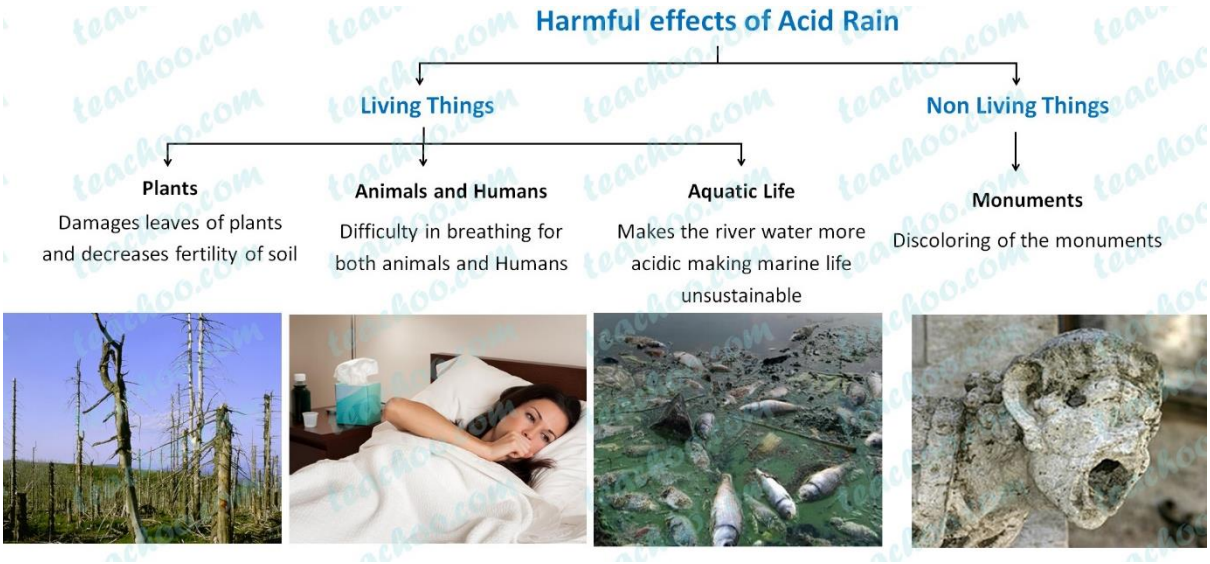
1. Natural Sources- naturally nitric oxides produced by volcanic emissions or Lighting react with water molecules to produce nitric acid, thereby forming acid rain.

2. Man-made sources

Human activities leading to chemical gas emissions such as sulfur and nitrogen are the primary contributors to acid rain.

Effects of Acid Rain

Public health plants animal all are greatly affected by acid rain



Solutions

1. routine and timely Cleaning up Exhaust Pipes and Smokestacks
2. ReinstatingSpoiled Environments
3. Substitute Energy Sources
4. Individual, National/State, and International Actions

Nuclear accidents and Holocaust

- Process when unstable nucleus result in emission of particle and ray is called Radioactivity they are serious threat to human health. Their sources are
- Normal sources:
- Anthropogenic Sources:
- nuclear explosions: local, tropospheric and stratospheric.
- Local fallout is quite intense but short-lived.

Radioactive waste causes

- Soil pollution
- Water pollution

The consequence of radioactive pollution depends upon

- Half –life
- Energy liberating capacity
- Amount of diffusion
- Amount of deposition of the contaminant.
- Numerous atmospheric and climatic conditions such as wind, temperature, rainfall also determine their properties.

The imaginable possessions of radioactive wastes are categorised into

- • Somatic Consequence
- • Genetic Outcome
- • Biomagnification

MCQ

1. Which of the succeeding is not a major greenhouse gas?

(a) CO2. (b) Water vapour. (c) Calcium Carbonate. (d) Methane.

2. Max.CO2emissions from fossil fuel burning is at

(a) Japan and China. (b) Europe. (c) Developing nations. (d) North America.

3. anthropogenic origingreen house gas is ?

(a) Nitrous oxide. (b) Water vapour. (c) Carbon dioxide. (d) CFCs.

4. The shortest wavelength of light visible to the human eye is what?

(a) Red. (b) Blue. (c) Violet. (d) Green.

Answers

1. (c) 2.(d) 3.(d) 4.(c)

Important Questions

1. What do you understand by about the green house effect?
2. What is the solar radiation?
3. Discuss about the greenhouse gases.
4. Explain the greenhouse effect.
5. What is acid rain?
6. How do we measure acid rain?
7. Explain the effects of acid rain.
8. What do you know about the ozone depletion?

Unit - 9

Social Issue and Environment

Objective:

- From unsustainable to sustainable development, analyze.
- Describe the extent of the energy-related issues facing cities.
- Recognize the significance of watershed management, rainwater harvesting, and conservation.
- Examine the issues and concerns surrounding the resettlement and rehabilitation of individuals.

Sustainable Development:

i. Humans inhabit both the natural and social worlds.

ii. The natural and social aspects of our lives are significantly impacted by our technological advancements.

Growth in the Gross National Product (GNP) of a few different countries is not indicative of development.

Thus far, human development has primarily benefited a select few wealthy nations.

iii. They have achieved remarkable advancements in science and technology, but at what cost? There is severe pollution in the food we eat, the water we drink, and the air we breathe. Because of excessive exploitation, our natural resources are simply running out.

iv. The world-famous report "The limits to growth" warned that if this growth keeps up its current pace, we will soon face the end of time.

According to G.H. Brundtland, the Director of the WHO and the Prime Minister of Norway, sustainable development is defined as "meeting the needs of the present without compromising the ability of future generations to meet their own needs." Development must be envisioned in a holistic way that benefits everyone, not just the current generation but also future generations.

v. There is an urgent need to link the social aspects with development and environment.

Aspects for Sustainable development

a. **Intergenerational equity:** In order to leave our future generations with a safe, healthy, and resourceful environment, we must minimize any negative effects on the environment and resources. This can only be accomplished by stopping over-exploitation of resources, lowering emissions and waste discharge, and maintaining ecological balance.
b. **Intra-generational equity:** This will support the economic growth of poor countries, narrow the wealth gap, and lead to sustainability. The development process should aim to minimize the wealth gaps within and between nations. Technology should address the problems of developing countries, producing vaccines for infectious diseases, clean fuel for domestic and industrial use, and drought-tolerant varieties for uncertain climates.

Sustainably developed measures:

a. Making use of the right technologies:

- Employing indigenous technologies is more beneficial, economical, and sustainable.
- Appropriate technology is that which is environmentally friendly, cost-effective, resource-efficient, and culturally appropriate (involves local resources and labor).
- Less waste and less resources should be used by the technology.

b. **Using the 3Rs (Reduce, Reuse, Recycle):** This method lessens the strain on resources and lowers pollution and trash production.

- Reducing the usage of resources: If there is less of a market for any metallic product, less metal will be mined, which will result in less waste being produced.
- Reusing them repeatedly: Reusable containers can be made from refillable materials that are disposed of after use. For example, rubber bands can be made from leftover rubber tubes.

- Recycling the material: Recycling is the process of turning waste resources into new, practical goods. Paper recycling is one example of this.

c. **Encouraging environmental education and awareness :**

- This helps in change people's perspectives and attitudes toward the environment and our planet.
- Give children an early exposure to the topic, which will help them develop a sense of earthly belonging.
- Help us change our way of life to one that is more sustainable.

d. **Utilization of resources in accordance with carrying capacity:**

- A system's carrying capacity determines how many species it can support sustainably.
- When a system's carrying capacity is exceeded, environmental degradation occurs.
- The two fundamental elements of carrying capacity are
  Supporting capacity: The ability to replenish
- Assimilative capacity: The ability to with stand various types of stress.
- Sustainability can be attained if the resources are used in accordance with the first two characteristics.

WATER CONSERVATION:

It is necessary to conserve water because it is one of the most valuable and essential resources. The water conservation techniques listed below can be implemented:

1. **Reducing runoff losses** : It can be accomplished in the following ways:
    - Creating a series of benches to catch runoff water through contour cultivation on small ridges and furrows across slopes.
    - Channeling water through a series of vertically spaced diversions.
    - Channeling water through small depressions dug in the area to provide temporary water storage.

- Applying chemical wetting agents or conditioners, such as gypsum, to sodic soils to improve soil permeability and reduce runoff.
- Surface crop residues Animal waste, tillage, and mulch • Water storage facilities like farm ponds and wells.

2. **Reducing Evaporation losses:**
   - Super slurper, a co-polymer of starch and acrylonitrile, absorbs water 4000 times its weight.
   - An asphalt horizontal barrier positioned beneath the soil's surface increases water availability.
3. **Water storing in Soil:**
   - It is necessary to wet the soil to the field capacity.
   - By keeping the land fallow for a season, water can be saved for crop growth the following year.
4. **Reducing irrigation losses:**
   - Watering in the early morning or late at night
   - Using drip or sprinkler irrigation
   - Using lined canals to minimize seepage
5. **Water reuse:**
   - Fertilizer can be made from treated waste water.
   - Washing cars and gardens with grey water from bathtubs and washing machines
6. **Preventing wastage of water**
   - Closing faucets when not in use
   - Fixing any pipeline leaks
7. **Increase block pricing**

   A higher water usage results in a proportionately higher bill for the customer.

RAIN WATER HARVESTING

Now a days, with the construction of concrete homes, well-constructed walkways, roads, and courtyards, there aren't many open spaces remaining. Additionally, the amount of exposed earth, concrete jungles, and natural forest cover has decreased, leaving less space for water to seep into,

raising the ground water table.

In order to increase the recharge of ground water, a technique known as rainwater harvesting involves capturing and storing water. This is accomplished by building specific water harvesting structures such as check dams, dug wells, percolation pits, and lagoons.

Aims of Rain water Harvesting:

1. Reducing runoff loss
2. Preventing road flooding
3. Meeting the growing demand for water
4. Raising the water table by replenishing groundwater

Techniques of Rain water Harvesting:

1. **Conventional/Traditional approach:** Rainwater is traditionally gathered from rooftops and kept in open storage areas like tanks, ponds, and lakes. In villages, people still carry it out. Embankments or underground tanks (known as tankas in Rajastan) are used in rural areas to store harvested rainwater. In foothills, springs' water flow is collected through embankment-style water storage.

   People in the foothills of the Himalayas use hollow bamboo as a conduit to carry water from natural springs.
2. **Modern approach:** There are two primary methods for collecting rainwater:

   • Depositing water onto the surface to be used later

   • Groundwater recharge

   It's a very old tradition to store water above ground for later use. Groundwater replenishment is a relatively new idea, and the buildings utilized to do so are:

   - **Pits:** recharge pits are built in order to replenish the shallow aquifer. These have a width of 1-2 meters and a depth of 3 meters. In order to facilitate filtration prior to percolation, this is backfilled with boulders, gravel, and sand.
   - **Trenches:** Where a permeable stream is available at a shallow depth, trenches measuring approximately 0.5-1 m wide, 1-1.5 m deep, and up to 20 m long are

built. Similar to what happens with pits, the trench is likewise backfilled with filter material.

- **Dug Wells:** These could serve as structures for recharge. Percolation should occur after the extra water has passed through the filter media.
- **Technique for spreading:** water is let to spread in streams and nullahs, or in a percolation pond, check dams, nullah bunds, and cement plugs.
  Furthermore, rainwater collected on city roofs and in roadside areas is utilized for recharging aquifers. The artificial recharge of ground water through rainwater harvesting is being promoted these days by the Central Ground Water Board and the local government.

WATERSHED MANAGEMENT

- A water shed is a geographical feature, or a plot of land, that gathers, holds, and releases water.
- Rain, snowmelt, and fog produce the collected water.
- Lakes, ponds, subsurface soil, etc. are places where water is kept.
- Rivers, streams, and groundwater flow release the stored water.
- The water shed refers to the area of land where water flows naturally to a shared drainage channel, such as a lake, river, stream, estuary, or even the ocean.
- The size of a water shed can vary from a few square kilometers to a few thousand square kilometers.
- The intricate relationships between water, vegetation, soil, and land use activities make up the water shed.

Reason of Watershed degradation:

The following are the main causes of watershed degradation:

- Shifting cultivation
- Complex interactions between soil, land, vegetation, land use activities, and water;
- Overgrazing
- Deforestation
- Mining
- Industrialization

- Construction activities
- Soil erosion

Watershed management: Watershed management involves using land and water resources rationally to maximize production while causing the least amount of harm to the environment.

Objectives of Watershed Management:

- In order to restore ecological balance needs to sustainable resource development of natural resourses.
- Encourage sustainable economic development by making the best use of land, water, and vegetation.
- Reducing the risk of landslides, floods, and droughts
- Managing watersheds for the purpose of beneficial developmental activities such as irrigation, hydropower production and domestic water supply to controlling soil erosion and moisture retention.

Practices of Watershed Management:

1. **Water Harvesting:**

- It also assists in mitigating floods.
- Percolation tanks, wells, check dams, and other structures are built at the foot of hills and mountains to collect rainwater and prevent it from running off.
- Allowing sufficient time for water to seep into the subsurface and raise the groundwater table

2. **Agro forestry and Afforestation:**

- In areas with high rainfall, woody trees are planted between crops to reduce runoff and loss of fertile soil
- in Dehradun, trees like eucalyptus and grasses like chrysopogan are grown alongside maize or wheat
- in high rainfall areas, afforestation and crop plantations play a significant role in the development of watersheds

- In addition, they help to prevent soil erosion and retain moisture.

3. Mechanical process to reduce run off loses and soil erosion

Various mechanical techniques are employed to minimize runoff losses and soil erosion including:

- ✓ Terracing
- ✓ Bunding
- ✓ Bench terracing
- ✓ No-till farming
- ✓ Contour cropping
- ✓ Strip cropping.

Bunding has shown to be a very effective technique in Dehradun for lowering peak discharge, runoff, and soil loss.

4. Quarrying and Scientific mining:

- Improper mining causes instability and disturbance of the hills, which leads to landslides, rapid erosion, etc.
- It is recommended to minimize the destructive effects of mining by Draining water courses in the mined area
- Planting some soil-binding plants, such as Vitex and Ipomeoea
- Contour trenching at 1 m intervals on overburden dumps

5. Public participation:

- For the success of watershed management programme related to soil and water conservation it is particularly important for the involvement of farmers and tribal people.
- Communities must be motivated by
  - To protect newly planted areas
  - Water harvesting structures implemented by the government or non-governmental organizations must be maintained
  - Proper education of the populace is essential

- Haryana state has successfully managed its watersheds thanks to the active participation of the local people.

RESETTLEMENT AND REHABILIATION ISSUES:

Numerous development initiatives frequently result in the impoverished and frequently uneducated native or tribal people being displaced. Their recovery represents a significant socioeconomic concern.

Concerns and issues:

1. **Displacement problems due to dams:**

- The large-scale local population displacement from their ancestral homes and the loss of their traditional profession or occupation make the big river valley projects among the most detrimental socioeconomic effects.
- It is estimated that over 20 million people in India have been impacted, either directly or indirectly, by the construction of large dams.
- Affected by the Hirakund dam are over 20,000 people who were living in roughly 250 villages.
- Since the Bhakra Nangal dam was built in the 1950s, not even half of the displaced people have been able to find new homes.
- The Sardar Sarovar and Tetri dams share the same problems.
- Displacement due to mining:
- Mining operations cover thousands of hectares of land, uprooting native populations in the process.
- Accidents that take place in mined areas, such as land subsidence, can occasionally cause locals to be uprooted and cause such movements.
- Residents in Jharkhand's Jharia coal fields are being asked to leave because underground fires have been causing serious problems for them.
- The cost of population relocation is expected to be approximately Rs. 18,000 crore, while the cost of putting out the fire is estimated to be approximately Rs. 8,000 crore.

2. **Displacement due to creation of national parks:**

- There is a social component to the designation of a forest area as a national park, even though it is a positive step toward the preservation of natural resources.
- The declaration of a large section of the forest as a core area restricts locals' access. Thus, they initiate acts of destruction.

The main problems with relocation and rehabilitation are:

- Women and broken families are the most negatively impacted; tribes are typically the most affected among the displaced who are already impoverished.
- The tribal people lack knowledge of market trends and policies.
- The dissolution of marriages, social and cultural institutions, folk songs, dances, and other activities; loss of identity and close ties among the populace

ENVIRONMENTAL ETHICS

Environmental ethical values must be fostered in order to instill in people a sensitivity to environmental degradation. Regardless of cultural differences, environmental ethics aims to define what is right and wrong. Respecting and caring for the Earth, preserving biodiversity, life-support systems, and ensuring sustainable development are all fundamental obligations that humans have to the natural world.

The following ethical principles regarding the environment should be instilled:

- Environmental consciousness
- Self-reliance
- Adoption of an eco-friendly culture
- Preservation of the planet's diversity
- Sharing of an environment; humility, reverence, responsibility, commitment,
- Respect for all living things and the environment;
- Global environmental citizenship;

The range of environmental activities for fostering environmental ethics includes:

1. Using recycled paper for notes and circulars

2. Moving waste from the kitchen to the garden
3. Turning off lights when not in use
4. Walking or bicycling; using public transportation
5. Collecting rainwater; avoiding using freshwater for gardening
6. Using cloth towels instead of paper towels
7. Avoiding needless outdoor lighting; organizing tree-plantation campaigns
8. Listening to radio programs on the environment and its problems
9. Setting up eco-clubs
10. Setting up trash cans and dustbins around the college grounds
11. Celebrating Environment Day on June 5 and Earth Day on April 22
12. Planting trees in and around the campus.
13. Preserving energy resources by avoiding needless energy waste
14. Cutting and putting on display images and newspaper cuttings portraying environmental crises
15. Putting on short plays about environmental crises to raise awareness of the issue

WILD LIFE PROTECTION ACT, 1972

1. It was established in 1972.
2. In 1976, Wild Life was moved from the state list to the concurrent list, granting the central government more authority.
3. The establishment of national parks and wildlife sanctuaries was a proactive endeavor undertaken by the Indian Board of Wildlife (IBWL).
4. It clarifies terminology pertaining to wildlife.
5. The appointment of the wild life warden and advisory board, as well as their responsibilities and powers
6. Creation of national parks and wildlife sanctuaries
7. An exhaustive list of threatened species of wildlife
8. Outlawing the taking of endangered animals by hunting
9. Preserving endangered species such as the blue vanda and ladies slipper orchid, among others

10. Trade and commerce in certain wild species that require a license to be sold, possessed, transferred, etc.
11. Outlawing the sale or trade of scheduled animals
12. Officers' legal authority and offenders' penalties
13. Several conservation initiatives were started to protect threatened species like crocodiles, lions, and tigers, among others.

Drawbacks

- There are only three years of imprisonment, a fine of Rs. twenty-five thousand, or both as the maximum punishments for offenders.
- Documents proving individual ownership of items pertaining to animals

THE WATER PREVENTION & CONTROL OF POLLUTION ACT 1974

1. It was started by Smt. Indira Gandhi following the Stockholm conference in 1974.
2. It is an act to provide for the prevention and control of water pollution, maintaining and restoring the wholesomeness of water.
3. The term "water pollution" refers to any modification of the physical, chemical, or biological properties of water that renders it unfit for its intended purpose in its unaltered state.
4. Offers water restoration and maintenance services.
5. Allows for the formation of State and federal pollution control boards.
6. Delegating to such boards duties and responsibilities
7. The steps involved and the different sanctions for noncompliance
8. The central boards
    - Will advise the government on issues related to controlling water pollution
    - Provide advice and counsel state boards
    - Organizing training and awareness programs
    - Gathering, compiling, and publishing pertinent technical data

- Possibly establishing own laboratories for pollution analysis

9. State boards
   - Develop pollution control programs
   - Counsel state government
   - Support research; oversee effluent treatment plants
   - Establish or amend pollution release standards
   - Maintain or alter sewage treatment and recycling facilities.

Drawbacks

- 1) The state boards suffer from a lack of resources and knowledge to carry out their missions.

  2) The fines are far smaller than the price of equipment for pollution control and treatment

THE AIR PREVENTION & CONTROL OF POLLUTION ACT 1981

1. The act addresses air pollution prevention, control, and abatement.
2. According to the act, air pollution is any solid, liquid, or gaseous material (including noise) that is present in the atmosphere and has the potential to endanger people, other living things, plants, or property.
3. In 1987, noise pollution was added to the list of pollutants in the act.
4. The regulatory power is vested in pollution control boards at the federal or state levels.
5. Provisions outlining the constitution, authorities, roles, resources, audits, sanctions, and processes
6. Boards are required by section 17 to verify that industries are adhering to standards.
7. Section 20's provision for guaranteeing car emissions standards
8. The state government may designate a region as a "air pollution control area" and forbid the use of any fuel other than authorized fuel in the area that contributes to air pollution, after consulting with the state pollution control board (Under section 19)

9. An appellate authority has been established as a means of handling appeals (Under section 31)

   Downsides

   1) Insufficient funding and expertise prevent the state boards from pursuing their goals.

   2) The fines are substantially lower than the price of treating and controlling pollution from cars (under section 20).

FOREST CONSERVATION ACT 1980

1. The act addresses the preservation of forests and associated issues.
2. The state government may only use forests for forestry operations.
3. The central government must give its prior consent before using it in any other capacity.
4. The clearing of forests for farming, mining, planting economically significant trees in place of some naturally occurring trees, and other non-forest activities
5. Some construction projects in the forest, such as building pipelines, fencing, and water holes, are exempt from non-forest activity regulations in order to protect wildlife or manage the forest.
6. Provisions for protecting all kinds of forests
7. Illegal non-forest activities can be put an immediate stop to within a forest area.
8. In 1992, the Act underwent some changes that permitted certain non-forest activities in forests, such as restricted tree cutting and seismic surveys, among other things.
9. It is strictly forbidden to engage in any non-forest activity in national parks and wild life sanctuaries.
10. The non-forest activities include the cultivation of oil-producing plants, tea, coffee, spices, and other plants.
11. The practice of tribal people cultivating tussier, a kind of insect that yields silk, in forested areas for their own subsistence is regarded as forestry.
    Twelve)
12. An EIA and cost-benefit analysis are required for any proposal for non-forest activity submitted to the central government.

Downsides

1) All decision-making regarding the use of the forest area is done at the top level, with no input from the local communities.

2) The tribe is prevented from stealing any resources and is forced to engage in criminal activity.

Summary:

A person's social surroundings comprise their place of employment and residence, their financial status, their educational background, and the communities they are a part of. In the end, it must minimize resource depletion, environmental harm, and social instability in order to reduce poverty among people in developing nations. Because of how quickly cities are growing, it is getting harder to fit all of the commercial, industrial, and residential facilities inside of a small municipality. Another development activity that drives native people away is mining. The native population is displaced as a result of mining operations covering thousands of hectares of land. Complex interactions between soil, landform, vegetation, land use, and water make up the watershed. Humans and animals coexist in a water shed and influence one another in different ways.

Key wards:

Chemical Wetting Agents: Chemical wetting agents help a liquid spread more widely by lowering the surface tension of water, which permits droplets to fall onto a surface.

Economic development: this term typically describes the persistent, coordinated efforts of communities and legislators to raise the standard of living and strengthen the local economy.

Rainwater harvesting: The process of collecting and storing rainwater for later use before it enters the aquifer is known as "rainwater harvesting."

Sustainable development: Although the phrase "sustainable development" is frequently overused, it is essential to addressing a number of interconnected global issues, including hunger, poverty, inequality, and environmental degradation.

Watershed Degradation: In part, this disconnect arises from the failure to recognize watersheds as essential social-ecological units in the context of sustainable management policies.

MCQ

1. What was the main subject of 1962's Silent Spring by Rachel Carson?
    i. The risk that growing population will cause resource depletion, which will result in worldwide poverty and starvation.
    ii. The possible destruction of the ecosystem by pesticides like DDT.
    iii. Rapid global warming brought on by the burning of fossil fuels and deforestation.
    iv. A computer virus that causes economic and social instability in a society that is overly reliant on technology and computers

2. Which of the following does not represent a significant environmental issue brought on by human meddling with the nitrogen cycle?
    i. The emission of nitrous oxide causes global warming.
    ii. More acid rain.
    iii. Eutrophication.
    iv. Depletion of stratosphere ozone.

3. Which of these doesn't qualify as a significant greenhouse gas?
    i. Water vapor.
    ii. Carbon Dioxide
    iii. Methane
    iv. Calcium carbonate

4. For what purpose did the parties to the 1987 Montreal Protocol sign it?
    i. To lessen the anthropogeni greenhouse effect, to start shifting from the use of fossil fuels to more renewable energy sources.
    ii. CFC use should be gradually phased out as it has been discovered to be causing ozone layer thinning.

iii. Prohibiting the use of nuclear weapons in tropical seas.

iv. To halt the international trade in goods derived from threatened or endangered tigers.

5. Approximately what percentage of the world's land area is utilized by the billion people who live there for grazing and agriculture?

i. Three-quarters.

ii. One-third.

iii. 10 percent.

iv. Half

Answers

1. (ii) 2.(iv) 3.(iv) 4.(ii) 5.(ii)

Important Questions

Give an explanation of sustainable development.

2. Describe population and the implications of it.

3. By "issues of human settlement," what do you mean?

4. Describe the energy-related issues facing cities.

5. Describe water management.

6. A little note on rainwater collection.

Unit - 10

Environmental Ethics

Objective

- Recognize environmental problems and potential fixes.
- Describe how climate change works.
- Talk about reclamation of waste land.
- Examine waste materials and consumerism.

Introduction

The goal of this environmental ethics course is to promote knowledge of environmental facts, figures, and issues. It includes the environment, the resources found there, and the way we live. It is important to protect nature's beauty and all of its forms for future generations. Environmental concern increased as a result of the expanding population, industrialization, and need for deforestation. An important worldwide concern is climate change. We start to preserve and safeguard our environment when we start to care about it. An extensive awareness of the environment, nature, climate change, natural resources, and the difficulties associated with these areas is necessary to instill the ability of preserving the environment.

If the younger generation can start enacting change and safeguarding the environment, they have the capacity to be true agents of change. Three main issues need to be addressed: exploitation of natural resources, the need to preserve the environment for future generations, and our lack of appreciation for the environment as a gift from nature. The moment has come to defend the one place we have ever called home—the universe. To maintain our prosperity and the destiny of future generations, it is imperative that we conserve nature.

Awareness and care for the environment will arise from knowing our surroundings and how they relate to our present and future. Forest conservation and pollution protection are necessary for both college campuses and rural areas. Every person should prioritize preserving vegetation, guaranteeing clean air, supplying clean water, and protecting soil and biodiversity. Nurturing plants, soil, water, and the environment is the first step in achieving a sustainable existence. Thus, students ought to lead the charge in preserving the natural world and its splendor since

they are the ones who can alter things. In addition to planting and protecting trees, cutting back on plastic usage, and disposing of garbage in an appropriate manner, students must assume responsibility for raising awareness of environmental issues in their local communities and for the conservation of air, water, soil, biodiversity, and energy.

Definition and Important Concepts

Environment

The surroundings in which we live are referred to as our "environment." The natural environments that surround us are mostly made up of rivers, woods, mountains, and other natural resources. In addition to the physical elements—air, water, land, fire, sky, and ecosystems—the environment also includes non-physical components—social, cultural, economic, and other elements—that have the potential to impact living things and their general well-being. For our food, livelihood, and shelter, we utilize natural resources such as water, air, and land. The human person is entirely reliant on the natural world. Oxygen is produced by the plants. Mountains supply minerals, forests offer wood and other food goods, water bodies supply water, and soil produces all agricultural products. Future generations may struggle to find food, water, air, and a clean environment if these environmental characteristics are not fostered and preserved. Knowing what an environment is and how it works is crucial to understanding how living things interact with their surroundings. As such, it is essential for tackling sustainability and environmental challenges.

Ecological Values

The beauty of nature is mesmerizing, and humans have a significant role in its development. Thus, life in all its manifestations is important. Because all the elements in nature are closely related to one another, any disruption can have far-reaching effects. The planet Earth, where we live, is home to a tremendous diversity of flora, animals, and distinct land and marine environments. It also includes nitrogen, phosphorus, sulfur, oxygen, water, and other important bio-geochemical cycles.

The importance of "ecology" became increasingly apparent to the public in the 1960s. Galang et al. (2003) identified seven important lessons concerning ecology and environmental concerns. Among these "Seven Lenses" are the following.:• Nature knows best

- All forms of life are equally important
- Everything is connected to everything else
- Everything changes
- Everything must go somewhere
- Ours is a finite Earth
- Nature is beautiful and we are stewards of God's creation.

The sustainability and well-being of our natural environment depend on ecological values, which are fostered by a thorough comprehension of the idea. These qualities cover a broad range of roles that biodiversity plays, including those performed by uplands, wetlands, water surfaces, habitats for fish and other wildlife, other species, breeding grounds, and nesting sites. Preserving all these elements of nature is the ultimate goal. When ecosystems live in their most natural condition, they are at the pinnacle of the biological hierarchy. The statement made by Cole (2000) is quite accurate: "The degree of naturalness and ecological value are directly and positively correlated." However, each species is essential to preserving ecological equilibrium.

Maintaining the integrity of the natural environment via preservation and restoration is essential for the continuation of ecological value. This entails keeping an eye on and protecting: Forest health: Preserving our forests' vitality.

- Soil quality: Preserving the fertility and health of the soil.
- Water accessibility: Handling water resources to ensure sustainability over the long run.
- Habitat quantity: Maintaining a variety of habitats for different species.
- Quality of vegetation: Preserving the standard of plant life.
- Prescribed fires: Using controlled fires to maintain the health of ecosystems.
- Ecological sensitivity: Understanding fragile ecosystems and protecting them.
- Drought-tolerant species: Supporting arid-adapted species.
- Ecological economics: the responsible use of natural resources for financial gain.
- Landscape aesthetics: recognizing and enjoying the beauty of one's surroundings.
- Geological structure: shielding distinctive geological elements.

- Rock type: Preserving a variety of rock types.
- Aquatic species: Preserving aquatic environments.
- Land use: Making sure that the land is managed responsibly.
- Conservation of soil: Keeping soil from eroding and degrading

Environmental Values and Valuing Nature

The act of appreciating nature and environmental values are related ideas that are essential to our interaction with the environment. "Environmental values" basically allude to the significant influence that the environment has on our lives. The continued presence of natural features like soils, rivers, and forests is essential to human life because they give us the clean water, air, and food we need to be healthy and prosperous. The environment makes incalculable contributions to our general well-being and ability to live in a healthy manner.

Economic Values of the Environment:

One of the main contributions of the environment and nature is the creation of food. The elements of soil, water, atmosphere, and climate provide the growth conditions for plants, food production, and ultimately human survival.

Social Values of the Environment:

Social values of the environment are the collective attitudes, convictions, and values that a society has toward its natural surroundings. The significance of protecting and honoring the environment for present and future generations is reflected in these principles. Among them include a dedication to sustainability, conservation, and prudent resource management. Environmental social values also stress the ethical duty to preserve the environment for the sake of human welfare, as well as the inherent value of biodiversity and ecosystems.

These principles motivate actions like recycling, conservation work, and support for laws that advance ecological health, demonstrating a common desire to protect the environment for the benefit of all people.

Cultural values of the environment:

A culture is a way of life that is practiced by the people who live in certain places. It covers a wide range of topics, including food customs, agricultural practices, holidays, clothing conventions, worldviews, and morals. Because of variations in the surrounding environment, cultures differ across different locations. People's lifestyles are directly impacted by environmental elements like climate. The environment has an impact on our diet, manner of life, and festival festivities. As a result, environmental factors—which include sunlight availability, rainfall, soil quality, food diversity, air quality, and climatic conditions—have a significant impact on forming our civilization.

Aesthetic and recreational values of the environment:

Natural environments provide aesthetic appeal. Examples include dense vegetation, gorgeous scenery, mountains, birds, animals, flowers, scents, and moving water features. Being in nature stirs up powerful feelings and serves as a reminder of how amazing and beautiful the natural world is. A peaceful existence is enhanced by the seasonal fruits and flowers, lovely animals and birds, and the shifting weather.

The beauty of nature serves as a source of inspiration for many poets, authors, and painters. The aesthetic and recreational qualities of nature and the environment are reflected in the colors, peaceful noises, rainbows, ever-changing skies, and the green surroundings.

Fundamentally, the natural world, the climate, and the environment always serve as a reminder to people that these factors are integral to their life on this lovely planet. We need to actively protect nature if we are to fully cherish it. It is the duty of every student, person, community, village, state, and country to preserve soil and biodiversity, avoid pollution, use resources wisely, and safeguard the environment. We have what we require to survive in the environment. Thus, it is essential that we cooperate in order to preserve biodiversity, soil, water, air, and land. Together, let's concentrate on projects like collecting rainwater, managing garbage efficiently, and valuing the wonders of nature in order to protect our world.

Equitable Use of Resources

The term "equitable use of resources" describes the equitable allocation of necessary resources to guarantee that everyone, regardless of background or situation, has access to what they require for a respectable level of life. In addition to addressing concerns of social justice and human rights, this notion is essential for attaining social and environmental sustainability. It highlights how important it is to take into account and deal with differences and inequalities in resource access in order to advance justice and lessen social and economic injustices.

Each element of our planet has an inherent right to be accessed and utilized by all. A worldwide awareness aimed at curbing unsustainable behaviors, redressing the uneven allocation of resources, and tackling population expansion is prerequisite for attaining this parity. The abundance of products, materials, and resources that our environment supplies for our everyday needs is rather generous. The problem, though, is that basic resources like soil, water, sunshine, forests, temperature, and mineral resources aren't distributed equally over the globe. Divides between countries are exacerbated by this inequality, which leads to disparities in resource consumption and development levels.

Nature gives food according to each person's requirements, no matter who they are. Humanity is the one that divides the world, harms others, and abuses Mother Nature. It is necessary to preserve and use clean air, water, land, minerals, forest products, agricultural yields, and food in an equitable manner. A strong emotion that highlights our concern for protecting the environment is our deep love and respect for the natural world. It is essential in the modern period to adopt a modest, self-sufficient lifestyle and practice conscientious protection of nature's resources. This cooperative endeavor is essential to guaranteeing a peaceful and pleasant cohabitation.

The Role of Individuals in Conserving Resources for Future Generations:

Like all other animals, humans are an essential component of their surroundings. For our survival, we are entirely reliant on natural resources including soil, food, water, and air. With their heavy reliance on fossil fuels, deforestation, river pollution, intense use of the soil, mineral extraction, and tree-cutting for construction, humans are seriously harming the ecosystem. The environment is mostly destroyed as a result of all these activities. It is not

possible for biological systems and other vital resources to recover rapidly enough to offset the overuse.

The two primary sources of worry are the quick depletion of natural resources and the growing need for various resource types for a range of applications. These issues have a direct impact on the welfare of next generations. Sadly, we don't give the needs of future generations much thought; we only care about the requirements of the present age.

As individuals, we must introspect and ask essential questions to ourselves:

As people, we need to reflect and pose these important questions to ourselves:

1. What will our offspring inherit from us? Do we leave behind a planet where resources are running low?
2. Is it possible to replicate the resources that are running out?
3. Are we motivated by long-term or short-term rewards in our actions?
4. Do we actually value nature, or are we just using it for our own gain?
5. Will the present course of progress yield enduring benefits, or are we exhausting
6. How can we as people preserve the environment for coming generations?
7. Do we aggressively spread the word about how important it is to preserve resources and the environment?
8. Do we contribute to air pollution that is detrimental to our health, or are we breathing pure, fresh air?
9. Do we lead disease-free lives, or are we causing environmental destruction with our decisions and actions?
10. What kind of legacy are we giving the next generation?

These queries ought to arouse humankind's consciousness. There is a worrying depletion of resources as a result of the world's population growth and the widespread adoption of a materialistic lifestyle. Every person has to think about these things and work toward living a life that is self-sufficient while using resources sparingly and responsibly. Due to their inherent scarcity, natural resources must be used wisely and conservation-minded strategies must be implemented in order to protect them for future generations.

Bioethics-Genetic Manipulation in Plants

Bio-genetics

The genetic composition of living things may now be altered and modified thanks to advances in science and human knowledge. A field of biology called "bio-genetics" is devoted to modifying the genomes of living things, with a particular emphasis on genetically modified organisms (GMOs). Genes from one organism inserted into the DNA of another form genetically modified organisms, or GMOs. Our food supply currently includes a sizable amount of foods and components produced by these genetically modified (GM) plants.

In bio-genetics, an organism's DNA is inserted into bacteria, causing the latter to create physiologically meaningful compounds. It's a scientific technique to modify the original plant or cell properties. Many items are produced using bio-genetic techniques, such as crops that are able to create poisons to repel particular insects by introducing genes from soil bacteria like Bacillus thuringiensis (Bt).

Bt-corn, Bt-potatoes, and Bt-tomatoes are the result of this.

Even though bio-genetics is a scientific revolution, it's important to keep in mind that throughout millennia, nature has refined the characteristics of plants, fruits, flavors, tastes, and colors.

Bio-Genetic Manipulation

Genetically based the process of altering and modifying an organism's genes using technological means is known as manipulation. It encompasses functions such as cell genetics, gene transfer both inside and across species to create new or enhanced animals, isolating and replicating genetic material, and using particular regions of the genome. These methods are used on humans, animals, and even plants.

Applications for bio-genetic modification may be found in many areas, including as agriculture, industrial goods, hormone manufacturing, and vaccine development. It is clear that genetically modified crops have economic benefits. However, there is still reason for fear that these crops might be more harmful to human health than whole meals.

The possible health concerns connected with genetically modified goods are acknowledged by the scientific community. As a result, it's critical to use prudence and restrict the use of genetic

alteration to goods that pose no threat to human safety. This technology should be used for human benefit, not to subjugate other species. Natural goods should be valued in our meals since they have a special combination of nutrients, enzymes, antibacterial capabilities, and other intrinsic attributes. Let us savor fruits, vegetables, and natural meals in season.

Animals for the Benefit of Society and Cruelty Against them

The benefits that animals provide to human civilization are numerous and substantial, making them priceless gifts from nature. They have merited the title of authentic friends to mankind and are sincere comrades. The following are some ways that animals improve our lives:

1. Companionship Animals: Pets such as dogs, cats, mongooses, rabbits, and ornamental fish have a particular place in people's homes and hearts. They are treasured as pets and enrich the lives of people who look after them with joy and happiness. Animals that provide companionship go beyond being merely pets and instead develop into buddies that are devoted, loving, and supportive.

2. Service Animals: These animals are incredibly helpful to people in a variety of capacities. They provide us with a variety of services:

• Dogs help people with disabilities—such as those who are blind or deaf—by giving them much-needed support and boosting their independence.

• Dogs are essential to military and security operations because they defend lives and keep countries secure.

• Horses are used in militaries, police departments, and even sporting activities.

• By moving items from one location to another, camels and donkeys reduce the need for human labor.

• Wool from Merino sheep is used to make clothes.

• Livestock species, such as cows and buffaloes, are essential for agriculture and for sustaining livelihoods.

Pleasure Animals: Some animals are maintained for amusement and sports, and they frequently take part in these activities. People's life are made happier and more enjoyable by horses, elephants, dogs, and in certain places, bullocks.

There are several advantages to having animals. They are essential to the agricultural sector and give friendship, enjoyment, and services. Having livestock is essential for producing revenue and promoting self-sufficiency. Aside from these functions, animals play a big part in maintaining the fertility and health of the soil. When fed to animals, legumes and grasses act as protective coverings over the soil, preventing erosion from wind and water.

In summary, Animals help society in many ways: they provide food and fabrics; they work in labor and transportation; they are used in scientific research, medicine, hunting, sports, agriculture, livelihoods, and leisure. Certain animals, such as pigs, are essential to waste management because they naturally clean up organic waste. They are treasured members of the human family, not simply valuable possessions.

It is depressing to realize, though, that despite all the advantages that come from animals, there is a negative aspect as well—cruelty. Animal abuse, neglect, and violence committed with the purposeful aim to harm animals are referred to as animal cruelty. Animals are living things that are deeply entwined with the environment and the food chain; they are not just objects to be purchased. These organisms have been endowed by nature with distinctive qualities that support the balance of the ecosystem. This equilibrium is upset and ecological imbalances result from animal neglect.

Animals possess the inherent right to lead safe and healthy lives, and it is our responsibility as stewards of this planet to protect them. Domestic animals should be cared for and utilized for various purposes, serving as essential components of businesses and agriculture.

As humans, it is our responsibility to love, care for, and protect animals. We have a responsibility to stop their mistreatment, killing, and smuggling. Animals become our allies and survival when they are given the respect and care they need. Animals are an extension of our own family, and as such, we as humans owe it to them to love, care for, and protect them from harm. We must protect animals' welfare and recognize the beauty they add to the planet since they are vital components of its complex ecology.

Summary

The basic knowledge of the environment's significance in our lives is introduced in this chapter. It emphasizes how important it is for us to spread environmental knowledge and consciousness.

For the sake of an independent existence, the beauty of nature must be preserved, fostered, and cared for.

- The explanation of important environmental ideas, including those pertaining to nature, the environment itself, ecological values, etc. The equitable use of resources (both renewable and nonrenewable) is covered in this chapter as well. It emphasized the significance of equitable resource distribution as well as the part that individuals may play in protecting resources for the benefit of future generations.
- An explanation of biogenetics, bio-genetic modification, and bioethics is provided along with an exploration of genetic manipulation in plants and bioethics. Additionally, pertinent ethical issues are covered.
- The chapter also explores the world of animals, highlighting the important roles they play in our day-to-day existence, the ecology they help to preserve, and the problem of animal cruelty. The ethical treatment of animals is also covered.

The future of humanity may be in danger due to abuse, overuse, negligence, and destruction of natural resources. It is now time for mankind to assume personal accountability for resource preservation and pollution avoidance in residential settings.

Keywords

Environment: An organism, community, or system's surrounds and conditions are referred to as its "environment". It includes all of the biotic (living) and abiotic (non-living) components that interact in a given space.

Ecosystem: An ecosystem is a complex network of interrelated living things (biotic components) in a specific geographic region that interact with their physical surroundings (abiotic components). The exchange of energy and matter occurs throughout these interactions, which controls ecological processes, maintains the life cycle in the system, and cycles nutrients.

Food chain: A food chain shows the linear link between predators and prey by showing how energy and nutrients move through ecosystems as producers, herbivores, and carnivores progressively consume one another.

Ecological Value: Ecological value is the sum total of the advantages that come from natural ecosystems. It is the importance of an organism, habitat, or ecosystem in relation to the natural world, taking into account how it contributes to ecological processes, biodiversity, and the general health of the environment.

Environmental Values: These principles include the variety of ways that the environment enhances human existence. This range includes aesthetic, recreational, social, cultural, and economic values. Furthermore, environmental values place a strong emphasis on risk avoidance, resource conservation, and planet survival.

Environmental Ethics: Environmental ethics is a field of philosophy that studies moral standards and values related to the environment, discussing human obligations and interactions with the natural world, and promoting ethical and sustainable behavior.

Bio-genetics: The branch of biology known as "bio-genetics" is devoted to editing the genomes of living things. It delves into the intriguing realm of genetic engineering.

Bio-genetic manipulation: This is the process of using technology to change an organism's genes. This field of scientific study is both influential and contentious.

Answer in Two or Three Sentences

a) Explain the environment.

b) Could you describe what environmental ethics are?

d) What values are ecological?

d) What distinct environmental values exist?

f) What does nature mean to us?

f) What does the environment's economic worth consist of?

g) How can social ideals get influenced by the environment?

h) How do cultural values influence how we relate to the environment?

Unit -11

Environment Protection Act

OBJECTIVE

- Recognize the Environment Protection Act.
- Describe the problems with environmental protection.
- Recognize the significance of environmental public awareness.

The Act of 1986 for Environmental Protection

On November 19, 1986, the Environment Protection Act, 1986 was established to address issues related to the environment and to protect and enhance the environment. In order to uphold the spirit of the statement made during the June 1972 United Nations Conference on the Human Environment in Stockholm, the Indian government adopted this act. Four primary chapters and the various clauses that fall under each of those chapters define the standards, laws, and acts related environmental degradations as well as the policies for protecting people from environmental dangers and enhancing the environment.

The definitions of numerous environmental entities are covered in Chapter I.

The function of the central government in promoting economic development and environmental conservation is discussed in Chapter II. It covers the selection of officers, the authority to issue directives, regulations governing pollution in the environment, and the establishment of guidelines and protocols for hazardous waste, emissions, industrial waste, and other waste types.

Environmental pollution prevention, control, and mitigation are covered in Chapter III. A person in charge of an industry or activity is prohibited by law from emitting or discharging more environmental contaminants than is permitted. Samples of air, water, soil, or other materials may be taken from any factory by the central government or its personnel for analytical purposes; if the samples do not meet the standards, they risk being investigated and penalized appropriately. Penalty: Five years in prison and a fine of up to one lakh rupees, or Rs 5,000 per day.

Chapter IV has a number of other sections that have nothing to do with the environment but rather provide recommendations for the conduct and operation of government officials and officers. In order for these guidelines to be legal, they must be presented to parliament.

The Air (Pollution Prevention and Control) Act of 1981

In response to the June 1972 UN conference on the human environment, this act was drafted in 1981 with the goal of regulating all natural amenities. It is divided into 7 chapters and 54 sections.

Chapter I: The phrases "air pollutant," "air pollution," "approved fuel," "automobile," "chimney emission," "control equipment," etc. are defined in this chapter.

Chapter II covers information on the CPCB and SPCB, their constitutions, member terms and conditions of service, and the delegation of authority to different authorities.

Chapter III: This chapter focuses on the roles played by the state and central boards, including their ability to gather, compile, and disseminate information about air pollution and to direct relevant industries toward the efficient prevention and control of the problem.

Chapter IV: This chapter addresses air pollution control and prevention. The boards have the power to designate zones for the control of air pollution, provide guidance on vehicle emission standards, and impose restrictions on the operations of specific companies. According to this chapter, industrial individuals are not permitted to permit excess pollution in comparison to standards. Under certain circumstances, the board has the authority to enter the state laboratories, examine and gather samples, and request reports. An appeal may be filed and the offending parties may face consequences based on the report.

Chapter V: The funds, accounting, and auditing of the state and central boards are covered in this chapter.

Chapter VI: There will be consequences for any industry or individual that does not adhere to the requirements. Penalty: A minimum of one year and six months in jail, with a maximum of six years, along with a fine.

Chapter VII: This section covers the authority to modify the schedules, the requirement for the state board to keep a register with pertinent information, and the authority of the federal and state governments to enact regulations pertaining to the management of air pollution.

The Water (Control and Prevention of Pollution) Act of 1974

The Parliament Act of 1974 established the Water Act with the aim of preventing water pollution and preserving or regaining the wholesomeness of water. It is valid in every state in India as of right now. There are 64 sections and 8 chapters in this act.

Chapter 1: This chapter defines terminology like "member," "outlet sewer," "central," "state board," "trade effluent," "stream," and "pollution."

Chapter II goes into detail regarding the terms and conditions of employment for members, committees, meetings of the board, and the constitutions of the state and central boards. It also discusses the transfer of authority to the chairman, member secretary, officers, and other board staff members.

Chapter III covers the particular provisions of the joint board as well as its makeup and constitution. For instance, officials from Karnataka, Tamilnadu, and Pondicherry sit on a joint board with the Central Board for the Cauvery River.

Chapter IV: This chapter covers the roles of the state and central boards as well as their authority to direct relevant entities.

Chapter V: This section discusses the state government's authority to gather effluent samples, evaluate them in a government laboratory, and then publish the findings. They may limit the outputs and discharges into streams or wells based on the outcome.

Chapter VI: It covers budgets, yearly report filing, accounts, auditing, and the upkeep of state and central board money.

Chapter VII: This section provides further details regarding the penalties for offenses committed by companies.

Penalties: imprisonment for a minimum of one year and six months, with a maximum term of six years together with a fine. Failure to comply will result in an extra fine of Rs. 5,000 per day. In such a situation, the perpetrators' names can potentially be made public.

Chapter VIII provides an explanation of the state and federal water laboratories, analysts, analyst reports, protection, actions taken in good faith, and the authority of the federal and state governments to create regulations. Significant portions of this act are

Section 19: Water pollution prevention control area has been declared for the whole National Capital Territory of Delhi.

Section 21 permits DPCC officials to collect water effluent samples for analysis from any industry stream, well, or sewage sample.

Section 23 permits State Board officials to access any location in order to inspect any plant, record, register, etc., or any Board function that has been assigned to them.

No one is allowed to discharge any toxic, noxious, or contaminating material into a stream, well, sewer, or onto property, according to Section 24.

According to Section 25: No one shall establish shall without prior authorization

Any industry, operation, process, or treatment and disposal system that is likely to release trade effluent or sewage into a stream, well, sewer, or onto land should be established or taken steps to establish them; b. Any new or modified outlet for the discharge of sewage should be used; or c. Any new sewage discharge should be started.

This section states that the State Board may either accept the industry's pollution control measures following their verification or reject them for justifications that need to be put in writing.

According to Section 27, a state board has the authority to periodically evaluate and change any conditions it has placed on an individual under Sections 25 and 26.

According to Section 28: Anyone who feels wronged by an order made by the State Board under Sections 25, 26, or 27 may file an appeal with the appropriate authority (referred to as the

appellate authority) within thirty days of the date the order is communicated to higher authority. This authority may be determined by the State Government.

According to Section 33, the State Board has the authority to order anyone who has contaminated water in a roadway or well to stop doing anything that could further contaminate the water or to remove any objects the Board designates through legal action.

Section 33A allows the DPCC to give any person, officer, or authority instructions, and those individuals or authorities are required to follow such instructions. The authority to order includes the following: stopping or restricting the supply of water, electricity, or other services; closing any industry; and forbidding any other activity.

According to Section 43: Anyone found in violation of Section 24 will be imprisoned for a minimum of one year and six months, with a maximum sentence of six years, as well as a fine.

According to Section 45, a person convicted of a crime under Sections 24, 25, or 26 and subsequently found guilty of another crime involving a breach of the same provision faces a minimum two-year prison sentence and a maximum seven-year sentence, in addition to a fine, for each conviction.

According to Section 45A, there are three months in prison, a fine of up to ten thousand rupees, or both for violating any of the Act's provisions or disobeying an order or direction made under it for which no alternative penalty has been stated in this Act.

Wildlife (protection) Act of 1972

The purpose of this statute is to safeguard flora, wildlife, and birds. There are 66 sections and 7 chapters in this act. With the exception of Jammu & Kashmir, this statute covers all of India.

Definitions of words like habitat, hunting, national parks, reserved forests, sanctuaries, etc. are covered in Chapter I.

Chapter II: It discusses in detail the authorities to be appointed, the wildlife advisory board's creation, and its responsibilities.

Chapter III: This section focuses on keeping a record of any wild animals that are killed or caught. There are specifics about hunting wild animals as well as information about the license holder.

The information in Chapter IV covers national parks, game reserves, sanctuaries, off-limits zones, permits to enter sanctuaries, the district collector's jurisdiction over these areas, and the central government's power to declare certain locations national parks and sanctuaries.

The selling of wildlife, animal goods, etc. is covered in Chapter V. The rules controlling the transfer of animals are explained in detail in this chapter, and it is made clear that the government owns all animals that are killed, captured, or trapped.

Chapter VI: In accordance with this legislation, a conviction carries a two-year jail sentence and a fine of Rs. 2000, or both. Additionally, committing an offense in an animal sanctuary or park has a maximum 6-year jail sentence, a minimum 6-month sentence, and a fine of at least Rs. 500.

Chapter VII describes the authority granted to the federal and state governments to enact laws pertaining to the protection of wildlife and covers the protections accorded to officers for actions conducted in good faith.

The 1972 Wildlife Protection Act

The Wildlife Protection Act of 1972 is the name given to the extensive collection of laws that the Indian government passed in that year. Prior to 1972, India had just five designated national parks. Among other things, the Act made it illegal to hunt or harvest certain plant and animal species by creating schedules of protected species. The Act addresses issues that are incidental, supplementary, or connected to the preservation of plants, birds, and wild animals. It encompasses all of India, with the exception of the State of Jammu and Kashmir, which has its own wildlife laws. There are six schedules available, with varying degrees of security. Schedule I and portion II of Schedule II offer complete protection and specify the worst penalties for infractions. Even though the fines are significantly lower, Schedule III and Schedule IV species are also protected. Schedule V contains the list of animals that can be hunted. It is prohibited to cultivate or plant any of the plants included in Schedule VI. Under this Schedule, the

Enforcement authorities have the power to compound violations, which entitles them to fine the violators. 16 people had been found guilty under this statute in connection with tigers' deaths as of April 2010. In order to successfully combat poaching and the illegal trade in wildlife and its derivatives, the Indian government passed the Wildlife Protection Act of 1972. January 2003 saw an amendment (and signature) to this, strengthening the penalties and punishments for violations of the Act. crimes include hunting endangered species and redrawing protected area borders.

Offenses involving hunting or altering the limits of a sanctuary or national park, as well as those involving wild animals (or their parts and products) covered by Schedule I or Part II of Schedule II, now carry a stiffer sentence. A minimum fine of Rs. 10,000 is stipulated, along with a maximum penalty of seven years and a minimum term of three years. Such a recurring infraction is punishable by a minimum fine of Rs. 25,000 and a maximum sentence of seven years in jail. Furthermore, the Act now includes a new provision (51-A) that lays forth conditions that must be satisfied in order to issue bail. If someone is accused of committing an offense related to Schedule I or Part II of Schedule II, or an offense related to hunting inside the borders of a National Park or Wildlife Sanctuary, or altering the boundaries of such parks and sanctuaries, nothing in the Code of Criminal Procedure, 1973 shall prevent them from being released on bail.' This is stated in the Act. (a) There is now an opportunity for the public prosecutor to oppose to the defendant's bond release; and (b) in the event that the public prosecutor objects, the court is convinced that there are good reasons to think the defendant is innocent of the charges against him and that he won't likely commit any new crimes while out on bond.

To improve the intelligence gathering related wildlife crime, the current provision for rewarding informants has been increased from 20% of the fine and composition money, respectively, to 50% in each case. Furthermore, it is suggested that a reward of up to Rs. 10,000/-be offered to informants and other individuals who help with crime detection and offender apprehending.

As of right now, individuals who possess ownership certificates for Schedule I and Part II animals are permitted to give or sell these items. In order to stop the unlawful trade, this has been changed. As a result, someone can no longer obtain Schedule I or Part II of Schedule II animals, items, or trophies unless they inherit them (live elephants excluded). Severe measures to seize the properties of convicted felons who have committed horrific crimes against wildlife have also been suggested. The "Narcotic Drugs and Psychotropic Substances Act, 1985" and these sections

are comparable. Additionally, measures enabling officials to drive out intruders from Protected Areas have been put in place.

Forest (Conservation) Act of 1980

Prior to this, the Indian Forest Act of 1927 was passed, incorporating non-government, village, protected, and reserved forests. The duties imposed on timber and other forest producers were regulated by this statute. However, the act does not take forest conservation or protection into account. Furthermore, the tribes who conserved and guarded the forests the most are not taken into account or included in this act. This led to the adoption of the Forests (Conservation) Act in 1980. This act is divided into sections that address distinct aspects of forest conservation.

1. Preserving all types of forests is the main objective of this Act.

2. Hence, they obliquely support the preservation of biological variety and the ecosystem.

3. This Act emphasizes that any forest area cannot be used for non-forest purposes, that is, for any use other than afforestation, and that the state government would have the authority to proclaim a reserve forest as unreserved.

4. This act further regulates activities that must be done in forests, such mining, which could upset the ecosystem and worsen the environment.

5. This act grants the federal government the power to keep the forest's biological balance intact, spanning from tropical to temperate zones.

6. The forest is a priceless treasure, which is why this legislation was passed and closely adhered to. A forest is an ecosystem where trees predominate and other plants, animals, and soil all play significant roles.

7. There are five significant portions in this statute.

• The use of forestland for purposes other than forests is covered in the first section, as previously mentioned.

• The Forest Advisory Committee's constitution is explained in the next section.

• The consequences for breaking the act are described in the next section. It covers simple imprisonment for a maximum of fifteen days. The authorities in charge of that area will likewise face consequences in such a scenario. The ability of the federal government to enact legislation pertaining to forest preservation is described in the next section. Background: Since independence, there has been a widespread and indiscriminate diversion of forest area for uses other than forestry.

• From 1950 to 1980, almost 4.3 million hectares of forest land were diverted for uses other than forestry. The Forest (Conservation) Act was passed in 1980 in order to limit the diversion of forest areas for uses other than forestry and to give the forests a stronger degree of protection.

• FC ACT, 1980: De-reservation and/or diversion of forest areas for uses other than forestry require prior consent from the Central Government. This act is regulatory rather than prohibitive. The Act serves as a mediator between development and conservation. It allows for the prudent and controlled use of forest land for uses other than forestry.

The Apex Court expanded the application of the Act's requirements to all woods, regardless of ownership, with its 1996 order.

Process for Forest Clearance:

• State and UT government-recommended proposals. sent to the Central Government for approval in accordance with Act Section 2.

• Proposals reviewed by the Forest Advisory Committee (FAC), which was established in accordance with Act Section 3.

• Choices made in accordance with the FAC's recommendations.

• The FC Rules, 2003 set forth precise deadlines for case handling.

Impact of this Act:

• From 1950 to 1980, the annual rate of forest land diversion for non-forestry activities was 1,50,000 hectares. • Following the implementation of the FC Act in 1980, this rate decreased to approximately 35,000 hectares per year.

Moef's Policy Initiatives

There is a time limit of 90/60 days for State Governments to process new/renewal cases and 60 days for the Central Government to expedite proposal processing. The application format has been streamlined. Furthermore, from 20 ha to 40 ha, Regional Offices will now be able to handle situations.

- Regional Office site inspections are required for plans involving more than 100 ha of forest land (up from 40 ha).
- Overall consent for the installation of telephone lines, drinking water supply pipelines, electrical cables, and wires underground.
- All public utility projects, including those involving schools, hospitals, dispensaries, small irrigation canals, drinking water systems, rainwater harvesting structures, electric and telecommunication lines, non-conventional energy sources, skill-upgradation and vocational training centers, power substations, communication posts, and police establishments like police stations, outposts, and watch towers, are approved generally, up to one hectare.
- DGF & SS, MoEF, is the chairman of the seven-member Forest Advisory Committee (FAC).
- For a two-year term, three non-official members—respected experts in forestry and allied fields—were proposed.
- MoEF's Additional Department of Agriculture Fellow (Soil Conservation).
- IGF (FC) — Member Secretary • At least one monthly meeting, usually in New Delhi
- There are three quorum members.
- The FC Act specifies the following requirements at the time of approval:
- Treatment of Catchment Areas, • Compensatory Reforestation,
- Phased Mining Area Reclamation
- Area of Safety
- The rehabilitation of any impacted families by the project.
- Plans for managing wildlife, disposing of muck, etc.

In brief

The environmental movement has raised awareness of environmental issues since the 1960s. By passing this Act, the Indian government carried out the spirit of the declaration made during the June 1972 United Nations Conference on the Human Environment in Stockholm. As a result of growing concern over India's declining environmental conditions, this Act was created to safeguard the environment. The PCBs have been granted the required authority by the government to address the issue of water pollution in the nation. This 1972 Act addresses the notice and declaration of National Parks and Wildlife Sanctuaries.

Key words:

Environmental Legislation: There has been and still is a great deal of debate around environmental laws because of the potential costs and restrictions they may place on trade, as well as the benefits of environmental protection that are frequently incalculable or non-monetizable.

Protecting the environment for the good of people and the environment at the individual, corporate, and governmental levels is known as environmental protection.

The quality of the environment is determined by weighing its conditions against the requirements of one or more species, as well as any objectives or demands made by people.

Sensitivity to Environment This difficult condition makes a person's body react to chemicals, toxins, or other elements that are typically found in their home or place of employment.

Population Awareness: Investigating the various connections and relationships that science, technology, and innovation have with the general population is a relatively young endeavor.

MCQs

1. A number of high-profile environmental issues, including as the Cuyahoga River fire, the bald eagle population loss, and the smog in Los Angeles, contributed to the political will to form the Environmental Protection Agency.

(a).Indeed. (b). Untrue.

2. Point source pollution sources are subject to strict regulations as a result of the environmental legislation enacted in the 1960s, and the majority of residual pollution typically originates from diffuse and extensive sources.

(a).Verified~.(b) Untrue.

3. Of the following, which is a prerequisite for public policy?

(a) the branch of legislation (b) The branch of justice.

(c). executive division. (d). everything mentioned above.

Answer: 1. (a) 2. (a) 3. (d)

Crucial Questions

1. Explain what the Environment Protection Act says.
2. Describe the Air (Prevention and Control of Pollution) Act in more detail.
3. Describe the roles and authority of the boards.
4. By the Wildlife Protection Act, what do you mean?
5. Give an overview of the Forest Conservation Act.