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REVIEWS IN ENVIRONMENTAL SCIENCE

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Reviews in Environmental Science

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PREFACE

Environmental science is a multidisciplinary field that encompasses various branches of knowledge, including ecology, climatology, oceanography, geology, chemistry, biology, and many others. The interplay between these disciplines is essential to comprehend the complexities of our planet's ecosystems and the impact of human activities on the environment.

This book aims to provide a comprehensive overview of the most significant developments in environmental science. It covers a broad range of topics, such as climate change, pollution, biodiversity loss, sustainable development, renewable energy, conservation strategies, and much more. Each review is a synthesis of current research, offering readers a deep understanding of the subject matter and the latest advancements in the respective areas.

Our team of esteemed authors, comprised of distinguished researchers and academics, have diligently curated their expertise and knowledge into these reviews. They share their cutting-edge research findings, thoughtful analyses, and critical insights, all of which contribute to the collective effort to address environmental challenges and create a sustainable future.

We hope that this compilation serves as a valuable resource for researchers, students, policymakers, and anyone interested in environmental science. It is our intention that the knowledge presented in these pages will inspire new ideas, encourage further research, and stimulate collaborative efforts to protect and preserve our planet for future generations.

We express our sincere gratitude to all the contributors who have generously shared their expertise and time to make this book possible. We also extend our appreciation to the reviewers and editors who have dedicated their efforts to ensuring the highest quality of content.

As we embark on this journey through the vast and intricate world of environmental science, we are reminded of the urgency and significance of our collective responsibility to safeguard the Earth. By fostering a deeper understanding of the challenges, we face and the potential solutions available, we hope to foster a future where humanity lives in harmony with nature.

Editors

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ENERGY FLOW IN THE ECOSYSTEM

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Abstract:

The sun's radiant energy is the primary source of energy in almost all ecosystems. The energy of the sun is used by the ecosystem's autotrophic or self-sustaining organisms (those that can produce their own food). These organisms, which are mostly made up of green vegetation, can use sunlight's energy to convert carbon dioxide and water into simple, energy-rich carbohydrates. The energy stored in simple carbohydrates is used by autotrophs to produce more complex organic compounds, such as proteins, lipids, and starches, that support the organism's life processes. The autotrophic segment of the ecosystem is known as the producer level.

Ecosystem

An ecosystem is a system made up of biotic and abiotic components that work together as a whole. All living things are considered biotic components, whereas nonliving things are considered abiotic components. Thus, an ecosystem science definition includes an ecological community made up of different populations of organisms that coexist in a specific habitat. Ecology and geography define an ecosystem as a geographical area where organisms, weather, and landscape interact to form a "bubble of life"[1]. In essence, the ecosystem definition in biology is that it serves as nature's fundamental unit. Nature, like a living organism, is made up of fundamental units called ecosystems, which serve as structural and functional units of life. An ecosystem consists of a community as well as the surrounding environment. Ecology, which is the scientific study of the interactions between populations or organisms and their environments, can be studied at the individual, population, community, or ecosystem levels[2].

Individual-level ecology is primarily concerned with the physiology, reproduction, and development of the individual organism. At the population level, ecology is primarily concerned with the characteristics and various factors affecting the population. Ecology investigates population interactions and community patterns at the community level. At the level of an ecosystem, ecology brings them all together to understand how the system functions as a whole. As a result, an ecosystem ecology is more concerned with energy flow and nutrient cycles than with individual species[3].

The meaning and origin of the term "ecosystem" can be traced back to the Ancient Greek "o" ("oîkos") for "house" and "" ("sstma") for "organised body." Roy Clapham, a botanist, coined the term in the early 1930s to describe the physical and biological components of an environment. However, it was Arthur Tansley, a British ecologist, who first introduced the concept in his paper "The Use and Abuse of Vegetational Concepts." [4,5]

Abiotic constituents of an ecosystem, such as minerals, can be classified. Climate, soil, water, sunlight, and all other nonliving elements, as well as its biotic constituents (all living members). Two major forces connect these constituents: the flow of energy through the ecosystem and the cycling of nutrients within the ecosystem. Ecosystems range in size from small enough to be contained within single water droplets to large enough to encompass entire landscapes and regions[5].

Structure of an ecosystem

An ecosystem's structure is made up of two major components:

(1) Biotic elements

(2) Abiotic elements

(1) Biotic elements

All living things are included in the biotic components. In general, there are two kinds of living things. They are known as eukaryotes and prokaryotes. Eukaryotes are distinguished by the presence of membrane-bound organelles (such as a nucleus) within their cells. Prokaryotes are those that lack membrane-bound organelles. Read this for more information on the differences between these two groups). Plants, animals, fungi, and protists are examples of eukaryotes. Prokaryotes include bacteria and archaea. Each of them now has a "job" in the ecosystem. Consumers are represented by animals. Herbivores are animals that feed on plants, whereas carnivores feed on other animals. There are also those that eat both plants and animals. They are known as omnivores.

2) Abiotic elements

All non-living things, such as rocks, soil, minerals, water sources, and the local atmosphere, are considered abiotic components. Abiotic components, like biotic components, serve an ecological purpose. Elements and compounds, for example, are nutrient sources. They are required for an organism's growth and metabolism. They not only provide nutrients, but also a place for organisms to live and thrive — a habitat.

Interactions

As a system, the biotic and abiotic components interact with one another and are linked by nutrient cycles and energy flows. Photoautotrophs, for example, transport energy and nutrients into the system. Plants and green algae are examples of photosynthesising organisms. The photoautotrophs are then consumed by heterotrophs, such as animals. This causes energy and nutrients to move through the system. When these organisms die, the decomposers begin to decompose them. This process returns nutrients to the environment for re-use by organisms.

Types of ecosystems

Terrestrial, freshwater, marine, and artificial ecosystems are the four types of ecosystems. The first three are found in various biomes. The last one is artificial. The size of ecosystems varies, from micro-ecosystems (such as tree ecosystems) to the largest ecosystems, such as ocean ecosystems.

(1) Terrain ecosystem

The terrestrial ecosystem is found on land. Forest ecosystems, grassland ecosystems, tundra ecosystems, and desert ecosystems are examples of land-based ecosystems.

A **forest ecosystem** is made up of various plants, particularly trees. This ecosystem is abundant in life due to the abundance of plants that serve as producers. A forest is teeming with not only plants but also animals. They are also a good source of fruits and wood, and they help to keep the earth's temperature stable. They are also a significant carbon sink[6].

Grassland ecosystems are most commonly found in tropical or temperate climates. Grass is the dominant plant. As a result, grazing animals such as cattle, goats, and deer are common in this type of ecosystem.

Tundra ecosystems are distinguished by the absence of trees and the presence of snow. In the spring and summer, the snow melts briefly, forming shallow ponds. Lichens and flowering plants are common during this period. This type of ecosystem is important in regulating the earth's temperature because of the ice that covers the land in the tundra. It also functions as a reservoir for water (in the form of ice or frost).

Desert ecosystems are those that exist in desert habitats. Deserts are usually dry and windy. Some have sand dunes, while others are mostly rock. Desert organisms are not as diverse as those found in forests, but they have adaptations that make them suitable for their environment. Cacti are examples of CAM plants that are commonly found in the desert. Insects, reptiles, and birds are examples of desert animals[7].

(2) Ecosystems of freshwater

Freshwater ecosystems are aquatic ecosystems that lack saltwater. Algae, plankton, insects, amphibians, and fish live there. There are two types of ecosystems: lentic and lotic.

Still-water ecosystems are referred to as lentic ecosystems. Ponds, puddles, and lakes are just a few examples. Lakes, in particular, can develop zonation. When different zones become well established, that is when they form. These are the littoral, limnetic, and profundal zones. The littoral zone is the area closest to the shore. Light can penetrate all the way to the bottom here. The limnetic zone is the area where light does not completely penetrate. The photic zone is the part of the limnetic zone that is illuminated by light, whereas the benthic zone is the part of the limnetic zone that is dark. Plants and animals differ in these zones. Rooted plants, for example, are found in the littoral zone but not in the limnetic zone. Rather, freely floating plants are commonly seen on the limnetic zone's surface.

A lotic ecosystem is an aquatic ecosystem distinguished by a freely flowing freshwater habitat. This is in contrast to the nearly stationary lentic. Rivers and streams are two examples. Many plants and animals in these ecosystems have evolved to cope with the force and variety of conditions brought on by running water.

(3) Marine environment

A marine ecosystem is a saltwater-containing aquatic ecosystem. Sea and ocean ecosystems are two examples. Because of the vast population of autotrophic algae that release

oxygen through photosynthesis, ocean ecosystems in particular are an important source of atmospheric oxygen. Marine ecosystems are the most abundant type of ecosystem on the planet[7].

(4) Man-made ecosystem

A man-made ecosystem is a system that can be classified as terrestrial, freshwater, or marine. A terrarium is an example of an artificial ecosystem. Many man-made ecosystems are constructed for conservation, aesthetics, and biological and ecological research.

Processes of the ecosystem

Energy flows while materials are cycled in an ecosystem. These two processes are intertwined and critical to an ecosystem's structure, function, and biodiversity. Ecosystems are responsible for nutrient cycling and allowing energy to flow from the sun to the biotic components. The various biological, physical, and chemical systems collaborate to keep the earth's systems stable. Biodiversity is required for an ecosystem to function properly. The biotic components are referred to as biodiversity. The greater the diversity of the biotic components, the "healthier" the ecosystem. This is due to the fact that each species plays an important role. The more diverse the species, the more likely the ecosystem will survive and continue to function. High diversity in an ecosystem can help improve productivity and thus stabilise its functioning.

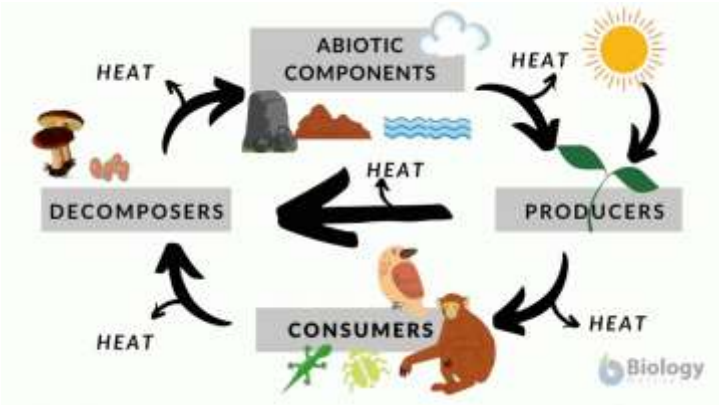


Figure 1: While some energy is stored in ATP others are released as heat. The heat, dissipated into the environment is lost in the system and cannot be recycled. This means the planet is an open system when it comes to energy[3]

The flow of energy

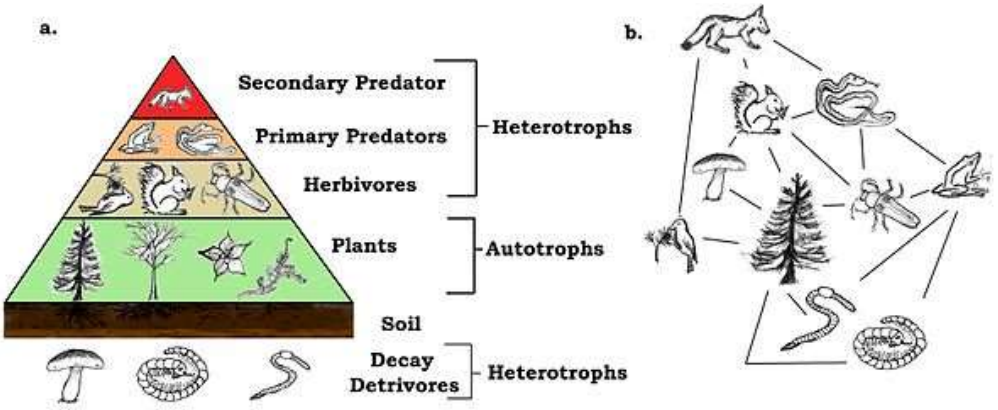
The flow of energy through living things within an ecosystem is referred to as energy flow. All living organisms can be classified as producers and consumers, and those producers and consumers can be classified further as a food chain.

Each level of the food chain is a trophic level. These food chains are then organised into trophic pyramids to more efficiently show the number of organisms at each trophic level. The arrows in the food chain show that energy flow is unidirectional, with the direction of energy flow indicated by the head of an arrow; energy is lost as heat at each step along the way.

The unidirectional flow of energy and the successive loss of energy as it travels up the food web are energy flow patterns governed by thermodynamics, the theory of energy exchange

between systems. Trophic dynamics is related to thermodynamics because it deals with the transfer and transformation of energy to and among organisms (originating externally from the sun via solar radiation).

The term productivity in ecology refers to the rate at which biomass is generated in an ecosystem. It is frequently expressed in mass per volume per unit of time, such as grammes per square metre per day (g m2 d1). Productivity can be classified as primary or secondary. Primary productivity refers to the productivity of autotrophs such as plants, whereas secondary productivity refers to the productivity of heterotrophs. Animals, for example, are heterotrophs[8]. (Refer Figure a & b)



Primary production

The primary production of biomass is frequently attributed to photosynthesis by plants and algae. The sun's radiant energy is the primary source of energy in almost all ecosystems. The energy of sunlight is used by autotrophic, or self-sustaining, organisms in the ecosystem (those that can produce their own food). These organisms, which are mostly made up of green vegetation, are capable of photosynthesis, which means they can use the energy of sunlight to convert carbon dioxide and water into simple, energy-rich carbohydrates. The energy stored in simple carbohydrates is used by autotrophs to produce more complex organic compounds such as proteins, lipids, and starches that support the organism's life processes. The autotrophic segment of the ecosystem is known as the producer level[9].

Autotrophic organic matter directly or indirectly supports heterotrophic organisms. Heterotrophs are the ecosystem's consumers; they cannot produce their own food. They use, rearrange, and eventually decompose the complex organic materials accumulated by autotrophs. All animals and fungi, as well as the majority of bacteria and many other microorganisms, are heterotrophs[9].

By feeding on these plants, energy (along with nutrients) is transferred from the producer to the consumer. It then moves from one consumer to the next. Carbohydrates, fats, and proteins, for example, are rich sources of energy stored in their chemical bonds. In the presence of oxygen, glucose (a sugar molecule) is processed to produce chemical energy (ATP) through cellular respiration. A series of oxidation reactions releases the energy stored in food molecules.

The last group of organisms through which energy flows is decomposers. They eat all living things' droppings and carcasses[9].

Secondary production

Secondary production is the use of energy stored in plants that is converted to biomass by consumers. Different ecosystems have different levels of consumers, but they all culminate in a single top consumer. The majority of energy is stored in plant organic matter, and as consumers consume these plants, they absorb this energy. Carnivores consume the energy stored in herbivores and omnivores. There is also a significant amount of energy used in primary production that ends up as waste or litter, referred to as detritus. Microbes, macro invertebrates, meiofauna, fungi, and bacteria are abundant in the detrital food chain. These organisms are eaten by omnivores and carnivores and contribute significantly to secondary production[10]. The efficiency with which secondary consumers consume can vary greatly[11]. It is estimated that the efficiency of energy passed on to consumers is around 10%. The flow of energy through consumers differs between aquatic and terrestrial environments[12].

Energy flow across ecosystem

Once carbon has been introduced into a system as a viable source of energy, the mechanisms that govern the flow of energy to higher trophic levels vary across ecosystems. Patterns that can account for this variation have been identified among aquatic and terrestrial ecosystems and have been divided into two main control pathways: top-down and bottom-up. Bottom-up controls involve mechanisms that control primary productivity and the subsequent flow of energy and biomass to higher trophic levels based on resource quality and availability. Top-down controls involve mechanisms based on consumer consumption. As herbivores or predators feed on lower trophic levels, these mechanisms regulate the rate of energy transfer from one trophic level to the next[13].

Aquatic ecosystems vs. terrestrial ecosystems

The flow of energy varies greatly within each type of ecosystem, making identifying variation between ecosystem types difficult. In general, energy flow is determined by primary productivity, temperature, water availability, and light availability. For example, in aquatic ecosystems, larger rivers and shallow lakes typically have higher rates of production than deep lakes and clear headwater streams. The highest primary production rates are found in marshes, swamps, and tropical rainforests, while the lowest are found in tundra and alpine ecosystems. Because of the various bottom-up and top-down controls at work, the relationships between primary production and environmental conditions have helped ecologists demonstrate that energy flows more efficiently through aquatic ecosystems than terrestrial ecosystems[14].

Bottom-Up

The nutritional quality, size, and growth rates of primary producers in an ecosystem determine the strength of bottom-up controls on energy flow. Photosynthetic material is typically high in nitrogen and phosphorus, which helps to meet the high herbivore demand for N and P in all ecosystems. Aquatic primary production is dominated by small, single-celled phytoplankton

that are mostly made up of photosynthetic material, providing herbivores with an efficient source of these nutrients. Multicellular terrestrial plants, on the other hand, have many large supporting cellulose structures that are high in carbon but low in nutrient value. Because of this structural difference, aquatic primary producers have less biomass per photosynthetic tissue stored within the aquatic ecosystem than terrestrial primary producers do in forests and grasslands. In aquatic ecosystems, the low biomass relative to photosynthetic material allows for a faster turnover rate than in terrestrial ecosystems[13]. As herbivores consume phytoplankton, their increased growth and reproduction rates replace lost biomass and, in conjunction with their nutrient density, support increased secondary production. Other factors influencing primary production include N and P inputs, which occur in greater quantities in aquatic ecosystems. These nutrients are essential for stimulating plant growth and, when passed to higher trophic levels, increase consumer biomass and growth rate. If either of these nutrients is in short supply, it can have a negative impact on overall primary production. P is the most limiting nutrient in lakes, while N and P both limit primary production in rivers. Because of these limiting effects, nutrient inputs have the potential to alleviate an aquatic ecosystem's net primary production limitations. Allochthonous material washed into an aquatic ecosystem introduces N and P as well as energy in the form of carbon molecules, which primary producers readily absorb. Increased inputs and nutrient concentrations promote higher net primary production rates, which in turn promote higher secondary production[15].

Top-down

Because of the role of consumers in an aquatic food web, top-down mechanisms exert greater control over aquatic primary producers. Herbivores, which are consumers, can mitigate the effects of trophic cascades by bridging the flow of energy from primary producers to predators at higher trophic levels. There is a consistent relationship between herbivore growth and producer nutritional quality across ecosystems. However, herbivores consume primary producers four times faster in aquatic ecosystems than in terrestrial ecosystems. Although this is a hotly debated topic, researchers have linked the difference in herbivore control to several theories, including producer to consumer size ratios and herbivore selectivity[13]. Modelling top-down controls on primary producers suggests that the greatest control over the flow of energy occurs when the consumer-to-primary-producer size ratio is greatest. In aquatic systems, the size distribution of organisms found within a single trophic level is much narrower than in terrestrial systems. On land, consumer body size ranges from smaller than the plant it consumes, such as an insect, to significantly larger, such as an ungulate, whereas in aquatic systems, consumer body size varies much less and is strongly correlated with trophic position. As a result, the size difference between producers and consumers in aquatic environments is consistently greater than on land, resulting in greater herbivore control over aquatic primary producers[13].

Herbivores have the potential to influence the fate of organic matter as it moves through the food web. Herbivores prefer nutritious plants over plants with structural defence mechanisms. Defence structures, like support structures, are made of nutrient-poor, high-carbon

cellulose. Access to nutritious food sources boosts herbivore metabolism and energy demands, resulting in more primary producer removal[13]. Phytoplankton are highly nutritious in aquatic ecosystems but lack defence mechanisms in general. Because consumed plant matter is quickly released back into the system as labile organic waste, top-down control is improved. Primary producers in terrestrial ecosystems are less nutritionally dense and more likely to have defence structures. Because herbivores prefer nutritionally dense plants and avoid plants or plant parts with defence structures, more plant matter remains unconsumed in the ecosystem. Because herbivores avoid low-quality plant matter, terrestrial systems may have weaker top-down control over energy flow[16]

Importance of energy flow in an ecosystem

For an ecosystem to survive, energy flow must continue. Every living thing needs energy to survive, and all living things in an ecosystem depend on one another for this energy. From the details provided below, people may comprehend the importance of energy flow.

- The energy flow in an ecosystem is crucial for preserving ecological balance. It starts with solar power or insolation.
- Recycling of materials is fundamental to the ecosystem's continued existence. For each trophic level to survive, there must be a continuous and consistent amount of energy flow.
- Through energy flow, the ecosystem is able to support itself and establish stability. If there is no energy flow, an ecosystem cannot function.
- A group of linked food chains is referred to as a food web. The food web preserves the stability of the ecosystem or environment. The community of living things grows more stable when there are more alternative pathways available.
- The sun is the most potent energy source. An ecosystem is a functional system in which biotic and abiotic elements efficiently transfer energy[16].

Conclusion:

Life is propelled by energy. The energy cycle is based on the flow of energy through various trophic levels in an ecosystem. Our ecosystem is sustained by the cycling of energy and nutrients from various external sources. Primary producers use solar energy to produce organic material through photosynthesis at the first trophic level. Herbivores at the second trophic level consume plants as food, which provides them with energy. A large portion of this energy is expended by these animals for metabolic functions such as breathing, digesting food, supporting tissue growth, maintaining blood circulation, and body temperature[1].

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DESERTIFICATION

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Introduction:

Desertification is a dynamic process that is observed in dry and fragile ecosystems. It affects soils, water resources, and ecosystems as well as human settlements and livelihood activities and is particularly important in areas where adaptation is difficult due to economic, social, or environmental constraints. Millennium Ecosystem Assessment 2005 (cited under Management), Ecosystems and Human Well-Being: Desertification Synthesis, reports that 10 percent to 20 percent of arid regions have become desertified, thus placing 2 billion people who live in the arid regions (in 2000) at risk of poverty. The United Nations Convention to Combat Desertification defines "desertification" as "land degradation in arid, semi-arid and sub-humid areas resulting from various factors including climatic variations and human activities," and, as of May 2014, a total of 196 countries and the European Union have ratified the Convention. Desertification is recognized as the outcome of a suite of processes and conditions rather than a singular process.

Definition:

Desertification is the process by which vegetation in drylands i.e. arid and semi-arid lands, such as grasslands or shrublands, decreases and eventually disappears.

Causes of desertification

The main **human activities** driving desertification are:

- Deforestation, causes of which go beyond tree felling, which increases the risk of fires, among others.
- Poor agricultural practices, from not rotating crops to unprotected soils or chemical fertiliser and pesticide use, etc.
- Overexploitation of natural resources as a consequence, for example, of irresponsible management of vegetation or water.
- Bad livestock practices, such as overgrazing, which severely erode the land and prevent the regeneration of vegetation.
- Climate Change
- Stripping the land of resources
- Natural Disasters

Catagories of desertation

Light desertification: In this type of desertification, a very slight damage occurs in vegetation cover and soil. This damage does not affect the biological capacity of the environment and can

be neglected.

Moderate desertification: A medium degree of damage of vegetation cover occurs and formation of small sand dunes and salinization of the soil which reduces production by 10-25%.

Severe desertification: In this type, spreading of weeds and unwanted shrubs in the pasture at the expense of desirable, and wanted species occurs as well as increasing of the erosion activity which affects the vegetation cover and reduces production upto 50%.

Very severe desertification: In this type of desertification, composition of active naked great sand dunes occurs and formation of many grooves and valleys and the salinization of the soil which leads to soil degradation. It is the most serious type of desertification.

Consequences of desertification

Dry lands cover about half of the earth's ice-free land surface and many of them belong to **the world's poorest countries,** which exacerbates the consequences:

- Loss of biodiversity by worsening the living conditions of many species.
- Food insecurity due to crop failure or reduced yields.
- The **loss of vegetation cover** and therefore of food for livestock and humans.
- Increased risk of zoonotic diseases, such as COVID-19.
- Loss of forest cover, with a corresponding shortage of wood resources.
- The decrease in drinking water reserves due to the **loss of aquifers.**

Four areas affected by desertification

1. Irrigated croplands, whose soils are often degraded by the accumulation of salts.
2. Rain-fed croplands, which experience unreliable rainfall and wind-driven soil erosion.
3. Grazing lands, which are harmed by overgrazing, soil compaction, and erosion.
4. Dry woodlands, which are plagued by the overconsumption of fuel wood.

Desertification impacts

1. Farming becomes difficult or even impossible in the area
2. Flooding chances are more
3. Hunger – because of no farming
4. Poor quality of water
5. Overpopulation
6. Poverty as a result of the above

Steps to reduce desertification

Given below are the steps which may help in reducing Desertification:

- Focus on Water management. Rainwater harvest must be done, water that can be reused must not be left out as waste
- Reforestation and tree regeneration
- Buttressing the soil through the use of sand fences, shelter belts, woodlots and windbreaks
- Better and hyper-fertilization of soil through planting

- The residue from pruned trees can be used to provide mulching for fields thus increasing soil water retention and reducing evaporation

Measures taken to curb desertification in India

Multiple steps and measures have been taken by the concerned authorities regarding curbing desertification in India. Discussed below are the same:

- A Command Area Development Programme was launched in 1974 which is coordinated by the Ministry of Water Resources for its implementation in various states of the country. It aims at improvising the irrigational potential through water management
- In 1989-90, Integrated Watershed Management Programme was launched, which was later renamed as Haryali Guidelines in 2013, and then, subsumed under Pradhan Mantri Krishi Sinchai Yojana
- Implemented by the Ministry of Rural Development, the Desert Development Programme was launched in 1995 to minimize the effects of drought in areas across the country
- India also became a signatory to the United Nations Convention to Combat Desertification (UNCCD) in 1994
- National Afforestation Programme was implemented by the Ministry of Environment, Forest and Climate Change in the year 2000
- In 2001, the National Action Programme to Combat Desertification was implemented by the Ministry of Environment, Forest and Climate Change
- Desertification and Land Degradation Atlas of India was released by ISRO in 2016to combat desertification and land degradation

Measures taken to curb desertification globally

Desertification is an issue for people across the globe and multiple steps have been taken to curb it. Given below are the steps which have been taken globally to curb desertification:

- Goal 15 of Sustainable Development Goals (SDG), 2030 declares that "we are determined to protect the planet from degradation, including through sustainable consumption and production."
- The Bonn Challenge has been taken up as per which 150 million hectares of the world's deforested and degraded land is expected to be restored by 2020 and around 350 million hectares to be restored by 2030
- United Nations Convention to Combat Desertification (UNCCD) was established in 1994
- Apart from this, every year, June 17 is observed as the World Day to Combat Desertification and Drought

Solution for desertification

- Rising awareness of the problem
- Planting indigenous trees and shrubs
- Developing sustainable agricultural practices
- Controlled grazing

- Crop rotation (increase fertility and reduce soil erosion)
- Proper land management
- Soil and Water management
- Introduce proper technologies
- Manage dry land resources
- Tree planting schemes to reduce soil erosion.

Conclusion:

There is an urgent need for people and planners to recognize desertification as a pressing problem in the Western Dry Region of Rajasthan increased burden on land from agriculture-based activities is likely to adversely affect the efforts to arrest desertification in the belt. There is an urgent need for policy interventions to prevent desertification due to human activities particularly in the more developed districts of the region as they are worse off in terms of various indicators that are directly related to desertification and land degradation.

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ECOSYSTEM

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Abstract:

Ecosystems (collections of living species interacting with one another and their non-living surroundings) can be thought of as natural resources that provide the services necessary to support and enhance human life. These "ecosystem services" include: the provision of clean air and water; the maintenance of soil fertility; the regulation of climate; the pollination of crops and native plants; the control of the vast majority of potential pests; the preservation of genetic resources; the provision of food, fuel, and fibre; and the fulfilment of our lives through stimulation of the mind, spirit, and culture.

Keywords: Ecosystem, Fragmenting, Nature, Food chain

Introduction:

Cology (Grade Oikos House; Study of Logos) Ecology, also known as Oikos-house or Logos-study, is the study of how organisms interact with one another and their surroundings. For survival in a certain geographic area, organisms exhibit intraspecific and interspecific connections. The habitat in which the biotic community lives meets both its material and energy needs. As a result, the bond between living things and their physical surroundings is unbreakable. These connections make up several ecosystems. Ecosystems are therefore the basic building blocks of nature.

Ecosystem

A self-sustaining entity called an ecosystem includes both living and non-living elements that interact with one another.

Definition

An ecosystem is a self-sustaining and functional unit of nature made up of biotic and abiotic components, where living things interact both with one another and with their physical surroundings.

Structure of ecosystem

Each type of ecosystem's physical structure is the consequence of the interaction of biotic and abiotic elements.

The two important structural features of an ecosystem are:

- Species composition
- Stratification

Species composition

All the plants, animals and microbial species present in the ecosystem.

Stratification

This term describes how various species are arranged vertically and inhabit various levels of an ecosystem.

Forest stratification

Trees over 40 feet tall make form the top layer of a forest, followed by shrubs in the second layer, dense canopies of trees between 20 and 40 feet tall, and grasses and herbs in the bottom layer.

Stratification in a lake or deep pond

- The littoral zone is characterised by shallow water with decaying strata that promote the growth of deeply rooted plants.
- The limmetic zone contains planktons, nektons, and neustons and is located at the depth where light can enter the ocean.
- The region where sunlight is unable to enter is referred to as the profundal zone. Photosynthetic organisms do not exist in this region. All the microorganisms in the mud are anaerobes, such as bacteria and fungus.

Function of ecosystem

Production, breakdown, energy flow, and nutrient cycling are the four main tasks that an ecosystem accomplishes.

Productivity

- Ecosystem to function and survive, it is essential that it get a steady supply of solar energy.
- In terms of weight (g-2) or energy (kcal m-2) plants can produce a certain amount of biomass (organic matter) per unit area over the course of a given amount of time.
- Primary productivity is a phrase used to describe the rate at which biomass is produced and is represented in terms of g-2yr-1 or kcal m-2y-1.

Decomposition

Detritus serves as the starting point for breakdown. The steps in the breakdown process are as follows:

Fragmentation

The detritivores' method of fragmenting debris into smaller fragments is known as fragmentation.

Leaching

Leaching is the process by which inorganic materials that are water soluble sink into the soil horizon and then crystallise as salts that are inaccessible.

Catabolism

Catabolism is the enzymatic transformation of detritus into basic organic chemicals, which is followed by the formation of inorganic substances. The decomposing organisms like bacteria and fungi secrete the enzymes.

Humification

Decomposition is accompanied by humification, which results in the formation of amorphous dark-colored materials known as humus.

Mineralization

The release of inorganic nutrients occurs through a process known as mineralization, in which certain bacteria break down humus.

The majority of the time, decomposition is an aerobic process, meaning oxygen is needed.

Food chain

It consists of many biological communities that rely on one another for nourishment. It is called a food chain because this relationship forms a chain.

Types of food chain

Detritus food chains and grazing food chains are the two main forms of food chains that can be found in nature.

The producers, who gather solar energy and use photosynthesis to feed it into the food chain, are the first nodes in the grazing food chain (GFC).

Energy moves in a single direction in a food chain, from the sun to producers, then to the numerous consumers.

A food chain typically has a maximum of four or five trophic levels. The top level consumers receive more energy from shorter food chains.

Detritus of food chain

Dead organic materials and decomposers (saprotrophs), such as bacteria and fungi, are where it all starts.

- This form of food chain receives more energy than the grazing food chain in terrestrial habitats.
- Trophic level is the place or position that an organism occupies in the food chain.
- The first trophic level is occupied by producers, the second by herbivores (primary consumers), and the third by carnivores (secondary consumers).
- At each new trophic level, the amount of energy drops; only 10% of the energy from the previous trophic level is transmitted to the new one. This is referred to as the energy transfer 10% law.
- Therefore, there can only be four or five trophic levels in a grazing food chain.
- The standing crop at each trophic level refers to the mass of living matter present at a specific period.

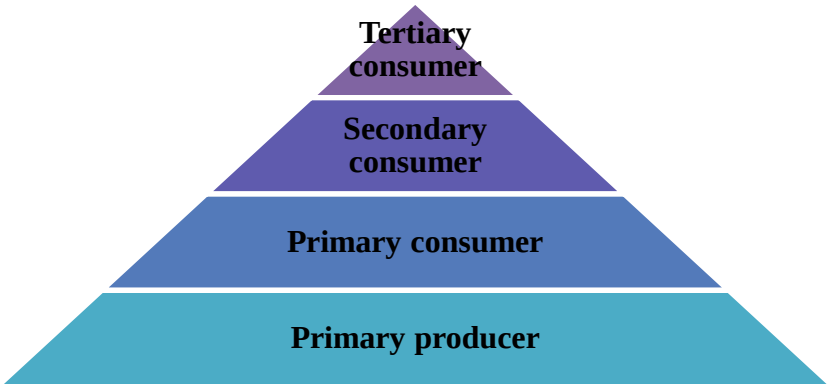
Energy flow

- All of the earth's ecosystems depend mostly on the sun for their energy.
- Photosynthetically active radiation (PAR) makes up just around 50% of incident sun radiation.

- ❖ All species (herbivores, carnivores, omnivores, and decomposers) are dependent on producers for their food, either directly or indirectly, as plants only collect 2–10% of PAR.
- ❖ Energy flows in a single direction from the sun to producers, then to consumers, in accordance with the first law of thermodynamics.
- ❖ Energy is transported in an ecosystem in the form of food, which causes degeneration
- ❖ The second rule of thermodynamics is adhered to by the majority of food energy being lost as heat during metabolic processes and a very tiny portion being stored as biomass.

Energy pyramid

- ❖ The link between food and energy for animals at various trophic levels can be described in terms of quantity, biomass, or energy.
- ❖ The statement takes on the form of a pyramid, with the producers at the base (first trophic level) and the tertiary (top level) consumer at the top.
- ❖ Each trophic level, rather than a specific species, symbolises a functional level.
- ❖ Commonly studied ecological pyramid types:
    i. Pyramids of energy,
    ii. Pyramids of biomass, and
    iii. Pyramids of numbers are all used.



Ecosystem services

Forested areas offer the following services:

- Provide home for a variety of wildlife,
- Purify the air,
- Reduce the likelihood of droughts and floods,
- Aid in the cycling of nutrients,
- Serve as carbon storage, and have an impact on the hydrological cycle.
- Keep biodiversity intact

Function of ecosystem

Environments are intricate, dynamic systems. They carry out particular duties. These include:

(i) The movement of energy through the food chain (biogeochemical cycles); and
(ii) The cycling of nutrients.

(iii) Homeostasis (or cybernetic) or feedback control mechanisms

(iv) Ecological succession or ecosystem development

Conclusion:

The environment is crucial for maintaining a sustainable way of life. A strong ecosystem protects our surroundings and makes a substantial contribution to preserving the wellbeing of all living things. A sustainable environment requires that human interference be kept to a minimum and that people learn to coexist peacefully with nature, regardless of the natural events that occur. Due of their desires, humans frequently alter the ecology, which throws off the balance of the system. Due to the events that occur from this, like natural disasters, environmental changes, and pollution, people should stop talking about the ecosystem and act in harmony with nature. Because man and nature get along well, there must be man as well. Nature won't exist if there is no nature.

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EQUITABLE USE OF ENVIRONMENTAL RESOURCES FOR A SUSTAINABLE LIFESTYLE

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Abstract:

Violence, famine, social discrimination, consumerism, resource waste, war, and the depletion of natural resources are all caused by the unequal distribution of power and resources among people. Interpersonal contacts as well as interactions between communities and countries are tainted by social and economic disparities. However, they are not the only factors contributing to environmental and social issues; gender, age, sexual orientation, racial, and ethnic inequalities also play a role in the current global environmental crisis. Therefore, proponents of sustainable development contend that equitable initiatives ought to be supported in order to protect the socio-physical environment.

Keywords: Resources, Socio-physical environment, crisis.

Introduction:

Without human intervention, natural resources exist in their natural state. Some of them are non-renewable and cannot be replenished, but they can readily be renewed. Resources determine a region's economy. A nation may protect its natural resources for future generations by using them wisely. Looking at the existing conditions, however, it is clear that the indiscriminate use of contemporary resources has made it extremely unlikely for future generations and emerging nations to get their due share. Furthermore, the results are terrible, and the damage they cause to the ecosystem will be severe and beyond it carrying capacity.

Natural resources

Climate and air

Declining air quality and climate change can significantly impact ecosystem health and human health. By reducing the amount of dangerous chemicals used in the air, communities may help reduce the sources of air pollution.

Energy

Energy is a non-renewable resource that is used to generate electricity and is mostly used for transportation, domestic use, and commercial facilities. Energy conservation and the utilization of renewable fuels, which offer less expensive and more environmentally friendly options, are urgently needed.

Water

We use water as a valuable resource in all of our daily activities, including drinking, cooking, cleaning, and washing. This valuable natural resource is largely being wasted. Government and citizens must cooperate to ensure that water is used wisely and that there is an adequate supply to satisfy future demands in order to prevent water shortage.

Biodiversity

Biodiversity mostly satisfies our requirement for many kinds of food, raw materials, fuel, etc. The world was teeming with diverse species more than 4 billion years ago, and each species had a specific job to keep the ecological balance in check. Over 80% of the species became extinct as time went on. By creating places like zoos, sanctuaries, national parks, biosphere reserves, wildlife safaris, and sanctuaries, communities participate in the preservation of healthy wildlife by supporting, managing, promoting, safeguarding, and enhancing it.

Ecosystems, land, and forests

Both living and non-living organisms interact with one another to form an ecosystem. Forests, light, air, soil, energy, and other renewable resources need to be safeguarded. Communities must create wise land-use techniques to preserve ecosystems and boost local economies while preserving the ecological balance.

Fair resource usage for sustainable development

Basically, sustainable development indicates that a region's development process needs to be sustained or planned in a way that will allow it to continue for a considerable amount of time. In order to preserve the quality of life while minimizing environmental degradation, it is necessary to use the limited resources available in a planned or wise manner.

To put it another way, rather than keeping a region in a permanent state of deterioration to accommodate the demands and comforts of the human population and industrial/economic centers, regional development is a limited process or has growth limits depending on the availability of natural resources.

Sustainable development is described by the Commission on Environment and Development’s report "Our Common Future" as development that satisfies current demands without jeopardizing the ability of future generations to satiate their own needs. However, economists describe sustainable development as an economic process in which our stock of natural resources (such as forests) and the integrity of biogeochemical cycles (such as climate) are sustained and passed on to the next generation undamaged. The supporting capacity and assimilative capacity are the two components of the carrying capacity.

Carrying capacity

Carrying capacity of a region/system could be described broadly as number of individuals of a species that it can sustain. In case of human beings, it is rather a complex situation, wherein the region/system has not only to bear the load of his basic needs but also all other associated activities including industrial/de-velopmental projects which has direct impact on limited natural base and envi-ronmental quality. The carrying capacity can be divided into two parts i.e. supporting capacity and assimilative capacity.

A region's or system's ability to support itself offers an evaluation of the stock of resources that are readily accessible and their capability for natural or sustainable regeneration. The carrying capacity's assimilative component evaluates the maximum pollution load that can be released while still maintaining the environment's best-intended usage. As a result, if we consume a region's or system's resource base beyond what it can regenerate or sustain, or if we release pollutants or produce waste outside of what it can assimilate, the region's or system's carrying capacity is impacted.

Green accounting

In both industrialized and developing nations, the idea of "green accounting" is very common. It highlights essentially the same ideas as those outlined in the concepts of sustainable development and carrying capacity, namely the wise and planned use of natural resources with little to no negative influence on the environment.

However, it communicates by giving us an economic interpretation of the resource base and environmental quality in contrast to the usual accounting in terms of GDP (Gross Domestic Product). By precisely converting both the base of natural resources and the quality of the environment into monetary values, it provides us with a uniform level, which makes it simpler for planners and policymakers to develop new development programs and plans.

Equitable use of resources for a sustainable lifestyle

Sustainable resource management involves using natural resources in a way that benefits the entire human race. Providing resources for current generations without compromising the requirements of future ones is the core goal of sustainable development.

Equitable resource usage entails treating everyone equally and justly when using natural resources while protecting the environment. It entails cutting back on waste, conserving resources, and effectively employing them to meet the demands of both the present and future generations.

Adopting a sustainable lifestyle is one of the fundamental elements of resource allocation that is fair to everybody. The term "sustainable lifestyle" refers to ways of living that reduce environmental damage and advance social and economic well-being. This entails making informed decisions regarding our consumption habits, waste disposal methods, and what we consume.

Coal and petroleum are examples of non-renewable resources that cannot be replaced; hence the economy cannot be built on their use. A resource that is truly sustainable does not compromise environmental quality. Natural resources that have been overused eventually run out of stock. Because nothing will be left for future generations, the current resources cannot be consumed at the same rate.

To conserve living resources, there are three main goals to consider:

1. To guarantee that all uses of the ecosystem are sustainable.
2. To conserve biodiversity, and
3. To safeguard crucial ecological processes

Strategies for promoting resource equity and leading a sustainable lifestyle:

Reduce, reuse, and recycle

A quick and easy strategy to cut waste and conserve resources is to follow the three Rs. We may save resources and lessen the environmental effects of our consumption by cutting down on the waste we produce, reusing things whenever we can, and recycling stuff.

Pick eco-friendly products

When making purchases, choose things that are eco-friendly and have a small carbon footprint. These products should be built of sustainable materials and powered by renewable energy. Food that is organic, recycled-material products, and renewable energy sources are all examples of this.

Conservation of water and energy

Energy usage can be considerably decreased by taking easy measures including correcting leaks, disconnecting appliances when not in use, and turning off lights and appliances when not in use. Similar water conservation techniques include taking shorter showers, addressing leaks, and utilizing water-saving appliances.

Use of public transportation or carpooling

The emissions of greenhouse gases from transportation are significant. We may lessen our carbon footprint and encourage sustainable mobility by using public transit or carpooling.

Encourage sustainable business practices

To find companies that are devoted to sustainable practices, such as using renewable energy, decreasing waste, and getting items from sustainable sources, do some research. We can inspire others to adopt sustainable practices by assisting these companies.

The governance challenge in the sustainable use of natural resources

The well-being of people and the health of ecosystems are harmed by the overuse of natural resources. We must take action in the face of environmental crises and rising inequality, which includes creating laws governing supply chains and extended producer responsibility, assuring green public procurement, encouraging technical innovation to improve resource circularity, and implementing decision-making procedures that respect and include women, Native Americans, and local communities.

The United Nations, while working to advance decolonization in the 1960s, stated that " the right of peoples and nations to permanent sovereignty over their natural wealth and resources must be exercised in the interest of their national development and of the well-being of the people of the State concerned" (UN General Assembly Resolution 1803). This is because the use of natural resources has long been seen as a component of both human rights and economic development.

Natural resources are frequently seen as important assets promoting growth and wealth creation. Resource utilization grew over time and with the advance of industrialization. In certain instances, resource utilization levels eventually surpassed their normal regeneration rates. In the end, such overexploitation jeopardizes ecosystem health as well as the lives and well-being of people who depend on these resources. This threat of resource depletion, which is most visibly

manifested in fishery collapses, highlights the necessity of regulating natural resource usage to better protect resources and their ecosystems. Fundamental guidelines in this regard were adopted during the first UN meeting on environmental issues, the UN Meeting on the Human Environment in Stockholm, Sweden, in 1972.

Stockholm declaration

- In accordance with Principle 2 of the Stockholm Declaration, "the natural resources of the earth, including the air, water, land, flora and fauna, and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate."
- Principle 3 states that the earth's ability to create necessary renewable resources must be preserved and, whenever possible, improved.
- The earth's non-renewable resources must be used in a way that protects against the risk of future exhaustion and ensures that benefits from such employment are shared by all people, according to principle 5.

The Stockholm Declaration addressed resource depletion as well as benefit sharing, with the aim of ensuring that the utilization of natural resources benefited the many as well as the few, both domestically and internationally. It also relates to the idea of intergenerational equality, which aims to protect current resource use from endangering the supply of natural resources for coming generations. In actuality, the use of natural resources is related to social justice, environmental health, and economic development the three pillars of sustainability. The long-term usage of resources must be maintained while maximizing societal benefits and minimizing environmental effects. This is what is meant by the sustainable use of natural resources.

Promotion of sustainable resource governance

Natural resource governance refers to the management of natural resources under the influence of a wide range of norms, institutions, and individuals. A complex web of regulations governing how natural resources are used and their benefits are dispersed is created by a variety of national legislation, intergovernmental agreements, regional organizations, certification procedures, corporate codes of conduct, and multi-stakeholder partnerships.

Since Stockholm, a wide range of operational standards, goals, and guidelines have been established through several international agreements. The Convention on Biological Diversity (CBD) is one example of an intergovernmental framework with a broad scope. Other frameworks, like the Minamata Convention on Mercury, are resource-specific or have a regional focus, like the Convention on the Conservation of Antarctic Marine Living Resources. Industry initiatives and multi-stakeholder alliances frequently concentrate on certain resources or industries. The Better Cotton Initiative, the Extractive Industries Transparency Initiative, the Roundtable on Sustainable Palm Oil, and the Forest Stewardship Council are a few examples of such programs.

Citizens also have agency over natural resource use: through the representatives, we elect to government, our activist engagement, and our consumption and transport choices. For instance, carefully considering food production cycles what we eat, where and how it is grown,

and how it arrives on our plate can go towards addressing the impact that agricultural expansion has on forests, wetlands, and grassland ecosystems (FAO, 2018; IPBES, 2019). However, this needs to be coupled with systemic change across governance structures.

These institutions and mechanisms don't always work together; sometimes they even conflict with one another. Consider, for example, an energy firm filing arbitration claims against a nation's decision to phase out coal, a move made in compliance with its duties under the Paris Agreement on Climate Change. This country invoked the Energy Charter Treaty to do so.

Protecting natural resources while balancing rights and interests

Concepts like property and rights have influenced how individuals can and should access, benefit from, participate in, and have responsibility for natural resources. On the one hand, property rights categorize lands and territories into private, common, public, and open access areas, where no specific rights are assigned, common property, where rights are shared by a community, and public property, where rights are held by the government (Aggrawal & Elbow, 2006).

Property rights are closely related to rights over natural resources, which might include the right to use a resource for example, to hunt in a forest, or management rights, which give the right to make decisions about usage, such as limiting hunting to certain times of the year. Different types of ownership and access rights might be held concurrently by many actors in terms of governance. For example, a wetland may be owned by the state, managed by a local council, and utilized by communities as a fishing area.

UNDROP

The idea of tenure security denotes the recognition and enforceability of a person's rights over particular lands and natural resources. These rights are essential for preventing conflict, promoting social stability, and ensuring the long-term sustainable use of resources.

On the other hand, there are rights that pertain to the quality of life that is both individual and collective. For instance, according to the United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas (UNDROP), "Pleasants and other people working in rural areas have the right to have access to and use in a sustainable manner the natural resources present in their communities that are required to enjoy adequate living conditions" and that they "have the right to participate in the management of these resources" (Article 5).

Small-scale sustainable practices are essential, and there is a need to increase the protection and acknowledgment of communities that have historically been marginalized and violently at odds with one another over resource use. These are the two issues that UNDROP emphasizes.

ILO:

The International Labor Organization (ILO) Convention 169 (ILO 169) and the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) safeguard the civil and political rights of Indigenous Peoples. States are required by UNDRIP Article 8(2b) to prevent and offer remedies for "any action which has the aim or effect of dispossessing them of their lands, territories, or resources." Both texts emphasize the significance of obtaining Indigenous Peoples'

free, prior, and informed consent (FPIC) for the use of their lands, with UNDRIP Articles 11(2) and 28 emphasizing their right to compensation for past FPIC violations.

UNDRIP:

As stated by the UN Human Rights Council in 2019, there is also the right to a healthy environment, which is protected by regional treaties. This right includes procedural rights regarding information access and decision-making processes, as well as the rights to clean air, a safe climate, healthy food, safe water, a safe environment for work and play, and healthy ecosystems. The ability of national governments to put these developments in international law into practice will ultimately determine their efficacy. Only 23 nations have ratified ILO 169 as of this writing, and many more around the world have not yet passed the necessary legislation to safeguard the rights outlined in UNDRIP.

Natural resources governance

Governments must implement significant reforms to national policies, laws, programs, and institutions in order to achieve this and to protect related UNDROP rights as well as the right to a healthy environment. These reforms must also ensure that environmental and social issues are mainstreamed across all sectors, with a particular emphasis on empowering marginalized groups. Prominent players, such as the UN Special Rapporteur on Human Rights and the Environment, are advocating for human rights-based approaches to natural resource governance to guarantee that decisions made across society better address ecological and social wellbeing.

Overall, this results in a complex architecture that is dynamic in character frequently builds on customary practices, and necessitates striking a balance between "competing" rights and interests through law and policy. Structures are rarely simple; frequently, contradictory or even overlapping systems are in place, which affects the sustainability of resource governance.

In achieving a balance between rights and interests, states are essential. The influence of a corporation's exclusive user rights on the right of the general public to a safe and healthy environment is governed by laws governing the extractive industry. The distribution, recognition, and protection of rights, as well as the enforcement of related obligations, are all balanced in different ways by different states and across time.

Conclusion:

For everyone to have a healthy and sustainable future, equitable resource utilization for sustainable lifestyles is essential. We can lessen our impact on the environment and encourage equal access to resources for all by adopting a sustainable lifestyle and making thoughtful decisions about our resource cons.

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AQUATIC ECOSYSTEM

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Abstract:

Water is essential for many lives. Aquatic organisms are those that live in water. All aspects of life, such as food, shelter, and reproduction, depend on water. Groups of interconnected species that depend on one another and their aquatic environment for food and shelter make up aquatic ecosystems. Rivers, lakes, and oceans are examples of water bodies that contain aquatic ecosystems. The freshwater environment is made up of bodies of water including lakes, ponds, rivers, oceans, marshes, swamps, etc. The ocean, the intertidal zones, the reefs, and the bottom make up a marine environment. Numerous different types of animals, plants, and bacteria reside in the aquatic ecosystem.

Keywords: Aquatic organisms, reproduction, freshwater environment, marine environment.

Introduction:

The natural resources and the accompanying ecological conditions are what sustain life on earth. The two main groups that comprise all life and all ecosystems on earth are the continents and the oceans. The oceans, which span over 75% of the surface of the world, are home to an abundance of marine life. A significant supplier of food, energy, and mineral resources is the ocean. Global climate is also influenced by the oceans. If plant biomass is the primary source of energy on land, then animal biomass must be the primary source of energy on the oceans. Living systems that depend on water are known as aquatic ecosystems. Freshwater ecosystems and marine ecosystems are the two categories into which aquatic ecosystems are divided. Marine ecosystems include the habitats of the open ocean and nearby coastal areas. In addition to this, salt marshes and wetlands that are found at river mouths and coastlines are also included in marine ecosystems. Several distinctive habitats, including estuaries, tidal inlets, and foreshore ecosystems, are also present in the coastal zone. Estuaries are one example of a zone where both freshwater and saltwater have habitats.

Concept for an aquatic ecosystem

The word "aquatic" is derived from the Latin word "aqua," which meaning water. An aquatic ecosystem is one that is based on water. An aquatic ecosystem is a group of animals that coexist, interact, and to some extent depend on one another in a water-based environment.

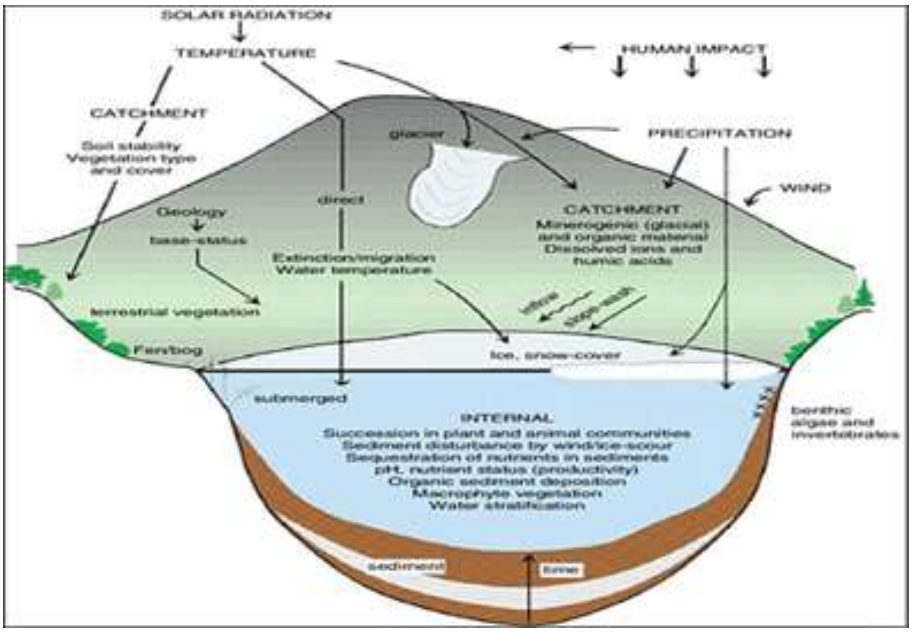
The following subgroups of aquatic habitats are based on the concentration of salt content.

- Rivers, lakes, and ponds are examples of freshwater environments.
- Ecosystems in brackish water, include mangroves and estuaries.
- Marine habitats, including oceans and seas.

The aquatic ecosystem definition

The fundamental functional component enabling the survival of aquatic organisms is the aquatic ecosystem. This ecosystem's special physicochemical characteristics enable the exchange of materials, execution of critical chemical reactions, and other crucial processes required for the existence of the life forms. The most common aquatic organisms include nekton, plankton, and benthos.

Freshwater aquatic ecosystems include lakes, oceans, ponds, rivers, swamps, coral reefs, marshes, and other well-known examples. Marine habitats include oceans, intertidal zones, reefs, and the seafloor.



Schematic Diagram of an Aquatic Ecosystem

Aquatic ecosystem types

Aquatic environments can be divided into two categories: marine ecosystems and freshwater ecosystems.

Ecosystem of freshwater

Only 1% of the earth's surface is covered by freshwater habitats, which include lakes, ponds, rivers, streams, marshes, swamps, bogs, and ephemeral pools. The three types of freshwater environments are lotic, lentic, wetlands, and swamps.

Standing water areas like lakes, ponds, pools, bogs, and other reservoirs are referred to as lentic habitats. Lotic ecosystems serve as a representation of moving bodies of water like rivers and streams. Let's examine these in more detail.

Lotic ecosystems

Rivers and streams are examples of lotic ecosystems because of their unidirectional flow and rapid flow. These habitats also support aquatic animals such as beavers, river dolphins, and otters, as well as a number of insect species like as beetles, mayflies, and stoneflies, as well as a number of fish species such as trout, eels, and minnow.

Ecosystems Lentic

The main examples of the Lentic Ecosystem are lakes and ponds. They include any environments with standing water.

Water that is motionless or comparatively still is referred to as lentic. These ecosystems are home to a variety of organisms, including algae, crabs, prawns, amphibians like frogs and salamanders, rooted and floating plants, and reptiles like alligators and other water snakes.

Lotic and Lentic Ecosystem

Swamps and wetlands

If there is no forest nearby, the area is referred to as a wetland. A swamp is an area in the forest that is continually submerged in water.

Freshwater swamps are typically located inland, while seawater swamps are situated towards the coast.

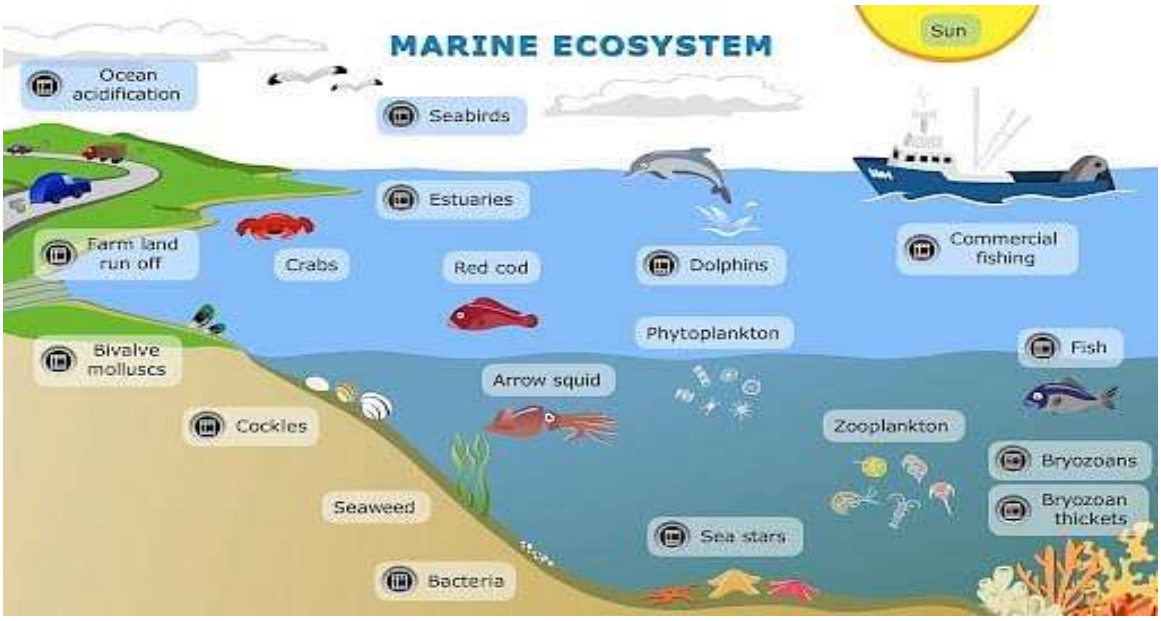
- Wetlands and swamps can contain freshwater, brackish water, or seawater.
- Swamps' water levels frequently fluctuate as a result of rain and flooding.
- Swamps and wetlands are home to a variety of terrestrial, aquatic, and amphibian species, including crocodiles, alligators, turtles, fish, and migratory birds. Swamps and wetlands are experiencing environmental degradation as a result of overdevelopment.

Marine ecosystem

The majority of the earth's surface is covered by the marine environment, which includes oceans, seas, the intertidal zone, reefs, the seabed, estuaries, hydrothermal vents, and rock pools. Aquatic animals cannot exist without water, and salt concentrations in the marine habitat are higher, making it more difficult for freshwater organisms to survive. Marine species are also unable to survive in freshwater.

- Because their bodies are made to live in saltwater, they will swell (osmosis) if placed in freshwater.

- They can also be divided into coastal ecosystems, coral reefs, estuaries, and ocean ecosystems.



Marine ecosystem

Oceanic ecosystem

The five major oceans on earth are the Pacific, Indian, Arctic, and Atlantic Oceans. Of these five oceans, the Pacific and Atlantic Oceans are the biggest and deepest.

These oceans are home to more than five lakh different aquatic species.

These ecosystems are home to a variety of creatures, including plankton, corals, seagulls, sharks, tube worms, crabs, turtles, crustaceans, blue whales, reptiles, marine mammals, and various ocean plants.

Estuaries

Estuaries, which often form where rivers and the sea converge, are important types of natural environments.

This is the area where the land meets the water. Estuaries have significant economic importance because they are capable of trapping plant nutrients and producing quality organic matter in comparison to all other land-based ecosystems, making them more saline than freshwater ecosystems but more diluted than marine ecosystems. Today, estuaries are popular locations for both recreational activity and academic research. Tidal marshes, coastal bays, and river mouths are a few examples.

Coral reefs

Reefs made of corals are underwater structures known as coral reefs. Reefs are made of the bones of marine vertebrates, also known as corals. Most of the oceans in the world contain these.

As a result of the hard calcium carbonate exoskeletons that these corals produce to safeguard their structure and support vital life processes, these reefs are known as hermatypic or hard reefs. Hard coral reefs are well-known examples, such as sea anemones. The additional species build soft reefs, which are rather adaptable creatures like plants and trees. Some of the most frequent types of soft reefs are sea fans and sea whips. Warm, shallow, clear, flowing seas with lots of sunlight are the ideal circumstances for coral reef survival. The Great Barrier Reef, located in Australia, is the biggest coral reef in the world.

Great Barrier Reef

Coastal system

The shape and richness of marine habitats vary, and coastal ecosystems are composed of open systems of land and sea that are linked together.

A wide variety of aquatic plant and algae species can be found living at the base of the coastal ecosystem.

- The fauna includes creatures like crabs, fish, insects, lobsters, snails, prawns, and others. Most aquatic creatures have streamlined bodies, which allows them to conserve energy by reducing friction.
- The fins and gills serve as the loco motional and breathing systems, respectively.
- Species that live in freshwater have unique adaptations that enable them to eliminate extra water from their bodies.
- Diverse roots on aquatic plants let them survive in the water.
- Some plants, like water hyacinths, have roots that are submerged, while others have emergent roots.

Coastal ecosystem

Characteristics of aquatic ecosystems

1.Water diversity: They can be made of either freshwater or saltwater, which is known as water diversity.

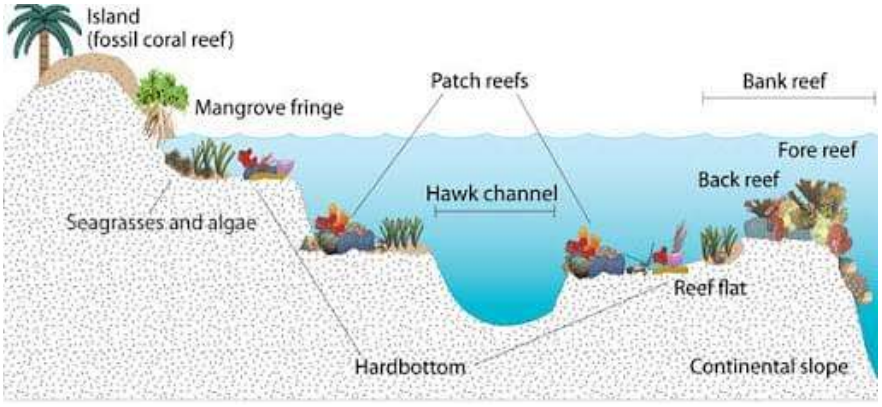
2. Diverse habitat population: They serve as habitat for a range of plants and animals, from those found in shallow water to those found in even the deepest oceans.

3. Exclusive biodiversity: The majority of the flora in aquatic habitats is made up of algae and corals.

4. Rich sustenance network: They control the hydrological cycle, serve as a pollution filter, and permit the smooth continuation of the overall complex food chain play.

Functions of aquatic ecosystem

1. Makes it easier to recycle nutrients.
2. Contributes to water purification
3. replenishes the water table's reserves
4. Offers a habitat for aquatic flora and fauna.
5. Reduces flooding



Aquatic ecosystem components

1. Abiotic components

Light: The energy source that keeps the system running is solar radiation. The number of plankton and the quantity of dissolved or suspended particles both have an impact on light penetration. An aquatic habitat can be classified as euphotic (eu=true, photic=light), mesophotic, or aphotic depending on how much light it receives. There is an abundance of light for plants and animals in the euphotic zone. Light is absent in the aphotic region.

Inorganic substances: Depending on where the ecosystem is located, these may include carbon, water, phosphorus, nitrogen, calcium, and other elements like sulphur. Other inorganic substances such as oxygen and carbon dioxide are dissolved in water. Water is necessary for both the nourishment and gas exchange of both plants and animals. Living things and sediment both contain reserves of phosphorus, nitrogen, sulphur, and other inorganic salts. These salts can dissolve in small amounts.

Organic compounds: Amino acids, humic acids, and the decayed remains of plants and animals are a few examples of the naturally occurring organic substances found in the aquatic environment. These granules are suspended in water and only partially dissolved.

2. Biotic components

a. Autotrophs or producers

For the entire heterotroph community in the aquatic ecosystem, these create nutrients. They fall into one of two categories:

Floating microorganisms and plants: These organisms are referred to as phytoplankton ("phyto" is short for "plants," "plankton" is short for "floating"). It is made up of tiny creatures. They can occasionally be so numerous in a body of water that they give the impression that it is green, including Spirogyra, Ultrix, Cladophora, Diatoms, and Volvox.

Rooted vegetation: These are structured in concentric zones from the outermost layer to the deeper layers, these are organised into concentric zones. The following three unique zones of aquatic plants are seen with increasing water depths:

- Zone of newly emerging vegetation, which contains Typha, Bulrushes, and Sagittaria
- Zone of rooted vegetation with floating leaves, such as nymphaea
- Pond weeds like Hydrilla, Rupia, and musk grass are examples of submergent vegetation.

b. Consumers and heterotrophs

Consumers are organisms that get their nutrition from autotrophs, or producers, like tadpoles, snails, sunfish, and bass, either directly or indirectly. The following categories can be used to classify these creatures:

- Neuston are unattached creatures, like floating plants, that live at the air-water interface. For instance, backswimmers and cockroaches
- Periphyton are living beings that cling to the stems and leaves of rooted plants or objects that stick out of the mud, such as sessile algae and the family of creatures that live around them.
- Zooplanktons are floating organisms. Cyclops and Cypris, as an example.
- Nektons are living things that can freely float and navigate. Mollusks, mites, beetles, and some crustaceans are examples of the species that reside on the ocean floor and are known as benthic species.

c. Decomposers

Decomposers are bacteria and fungi that feed on dead and decaying creatures and are found across the entire aquatic ecosystem, although they are specifically found near the bottom of bodies of water.

The Influences on aquatic ecosystems

A. Natural elements

Beavers

Beavers can alter the structure and dynamics of aquatic ecosystems by building and destroying dams. It is possible to make the following modifications (Naiman et al., 1986): The flooding of the riparian zone to create wetlands; Changes in nutrient cycling and decomposition; Alterations in the geomorphology and hydrology of channels; decreased velocities cause silt and organic materials to hold for longer; Changes to the riparian zone, such as changes in species composition and dynamics; influences on the habitat and, consequently, the overall species present there; and effects on the materials transported downstream of the transformed area.

Being able to modify its surroundings and create new habitats makes the beaver a keystone species, as the loss of this species will harm all species that rely on these habitats.

Flooding

- Inundation is a critical part of the hydrological cycle that naturally occurs and the ecosystems it affects.
- Floods retain the hydrological connection between floodplains and rivers.
- When a river floods, it leaves behind nutrient-rich sediment on the banks and flushes fragments of plant matter into the water, which feed aquatic life. Flooding can increase the water table in addition to replenishing the lakes and ponds in the floodplain.
- For instance, seasonal flooding in the Peace-Athabasca Delta replenishes the perched basins.
- Until equilibrium is restored, the introduction of flooding by damming or catastrophic occurrences can be harmful to an aquatic ecosystem.
- This equilibrium will be reached in the case of dams in due course; while one habitat is destroyed, another is developed. After the water has subsided and aquatic organisms have had time to reconstruct their home in a nutrient-richer environment, balance usually restores in the case of catastrophic flood occurrences.

B. Effects of human activity on aquatic ecosystems

People are more likely to disrupt natural patterns and processes when they do activities that affect aquatic ecosystems because animals can't adjust to environmental changes rapidly enough. The lower Athabasca basin is impacted by the oil sands, pulp and paper mills, municipal trash, and, to a lesser extent, forestry and agriculture. We discuss more broad concerns that arise when humans alter aquatic ecosystems below.

1. Bio amplification and Bio absorption

- Instead of being discharged into the environment or being eliminated by the body, some toxins that enter aquatic systems are kept in organisms, typically in adipose tissue. The process through which toxins become more concentrated in species higher up on food webs is referred to as biomagnification, and it occurs when contaminants accumulate over time.
- Even if an organism in a food web at a low trophic level has low amounts of a pollutant, the contaminant will be more concentrated in the organism that consumes it since it will consume many of these organisms throughout its lifetime.
- Contaminants get more concentrated as you move higher up the food chain. More pollution accumulates as there are more steps to reach the top predator.
- The top predator in systems with longer food webs typically has a higher degree of pollution than the top predator in systems with shorter food webs, assuming all other factors are equal.

2. Endocrinogenic substances

Pollutants known as endocrine disrupting substances (EDS) have the ability to alter the general growth, reproduction, and development of aquatic organisms.

Alkyl phenolics, which are oil-removing detergents present in industrial and municipal effluents, natural hormones, and synthetic steroids (such as those found in contraceptives), which are found in agricultural runoff and municipal effluents are all sources of EDSs.

EDSs have the potential to transform male fish into female fish, impair fish reproduction, and result in deformed fish embryos.

3. Change in climate

According to modelling done by the Northern Rivers Basin Study (NRBS), global climate change could cause spring melt to occur earlier, more rain and snow to fall, and more evaporation (NREI 2002). These alterations could collectively cause the Athabasca River's water levels to drop overall. Lower water levels could arise from slower replenishment of lakes and ponds due to warmer temperatures triggering earlier melting of ice jams. Fish species like trout and burbot may not survive or reproduce as successfully as they could otherwise (Hynes, 1970). Therefore, the species composition and survival in the oil sands region may be impacted by rising temperatures and changes in the amount of water available.

4. Airborne deposition

Gases and tiny particulate matter (PM) are released into the atmosphere by pulp mills and oil sands operations. Then, these materials can either be dryly deposited or wetly deposited (when rain or snow binds to the gases or particles) on land or in water.

In the atmosphere, pollutants including nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) can be detected. These gases are linked to acid rain, which causes delicate lakes and soils in the oil sands region to become more acidic.

The northern rivers of Alberta are particularly concerning for mercury. At the local level, oil sands operations and coal power stations close to Edmonton are the main sources of mercury emissions (NREI, 2002). Long-distance atmospheric migration of mercury results in its eventual deposition in aquatic ecosystems, where it may be harmful to aquatic life.

Renewal of aquatical ecosystems

According to Gwin *et al.* (1999), restoration is the "return of an ecosystem to a close approximation of its condition prior to disturbance" or the reestablishment of pre-disturbance aquatic functions and related physical, chemical, and biological characteristics.

Reconstruction guidelines are

Preserve and safeguard aquatic resources: Preserving biodiversity depends on maintaining existing, largely unaltered ecosystems, which also supply the biota and other natural resources required for the restoration of damaged systems.

Restore ecological integrity: The condition of an ecosystem, including the structure, makeup, and natural processes of its biotic communities and physical surroundings, is referred to as having ecological integrity.

Restore natural structure: Many aquatic resources that require restoration have issues that started with damaging alterations to channel form or other physical characteristics, which may have in turn caused issues including habitat degradation, altered flow regimes, and siltation.

Restore natural function: In river corridors, lakes, wetlands, estuaries, and other aquatic resources, structure and function are intertwined. Putting the right natural structure back in place can restore beneficial functions.

Work within the context of the watershed and the larger landscape: Restoration calls for a design that takes into account the entire watershed, not just the area of the water body that may be the most damaged site. The aquatic resource that is being restored may suffer as a result of activities occurring throughout the watershed. Restoration planners may be able to design a project for the targeted advantages of restoration while simultaneously withstanding or even aiding in the remediation of the effects of nearby land uses on runoff and non-point source pollution by taking into account the watershed context in this situation.

Recognise the watershed's natural potential: Restoration planning should focus on restoring the watershed's natural potential while accounting for any irreversible changes in the watershed that might harm the system being restored.

Address persistent causes of degradation: Wherever possible, pinpoint the root causes of degradation and take steps to mitigate or eliminate persistent pressures.

Create goals that are specific, attainable, and measurable: Goals guide execution and serve as the benchmarks for success. Given the natural potential of the place, the chosen objectives should be feasible from an ecological and socioeconomic standpoint, depending on the resources at hand and the level of support for the initiative from the local population.

Put a strong emphasis on viability while taking into account scientific, economic, social, and other factors.

Be prepared for changes in the future: Because the environment and our communities are dynamic, many anticipated ecological and societal changes can and should be taken into account when designing a restoration project.

Use a multidisciplinary team's talents and insights to guarantee that restoration initiatives are founded on comprehensive and well-balanced plans. Universities, governmental organisations, and private organisations may be able to offer helpful information and knowledge in this regard.

Plan for self-sustainability: Reduce the amount of ongoing site maintenance required to ensure the long-term viability of a restored region. Designing for self-sustainability involves encouraging ecological integrity in addition to reducing the need for maintenance, as a healthy ecosystem is more likely to be able to adapt to changes.

Utilise passive restoration when necessary: The site can regenerate naturally if the sources of deterioration are simply reduced or eliminated and recovery time is given. Without carrying out a specialised restoration project, passive restoration for some rivers and streams can reestablish stable channels and floodplains, regenerate riparian vegetation, and enhance in-stream habitats. Although natural processes are primarily used in passive restoration, it is still required to assess the site's recovery requirements and decide whether time and natural processes can adequately address them.

Restore native species and stay away from non-native ones: Because invasive species are skilled colonisers of disturbed environments and lack natural controls, they frequently outcompete native species.

When possible, use bioengineering and natural solutions: In bioengineering, living, functional systems are created to stop erosion, manage silt and other pollutants, and provide habitat by merging living plants with dead ones or inorganic elements. These methods would be effective for water purification, bank stabilisation, erosion management, and flood reduction.

Monitor the project and make modifications when necessary: Monitoring is essential for determining whether objectives are being met. If they are not, "mid-course" project alterations should be made. Monitoring once a project is complete will assist identify whether any extra steps or alterations are required and can offer helpful data for upcoming restoration initiatives. Adaptive management is the term used to describe this monitoring and adjusting process. Monitoring plans should always give information pertinent to achieving the project goals and be cost- and technologically feasible.

- Using new technology to implement systems for water audits, leak detection, and water fees.
- Involve the community in planning activities at the local and regional levels, as well as through outreach to community and cultural organisations.
- Scientific studies include aquifer monitoring, study of the marine environment along the coast, forecasting of supply and demand, and pollution abatement.

Conclusion:

Around the planet, there are many different kinds of aquatic ecosystems, and each one is home to amazing creatures. Because of the size and mystery of our marine ecosystems, scientists estimate that they have only identified about 10% of the creatures that live there. However, these aquatic habitats are seriously threatened by pollution, carbon emissions, and overfishing. One of the natural wonders of the world, the Great Barrier Reef, is already deteriorating right before our eyes. We must all take action right away to safeguard the world's aquatic ecosystems for coming generations. We may accomplish this by reducing emissions, ceasing the use of hazardous substances that can leak into rivers and oceans, and eliminating fish from the food chain.

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FORESTATION

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Abstract:

A forest is a dense area of land that is covered in a variety of plants and trees. Tropical rain forests, deciduous forests, and coniferous forests are the three primary categories of forests. Depending on the right amount of rainfall and temperature, the forest ecology is separated. The forest ecology supports a wide variety of creatures and provides all essential resources, including wood, timber, medicinal herbs, and other items, in abundance. The atmosphere's oxygen and temperature levels are kept stable by forest. Global warming can be avoided thanks to the forest environment. Plants' roots allow them to take up water from the earth. They discharge surplus moisture into the atmosphere, which promotes the occurrence of rains. The soil's fertility is preserved by forest ecosystems, which also stop soil erosion.

Keywords: Forests, flora

Introduction:

A forest is an area with a high density of trees and undisturbed areas. Receives high annual rain fall. We can observe wide variety of plants and animals. World's total land area is 13,076 million hectares - (Source: FAO; 1989) of which total forests account for about 31% of the world's land area. In India, the forest cover is roughly 11% of the total land area. The forest ecosystem is of great concern from the environmental point of view.

Forest ecosystem

An ecosystem of resources and forests is called a forest ecosystem. The resources found in forests are renewable. With the help of their trees, shrubs, herbs, climbers, and ground cover, forests are made up of a variety of species. The most crucial interdependent components of a forest ecosystem include soil, animals, insects, microorganisms, and birds. About 18–20% of the land area of India is covered by forests.

1. Abiotic components: The inorganic and organic elements found in the soil, as well as factors such as temperature, precipitation, and light, are all components of the forest.

2. Biotic components: Production, consumption, and decomposition are the three types of biological components.

Types of forests

Large areas that support dense tree growth are known as forests. They can generally be divided into the following categories:

(i) Tropical rain forests

(ii) Forests of temperate deciduous trees

(iii) North coniferous woods or the boreal

(i) Tropical rain forests

- **Distribution:** These can be found in the regions with high rainfall on either side of the equator (i) tropical rain forest. These woods are distributed over south-east Asia and the western coast of India.
- **Flora and fauna:** Tropical rainforests grow in regions with high temperatures, high humidity, and more than 200 cm of annual precipitation. These regions include sections of Africa and South America. Humus is abundant in soil. These woods are incredibly diverse, including, for example. In the 200 square kilometer area of the Brazilian tropical rain forests, there are more than 300 different species of trees. Trees can reach heights of 50 to 60 metres. Epiphytes, including vines, creepers, woody creepers, orchids, and others, can also be found in these woodlands. These forests are home to a wide variety of insect species, as well as many types of monkeys, flying squirrels, snails, centipedes, and millipedes that live in the trees.

(ii) Forests of temperate deciduous trees

- **Distribution:** They are primarily found in Australia, far eastern Russia, far eastern Korea, northwest, central, and Eastern Europe, eastern North America, and north China. In deciduous woods, trees lose their leaves in the autumn, and new foliage emerges in the spring.
- **Climate:** These woods are found in regions with moderate climatic conditions, such as temperatures between 10 and 20^0 C, a winter that lasts six months, and annual precipitation of 75 to 150 cm. They have nutrient-rich brown soils of their own.
- **Flora and Fauna:** Oak, beach, heath, chestnut, birch, and pine are common trees. These forests exhibit stratification as well and include an understory of young shrubs, tall herbs, and saplings. Rodents, deer, and bison are prominent grazers. Rodents are crucial to the health of these woodlands. They consume fruit, leaves, and seeds from trees. In these woodlands, omnivores such black bears, raccoons, wild cats, wolves, foxes, and skunks can be found. Animals living in these woodlands frequently engage in hibernation, or winter sleep, during the colder months. Green flies, aphids, some moths, and butterflies are examples of invertebrate fauna.

(iii) Northern coniferous woods, or boreal forests

- Geographical range: Taiga is another name for coniferous forests. They spread out beneath the northern tundra in a continuous strip over North America and North Eurasia. Since there is no land at this latitude, there is no analogue to these forests in the southern hemisphere. The mean annual temperature is below zero degrees Celsius, and the winters are long and brutal. Acidic and deficient in nutrients, the soils.

- Coniferous woods are evergreen, drought tolerant, and woody, which define their flora and fauna. Conifers (gymnosperms), such as spruce, fir, and pine trees, produce cones that contain naked seeds. Red squirrels, deer, goats, mule dogs, moose, and other creatures can be found in these forests. Timber wolves, lynxes, and bear are the carnivores that eat them. Crossbills, thrushes, warblers, flycatchers, robins, and sparrows are some examples of common birds.

India is a large country with a variety of different natural environments.

1. **The terrestrial forest areas include:**

India's forests can be categorized in a variety of ways depending on their location, mood, weather, etc. Common traits of different kinds of indigenous plants in India include

(i) Tropical rain forests
(ii) Tropical deciduous forests
(iii) Temperate board leaf forest
(iv) Temperate needle leaf or coniferous forests; and
(v) Alpine and tundra forests.

In addition to these, there are various types of forests in India, including tidal forests, Himalayan vegetation, southern India's rain forests, desert regions, etc.

(i) Tropical rain forests

The Indian subcontinent's native vegetation is significantly influenced by the tropical rain forests. These types of forests, which include tropical evergreen and semi-evergreen varieties, are primarily found in regions with year-round high levels of precipitation and sunshine. Where there is a short dry season and rainfall in excess of 200 cm, tree growth is typically at its best. These kinds of woods can be found in the wet Western Ghats slopes, the plains of West Bengal and Orissa, and northeastern India. In these forests, trees grow extremely quickly and can reach heights of up to 60 metres. These woods include much too many and different species for any one of them to be used commercially. The dominant trees in these woods include rosewood, mahogany, and ebony.

(ii) Tropical rain forests

Tropical forests that shed their leaves for six to eight weeks throughout the summer are also referred to as deciduous forests, regardless of whether they are moist or dry. With all of their grandeur and splendour, they are also known as monsoon woods. This is due to the fact that they make up a natural cover almost everywhere in India, especially in areas with 200 and 75 cm of annual rainfall. The state of Kerala in India is home to the majority of the world's tropical deciduous woods. In addition to Kerala, these woods can be found in the Himalayan valleys, on the northern and eastern portions of the peninsular plateau, and on the eastern slopes of the Western Ghats. Because they are less fire resistant, tropical deciduous forests are quite big, economical, and maintenance-intensive. Moist and dry deciduous woods can be found in these forests. The eastern slopes of the Western Ghats are where you'll most often find the damp deciduous forests. Shiwaliks in northern India can also be found in the Chhotanagpur plateau

area, which includes east Madhya Pradesh, south Bihar, and west Orissa. Teak, sal, and sandalwood are three of these woods' most significant trees.

(iii) Temperate broad leaf forest

It mostly occurs in the western Himalayas at elevations of 1500–2400 m. These woodlands contain a number of oak (Quercus) species. Evergreen oak species can be found in the Himalayas. While the peak leaf fall occurs in the summer, these plants never lose all of their leaves. The trees may reach a height of 25 to 30 metres. The herbaceous layer is least developed, the tree canopy is dense, and grasses are generally scarce. Epiphytic flora is frequently abundant in oak woodlands.

(iv) Temperate needle leaf or coniferous forest

These forests can be found in the Himalaya between 1700 and 3000 metres above sea level. Gymnospermous trees including pine (Pinus wallichiana), deodar (Cedrus deodara), cypress (Cypressus torulosa), spruce (Picea simthiana), and silver fir (Abies pindrow) are abundant in these woods and are economically valued. Coniferous forests have an evergreen canopy of long, needle-like leaves and are taller (30–35 m). These trees' canopies never lose their green colour. It has a cone-like form in many species.

(v) Alpine and Tundra forests

Another type of natural vegetation seen in India are the tundra and alpine woods. Alpine vegetation is typically referred to be vegetation that grows over 3600 m in elevation, and it can be seen that as altitude increases, plants exhibit stunted growth. This category includes trees including silver fir, pine, juniper, and birch. Higher elevations in this area are mostly where the alpine grasslands can be found. Tribal members from the Gujjar and Bakarwal tribes make great use of this area. High altitudinal zones also have vegetation like lichen and mosses.

- In India, the **tidal forests** offer yet another type of indigenous vegetation. They can be found near rivers and coasts, and mangrove plants that can survive in both fresh and salt water cover them. The Ganga-Brahmaputra delta's forested areas have been given the name Sundarban in honour of the famous mangrove tree Sundari, which is primarily found in tidal forests.
- One of the most prevalent types of natural vegetation in India is that found in the Himalayas **(Himalayan vegetation**). In stark contrast to the pine and coniferous woodlands of the western Himalayas, India's eastern area has dense tropical forests. Except for Kashmir, the northwest Himalayas are home to Chir pine (Pinus roxburghii). The eastern Himalayas are also home to abundant populations of Chilgoza (pine nut), oak, maple, ash (Fraxinus xanthoxyloides), and other trees.
- The **southern Indian rain forests** make a significant contribution to India's native vegetation. The state of Kerala is home to some of the world's most opulent rain forests. Coconut palms envelop the lagoons here, which lead to the nation's longest uninterrupted length of rain forests. Some additional areas in India with well-preserved rain forests are

the state of Arunachal Pradesh and the Andaman & Nicobar Islands. On the moist Karnataka plateau, extensive sandal, teak, and sisoo (Dalbergia sissoo) woods are also abundant.

- A beautiful representation of India's native plants can be found in the **Thar Desert**. The searing sun has made the trees in this desert short and sturdy. In this location, it's typical to see cacti, reunjha (Acacia leucophloea), khejra (Prosopis spicigera), kanju (Holoptelia integrifolia), oak (Calotropis gigantea), and other species. The above-mentioned types of forests and places significantly contribute to India's natural vegetation.

Components of forest ecosystem

1. Producers: Through the process of photosynthesis, producers can create their own food. Given that they transform sunlight into the chemical energy of food, all plants that grow in the green are regarded as producers of the environment.

2. Main customers: Because they are unable to prepare their own food, consumers rely on producers. Animals that are herbivorous obtain their nourishment by directly consuming the producers (plants). Grasshoppers, deer, and other animals are examples of main consumers.

3. Secondary Consumers: Food is obtained by secondary consumers from primary consumers.

4. Decomposers: In the forest ecosystem, decomposers disintegrate dead plants and animals and return the nutrients to the soil for use by the producers. Ants and termites are significant decomposers in the Amazon jungle in addition to bacteria. Dead stuff is also broken down by earthworms and millipedes.

5. The nutrition cycle: occurs in cycles. Nutrients are necessary for ecosystems to function properly. About 95% of the mass of living things is made up of carbon, hydrogen, oxygen, and nitrogen. Additional components are required in relatively tiny amounts, between 15 and 20. Between the ecosystem's living and non-living parts, these are repeatedly recycled.

6. Energy Flow: In a forest environment, the grasshopper consumes the grass, which receives its nutrition from the sun, soil, and water. The grasshopper is then consumed by frogs, snakes, and vultures, all of which are at various trophic levels. Nutrients are transferred from one link in the food chain to the next during this process of eating and being eaten. Energy flow refers to the movement of energy along a food chain. The total amount of energy at each trophic level of a food chain is represented by the energy pyramid. Energy always moves in a single direction.

Features of the forest ecosystem

1. Forests are characterised by warm temperatures and ample rainfall, which leads to the production of numerous ponds, lakes, etc.
2. Rainfall and climate are maintained by the forest.
3. The forest preserves biodiversity and is home to numerous wild animals.
4. The soil is rich in nutrients and organic materials, which helps trees thrive.

Functions of forest ecosystem

1. Products Obtained from Forests: Forests are a source of many different food items, including honey, wild meat, fruits, mushrooms, palm oil, wine, and medicinal plants. In addition

to edible components, forests may provide us with timber, wood biomass, cork, etc. Old trees that are buried in the ground can be harvested for their fuel.

2. Ecological Functions: Forests are crucial for the preservation of ecological elements such the climate, carbon storage, nutrient cycle, and rainfall.

3. Cultural and social advantages: Tribal inhabitants of the forests revere the trees as goddesses of nature. Traditional spirituality and beliefs protect wildlife against hunters and urban people's tree-cutting. A few contemporary people go to woodlands for fun.

Threats to the forest ecosystem

- Overutilization of forest resources due to rapid population growth, urbanization, and industrialization in an unsustainable way leads to highly disturbed ecosystem unsustainable consumption pattern.
- India’s forest cover has decreased from about 33% to 11% in the last century.
- Loss of forests by mining and dam construction.
- Exploitation of forest resources beyond their production capacity ecosystem degradation
- Extinction of plant and animal species in forest by fragmented into small patches.

Consequences of forest ecosystem degradation

- Survival of tribal people becomes difficult – they depend upon forest resources for food, fuel wood and other products.
- Agricultural and Urban people do suffer from various reasons (such as fuel wood, small timber, etc. for making houses, food from agricultural areas) which in turn depend on neighboring forest ecosystems.
- Rain fall on deforested land flows directly into nearby rivers no ground water recharge
- Rapid soil erosion - agriculture is seriously affected.
- Wild animals lose their habitat - extinction of species.
- Reduction in the agricultural yield loss of bees, butterflies, moths

Conservation of forest

- Careful utilization of forest resources – alternate sources of energy instead of fuel wood.
- Afforestation - need to grow more trees than that are cut down from forests.
- Natural forests with diverse species must be protected as National Parks and Wildlife Sanctuaries.
- Scientists suggested that at least 10% of ecosystem is left as Protected areas

Centrally Sponsored Schemes (CSS)

- Green India Mission (GIM)

The National Mission for a Green India, also known as the Green India Mission, is one of the eight objectives of the National Action Plan on Climate Change. Increased forest/tree cover is one of the mission's objectives.

i) To increase forest/ tree cover.

ii) To enhance the quality of the forest

iii) Eco-restoration of scrub/shifting cultivation areas

iv) To improve/enhance eco-system services like carbon sequestration, hydrological services, and biodiversity, among others.

Forest Fire Prevention and Management Scheme (FFPMs)

This plan is focused on forest fires and the problems they raise. The major activities are:

(i) Employing fire watchers
(ii) Building and maintaining fire lines
(iii) Controlled burning
(iv) Awareness campaign
(v) Field patrolling, etc.

Forest Training School

Since 1974, the EF&CC department has had a Forest Training School (FTS) at Bethlehem Vengthlang, which is run by a DCF/DFO level officer. Originally known as the Mizoram Forest School, FERI later changed its name to the Forest Training School (FTS).

Extension Activities

The DCF/DFO-led Forest Extension Division is in charge of handling departmental communications for the conservation of forests and wildlife. Pamphlets, notebooks, slogan posters, calendars, folders, and other materials for spreading awareness were created, along with brief videos that were shared via electronic and media including Whatsapp, Facebook, and YouTube.

Conclusion:

Forests cover around 31% of the earth's land area. A 2015 study found that 23% of India's land area is covered by forests. The environment of the forest depends heavily on the trees and other plants there. It offers clean air, food, and shelter for life on the planet. Forests also support biodiversity preservation. Since they are a valuable source of raw materials, food, medicine, clothing, and raw materials, forests need to be conserved. Additionally, in addition to regulating the earth's temperature, forests protect more than 80% of the animal species and terrestrial biodiversity. They also help to prevent soil erosion. Additionally, they help a nation's socioeconomic conditions. As a result, we must be sure to protect forests and wildlife.

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GLOBAL WARMING AND ENVIRONMENTAL PROCTECTION ACT

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Abstract:

The long-term warming of Earth's surface that has been seen since the pre-industrial era (between 1850 and 1900) is a result of human activity, particularly the burning of fossil fuels, which raises the levels of heat-trapping greenhouse gases in Earth's atmosphere. Total annual global temperature rise during the Industrial Revolution has been little over 1 degree Celsius, or over 2 degrees Fahrenheit. It increased on average by 0.07 degrees Celsius (0.13 degrees Fahrenheit) per 10 years between 1880—the year that accurate recordkeeping started—and 1980. The rate of growth, however, has more than doubled since 1981: Over the past 40 years, the yearly global temperature has increased by 0.18 degrees Celsius, or 0.32 degrees Fahrenheit, every decade.

Keywords: Deforestation, Global warming, Greenhouse gas, CFC, Carbon dioxide.

Introduction:

The term "global warming" refers to the rise in global average temperatures brought due to the greenhouse effect. When sunlight heats the earth's surface, certain gases in the atmosphere function like glass in a greenhouse, trapping the heat as it radiates back into space. Earth's temperature rises as a result of the atmospheric buildup of greenhouse gases. Climate change, another name for this process, is changing the climate rapidly.

Definition of global warming

"Global warming is a gradual increase in the earth's temperature x generally due to the greenhouse effect caused by increased levels of carbon dioxide, CFCs, and other pollutants.

Global warming

The phenomenon of a slow rise in temperature close to the earth's surface is known as global warming. Over the last century or two, this tendency has been noted. The earth's climate pattern has been altered by this alteration. Although the idea of global warming is still up for debate, scientists have presented evidence to support the idea that the earth's temperature is steadily increasing.

Global warming has a number of causes that are harmful to people, plants, and animals. These factors could be a result of human activity or could be natural. Understanding the harmful effects of global warming is crucial for tackling the problems.

Causes of global warming

Following are the major causes of global warming:

Man-made causes of global warming

Deforestation

The primary source of oxygen is plants. They maintain environmental balance by absorbing carbon dioxide and exhaling oxygen. For a variety of domestic and commercial uses, forests are being destroyed. This has caused an imbalance in the environment, which has resulted in global warming.

Use of vehicles

Even over extremely short distances, using a car produces a variety of gaseous pollutants. When fossil fuels are burned in vehicles, a lot of carbon dioxide and other poisons are released into the atmosphere, raising the temperature.

Chlorofluorocarbon

Humans have been introducing CFCs into the environment through the excessive use of air conditioners and freezers, which has an impact on the ozone layer in the atmosphere. The ozone layer shields the surface of the earth from the sun's harmful ultraviolet rays. By causing the ozone layer to thin and make space for ultraviolet light, CFCs have raised the earth's temperature.

Industrial development

The onset of industrialization has resulted in a dramatic rise in earth's temperature. The earth's temperature is rising as a result of the manufacturers' damaging emissions.

The difference between 1880 and 2012, according to the Intergovernmental Panel for Climate Change, was 0.9 degrees Celsius in 2013. When compared to the pre-industrial mean temperature, the rise is 1.1 degrees Celsius.

Agriculture

Carbon dioxide and methane gas are produced during several farming processes. These raise the earth's temperature by increasing the amount of greenhouse gases in the atmosphere.

Overpopulation

More individuals breathing equals more people in the population. As a result, the atmospheric concentration of carbon dioxide, the main gas responsible for global warming, rises.

Natural causes of global warming

Volcanoes

One of the main natural causes of global warming is volcanoes. Volcanic eruptions release smoke and ash into the sky, which has an impact on the climate.

Water vapour

One sort of greenhouse gas is water vapour. More water evaporates from water bodies and stays in the atmosphere as a result of the earth's temperature rising. This process contributes to the warming of the planet.

Melting permafrost

Under the surface of the Earth, there is permafrost, which is frozen soil that has been trapped in ambient gases for a long time. It can be found in glaciers. The gases are released back into the atmosphere as the permafrost melts, raising the temperature of the planet.

Forest blazes

Forest fires and blazes produce a lot of smoke that contains carbon. Global warming results from the release of these gases into the atmosphere, which raises the earth's temperature.

Effects of global warming

Following are the major effects of global warming:

Rise in temperature

The temperature of the world has increased dramatically as a result of global warming. The earth's temperature has risen by 1 degrees since 1880. As a result, there has been an increase in glacier melting, which has raised the sea level. The consequences for coastal areas could be catastrophic.

Threats to the ecosystem

Global warming has affected the coral reefs that can lead to the loss of plant and animal lives. Increase in global temperatures has made the fragility of coral reefs even worse.

Climate change

Global warming has led to a change in climatic conditions. There are droughts at some places and floods at some. This climatic imbalance is the result of global warming.

Spread of diseases

Global warming leads to a change in the patterns of heat and humidity. This has led to the movement of mosquitoes that carry and spread diseases.

High mortality rates

Due to an increase in floods, tsunamis and other natural calamities, the average death toll usually increases. Also, such events can bring about the spread of diseases that can hamper human life.

Loss of natural habitat

A global shift in the climate leads to the loss of habitats of several plants and animals. In this case, the animals need to migrate from their natural habitat and many of them even become extinct. This is yet another major impact of global warming on biodiversity.

10 ways to stop globalwarming

Change a light

Replacing one regular light bulb with a compact fluorescent light bulb will save 150 pounds of carbon dioxide a year.

Drive less

Walk, bike, carpool or take mass transit more often. You'll save one pound of carbon dioxide for every mile you don't drive!

Recycle more

You can save 2,400 pounds of carbon dioxide per year by recycling just half of your household waste.

Check your tires

Keeping your tires inflated properly can improve your gas mileage by more than 3 percent. Every gallon of gasoline saved keeps 20 pounds of carbon dioxide out of the atmosphere.

Use less hot water

It takes a lot of energy to heat water. Use less hot water by taking shorter and cooler showers and washing your clothes in cold or warm instead of hot water (more than 500 pounds of carbon dioxide saved per year).

Avoid products with a lot of packaging

You can save 1,200 pounds of carbon dioxide if you reduce your garbage by 10 percent.

Adjust your thermostat

Moving your thermostat down just 2 degrees in winter and up 2 degrees in summer could save about 2,000 pounds of carbon dioxide a year.

Plant a tree

A single tree will absorb one ton of carbon dioxide over its lifetime.

Turn off electronic devices

Simply turning off your television, DVD player, stereo, and computer, when you're not using

Environment protection act and rules, 1986

Introduction

- The period of 1970s experienced an ascend globally in industrialization leading to degradation of the environment at a very high pace.
- The need was felt for a combined effort towards environment conservation from all over the world.
- The result of these combined efforts was The United Nations Conference on the Human Environment i.e. The Stockholm Conference, 1972 from 5 to 16 June 1972.
- In India, the Bhopal Gas Tragedy of 1984 called for urgent legislation in the field of environment.
- In this background the Parliament passed the Environment Protection Act, 1986 and the Environment Protection Rules, 1986.

Stockholm conference, 1972

- The Stockholm Conference, 1972 was held from 5th to 16th June 1972 by The United Nations Conference on the Human Environment.
- The focus of this conference was the state of the global environment and the relationship between economics, science and the environment in a political context.

- The emphasis was on solving environmental problems, but without ignoring social, economic and developmental policy factors.
- India played a very significant contributory role in this conference.
- This conference laid the foundation of Environmental Legislation in India.

Environment protection act, 1986

- The Act came into force on Nov. 19, 1986 and extends to the whole of India.
- The Act was passed to provide for the protection and improvement of environment and for matters connected there with.
- The Act gives certain powers to the Central Government to take measures for the purpose of protecting and improving the quality of the environment and to prevent environmental pollution.
- The Act is an "umbrella" legislation designed to provide a framework for Central Government coordination of the activities of various central and state authorities established under previous laws, such as the Water Act and the Air Act.

Important definitions

"Environment" includes water, air and land and the inter- relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property. [S-2(a)]

"Environmental Pollutant" means any solid, liquid or gaseous substance present in such concentration as may be, or tend to be, injurious to environment [S-2(b)]

"Environmental Pollution" means the presence in the environment of any environmental pollutant [S-2(c)]

Central government is most powerful under ep act

- **General powers of the Central Government (S-3)**

-Take all necessary measures for environment protection. -Coordinate the actions of State Governments

-Lay down standards of environment quality and pollutants. -Execute nationwide programmes.

-Restriction of areas for industries, etc.

-Inspecting industrial premises,

-Preparation of manuals, codes or guides

- The Central Government may appoint officers and entrust them with such powers and functions as it may deem fit. (S-4)

Central government is most powerful under ep act

- The Central Government is empowered to issue directions to any person, officer or any authority. (S-5)

  - Closure direction

  (with power to disconnect electricity and water supply)

- The Central Government is empowered to make rules to regulate environmental pollution on the following matters: (S-6)
    - ✓ the standards of quality of air, water or soil
    - ✓ the maximum allowable limits of pollutants
    - ✓ the procedures for the handling of hazardous substances
    - ✓ the prohibition and restriction on the location of industries
    - ✓ the procedures and safeguards for the prevention of accidents

Prevention, control, and abatement of environmental pollution under ep act, 1986

- No person/industry is allowed to pollute the environment. (S-7) Procedures and processes are laid down to control pollution. (S-9)
- Monitoring authority can carry out inspections. (S-10)
- Power to take samples (As per prescribed procedure). (S-11)
- Samples are tested in environmental laboratories. (S-12)

Stringent penalties and punishments

- Whoever contravenes the provisions of the Act- maximum punishment up to 7 years and penalty up to Rs. 1 lakh or Rs. 5000 per day for continued offence. (S-15)
- For defaulter Companies or Body Corporates- Directors or partners are prosecuted (S-16)
- This Act is also applicable to Government Departments and HOD is prosecuted (S-17)

Salient features of the act

- This Act deals with criminal jurisdiction.
- Central Government is most powerful.
- Environmental labs are established or authorised by Central Govt., State Govt., CPCB or State PCB.
- Standards are laid down by Central Govt., State Govt., CPCB or State PCB.
- Stringent penalties and punishments.
- Person having highest authority is prosecuted.
- Hazardous wastes are defined and special procedure is laid down.
- Locus standi is relaxed. Any person can file a case. This Act is also applicable to Government Department.
- This is an Umbrella Legislation.

Environment protection rules, 1986

These Rules lay down further details for implementation of the Act

- It provides standards for emission or discharge etc.
- Procedure laid down for giving direction under S-5 by Central Govt.
- Prohibition and restrictions on locations. (based on proximity to human settlement, ancient monument, biodiversity etc.)
- Procedure to take samples. When any person is filing complaint, format of notice and details about whom to serve the notice etc.

- Format of environmental lab reports.
- Format of environmental Audit.

Schedules under ep rules, 1986

- Schedule lays down the Procedures and Standards for 87 different industries (e.g. rubber, copper, iron etc.)
- Schedule II - Noise Standards
- Schedule III- Standards for Motor Vehicles
- Schedule IV- General standards for effluents, inland surface, public sewer, land of irrigation, marine coastal areas etc.

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NATURAL RESOURCES IN ENVIRONMENTAL HEALTH

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Abstract:

The relationship between natural resources and environmental health is extensively discussed in this chapter. The importance of natural resources in supporting human well-being as well as any risks they may represent to the environment and to public health are also examined. The chapter also covers the significance of sustainable management practices for preserving and safeguarding natural resources while minimizing their detrimental effects on the environment and public health. It is important to incorporate environmental health concerns into resource management techniques, as shown by the numerous case studies and examples that are provided. This chapter also addresses current trends and potential future paths for encouraging the sustainable use of natural resources to guarantee a stable and resilient world.

Keywords: natural resources, environmental health, sustainability, resource management, public health

Introduction:

Natural resources are essential parts of the ecosystems on Earth and are crucial to the continuation of life. These resources cover a vast range of things, such as energy supplies, air, water, minerals, forests, and biodiversity. However, the use and exploitation of these resources have significant negative effects on the ecosystem. In order to maintain a balance between resource use and conservation, this chapter examines the complex relationship between natural resources and environmental health and emphasises the necessity for sustainable practises. Natural resources are the elements and substances found in the natural world that people use to meet their requirements and maintain their civilisation. These resources come from the Earth's geological processes, ecosystems, and biosphere. There are several different sorts of natural resources, including:

Renewable resources

These are resources that, in a relatively short amount of time, can be replenished or replaced by natural processes. The sun's rays, the wind's energy, water's energy (hydroelectricity), forests, and agricultural crops are some examples.

Non-renewable resources

These resources have a limited supply and cannot be replenished or renewed in the course of a human lifetime. Examples include non-renewable energy sources like uranium, minerals like iron, copper, and gold, and fossil fuels like coal, oil, and natural gas.

Biological resources

Resources that come from living things, such as plants, animals, and microorganisms, are referred to as biological resources. Food, lumber, medicinal plants, and biodiversity are just a few of the many products and services they offer.

Geological resources

These resources are made up of minerals, rocks, and metals that can be found in the Earth's crust. They are employed in building, manufacturing, and the creation of energy.

Water resources

This category comprises freshwater supplies that are essential for industrial, agricultural, and human needs. Examples include rivers, lakes, and groundwater.

Resources for air

The air we breathe comes from the atmosphere, a natural resource that is necessary for maintaining life on Earth.

Energy resources

The term "energy resources" refers to the numerous energy sources that can be used by humans, such as fossil fuels, nuclear energy, renewable energy sources.

Importance of natural resources for environmental health

Biodiversity and ecosystem stability

Natural resources serve as the basis for diverse ecosystems and the linkages between various species. Biodiversity and Ecosystem Stability. By improving ecosystems' capacity to tolerate disturbances, adapt to changes, and recover from environmental shocks, biodiversity maintains ecosystems' resilience and stability. Additionally, it is critical for regulating the cycles of nutrients, pollination, insect management, and other important ecological activities.

Clean water and air

Natural resources are necessary for maintaining life, especially clean water and air. By collecting carbon dioxide and releasing oxygen through the process of photosynthesis, trees and other vegetation contribute to the air's purification. Additionally, forests serve as natural filters for the air, capturing pollutants and particulates. Similar to this, water bodies like lakes, rivers, and wetlands act as natural purification systems by filtering pollutants and preserving the quality of the water.

Temperature regulation

By collecting and storing carbon dioxide, a significant greenhouse gas that causes global warming, natural resources, in particular forests, oceans, and wetlands, help to regulate the temperature. By sequestering carbon dioxide through tree growth and delaying its release into the

atmosphere, forests serve as carbon sinks. Carbon dioxide is largely absorbed by oceans and other aquatic ecosystems, which lessens the greenhouse gas' effect on climate change.

Soil fertility and nutrient cycling

Fertile soils and the cycling of nutrients are important natural resources for sustaining agricultural output and assisting in food production. The cornerstone of plant growth, soils supply crops with vital nutrients and water. In order to preserve the fertility and health of ecosystems, decomposers and detritivores participate in natural nutrient cycling processes that help break down organic materials and recycle nutrients.

Resources used in pharmaceutical and medical production

A variety of natural resources are used to create these products. For instance, several plant species have contributed useful components that have been employed in the creation of drugs to treat a variety of diseases. The preservation of prospective sources for new medicines and the continuance of conventional medical procedures are ensured by protecting natural habitats and biodiversity.

Economic and societal value

Natural resources provide enormous economic value and sustain a variety of sectors of the economy, as well as local communities, livelihoods, and communities at large. They supply the necessary raw materials for building, generating electricity, and manufacturing. Natural resources including woods, wetlands, and coastal regions also provide leisure opportunities, tourism potential, and cultural value, all of which contribute to society's well-being.

Impacts on natural resources in the environment

Air

Air pollution brought on by car exhaust, industrial pollutants, and the combustion of fossil fuels has serious negative effects on the environment and human health. Emissions of nitrogen oxide, ozone, and particulate matter all play a role in respiratory illnesses, cardiovascular disorders, and other health concerns. Environmental protection depends on putting into practise efficient air quality control measures and switching to better energy sources.

Water

Water is a valuable resource that sustains a variety of ecosystems and human endeavours. Water quality is seriously endangered by contamination from industrial effluents, agricultural runoff, and poor waste disposal. Unsustainable water resource management has a direct impact on diseases transmitted by water, the disappearance of aquatic biodiversity, and water cycle disruptions. To ensure that everyone has access to clean water, proper wastewater treatment, conservation practises, and water source protection are crucial.

Mining and mineral extraction

These processes can have serious negative effects on the environment. Environmental problems related to mining operations frequently include deforestation, habitat degradation, soil erosion, and water contamination. Additionally, the handling and disposal of mining waste results in hazardous emissions that can be detrimental to ecosystems and human health. Mineral

extraction can have a smaller negative impact on the environment if responsible mining practices are followed, recycling is encouraged, and alternative resources are investigated.

Forests and biodiversity

Forests offer a variety of ecological functions, such as the storage of carbon dioxide, the preservation of habitat, and the control of water flow. The delicate balance of ecosystems is threatened by unsustainable logging, deforestation, and the illegal trafficking in wildlife, which can result in habitat loss, extinction of species, and changes to climate patterns. Maintaining biodiversity and reducing climate change depend on protecting forests, using sustainable forestry methods, and encouraging conservation initiatives.

Energy sources

The increased demand for energy has a big impact on the environment. The use of fossil fuels increases air pollution, greenhouse gas emissions, and global warming. It is essential to switch to renewable energy sources, such as hydroelectric, solar, and wind power, in order to lessen the environmental impact of energy production. Energy efficiency and conservation methods can also optimise resource utilisation and reduce waste.

Natural resource categories and health effects

Resources from the natural world are necessary for maintaining life and human welfare. They promote ecological processes that preserve a healthy environment and offer the raw materials required for diverse commercial operations. Natural resource exploitation, use, and depletion, however, can have a severe negative influence on the environment and public health. This section will look at several natural resources and explain how they specifically affect human health.

Resources

Water is a necessary natural resource for both human survival and the health of ecosystems. It is essential to agriculture, industry, sanitation, and community well-being as a whole. However, a number of variables can affect the standard and accessibility of water supplies, which can have a negative impact on people's health.

Health effects

Waterborne illnesses

Waterborne illnesses like cholera, typhoid, dysentery, and hepatitis A are largely brought on by contaminated water. When consumed or utilised for personal hygiene, pathogens and pollutants from industrial waste and agricultural runoff can contaminate water sources, endangering human health.

Water scarcity

Communities may experience water scarcity in areas with limited water resources, resulting in insufficient access to safe drinking water and sanitary services.

Chemical contamination

Industrial and agricultural activities have the potential to contaminate water sources with dangerous chemicals and pollutants, endangering human health through ingestion of contaminated water or food produced in contaminated soil.

Forest resources

Forests are significant ecosystems that provide several environmental and social benefits. They are in favour of soil conservation, water management, carbon sequestration, and biodiversity preservation. However, the exploitation and destruction of forests have detrimental effects on human health.

Health effects

Air Quality: By removing pollutants and releasing oxygen, forests are essential for preserving good air quality. Forest deterioration and deforestation contribute to elevated air pollution levels, which can result in respiratory conditions, cardiovascular disorders, and other health concerns.

Biodiversity is lost as a result of habitat damage and deforestation. Ecosystems may be disturbed, the supply of natural goods and medicinal plants may be reduced, and the possibility for novel medicine and treatment sources may be constrained.

Forests are essential for reducing climate change because they absorb carbon dioxide through photosynthesis. Deforestation increases greenhouse gas emissions, which has a severe impact on human health by increasing temperatures, causing more extreme weather, and disrupting agricultural output.

Mineral resources

Mineral resources encompass several substances and components that can be found in the crust of the Earth, including metals, ores, and minerals. They are necessary for the development of infrastructure, the manufacturing of consumer items, and industrial operations. However, there are health concerns associated with the mining and processing of mineral resources.

Health effects

Occupational risks include noise, harmful chemicals, dust, and physical risks for those working in the mining and mineral processing industries. These exposures have the potential to cause occupational illnesses, accidents, respiratory problems, and long-term health consequences.

Heavy metals and hazardous compounds may be released into the soil and water systems as a result of mining operations. Polluted water sources provide health dangers through the use of tainted food and water, while contaminated soil can influence agricultural growth.

Land degradation

Mining activities may result in land degradation, deforestation, and habitat damage, which may have an impact on the livelihoods and general wellbeing of nearby communities. Social and mental health issues might result from the uprooting of communities and the disturbance of traditional lifestyles.

Fossil fuels

Coal, oil, and natural gas are examples of fossil fuels, which have long served as the main sources of energy. However, their extraction, burning, and related pollutants have a considerable negative impact on the environment and human health.

Health effects

Air pollution

Pollutants such as particulate matter, nitrogen oxides, sulphur dioxide, and volatile organic compounds are released into the air when fossil fuels are burned. These pollutants contribute to indoor and outdoor air pollution, which increases the risk of respiratory infections, cardiovascular problems, and other illnesses.

Climate change

The burning of fossil fuels contributes significantly to the greenhouse gas emissions that cause climate change. Heat-related illnesses, an increase in water and foodborne illnesses, mental health issues, and sea level rise are just a few of the health repercussions of climate change, which includes rising temperatures, changing precipitation patterns, sea level rise, and extreme weather events.

Environmental disturbance

The extraction of fossil fuels has the potential to damage the environment, resulting in habitat loss, water pollution, and ecosystem disturbance. By altering the availability of clean water, food security, and the development of vector-borne diseases, these changes may have an effect on human health.

To reduce the negative effects of resource extraction and use, it is critical to be aware of these impacts and implement sustainable practises. Both the environment and human health can be safeguarded by putting into practise policies like pollution control, conservation, and sustainable land management.

Management of sustainable resources

Policy interventions

Promoting sustainable resource management requires strong laws and regulations. Governments must create legal frameworks that support ethical resource extraction, uphold environmental regulations, and reward conservation initiatives. Long-term sustainability depends on integrated approaches that take into account the social, economic, and environmental elements of resource management.

Technology and innovation

The reduction of the environmental effects of resource extraction and use is made possible in large part by technological advancements. A more sustainable future can be achieved through innovations in waste management, renewable energy, and sustainable agriculture. Additionally, advancing clean technology research and development is essential for achieving resource efficiency and environmental health.

Individual and community actions

Both individuals and communities have a duty to support the sustainable management of resources. Eco-friendly practises, waste reduction, water and energy conservation, and support for neighbourhood projects can all contribute significantly. People can be empowered to make educated decisions that prioritise environmental health through education and awareness initiatives.

Environmental health considerations in resource management

The accountable and environmentally friendly utilization of renewable resources for satisfying the needs of both present and future generations is known to as the management of resources. It involves making careful consideration and implementing strategies into action to guarantee resource conservation, protection, and equitable distribution while minimising detrimental environmental effects. Effective resource management must take into account environmental health issues in order to protect human health and welfare. We shall examine the important environmental health factors in resource management in this part.

Precautionary principle

The precautionary principle is a key strategy for managing resources that places an emphasis on adopting preventative measures in the face of uncertainty. It implies that proactive efforts should be made to prevent or minimise such harm if an activity or policy has the potential to harm human health or the environment, even if the scientific evidence is inconclusive. Decision-makers can give human health and environmental protection top priority in resource management practises by using the precautionary principle.

Risk assessment and management

In order to identify possible hazards, assess their likelihood and extent, and devise measures to reduce or eliminate risks to human health, risk assessment and management are crucial elements of resource management. To assess the health risks related to resource extraction, use, and waste disposal, this procedure include gathering and analysing data on exposure pathways, substance toxicity, and vulnerable populations. It is possible to establish suitable management strategies to safeguard human health by being aware of these dangers.

Ecosystem-based management

A strategy called ecosystem-based management acknowledges the connection between ecosystems and human well-being. It emphasises the significance of preserving the robustness and integrity of ecosystems while making sustainable use of resources. This method takes into account how ecological health affects human health. Resource managers can guarantee the provision of ecosystem services, such as clean air and water, food security, and climate management, by maintaining and restoring ecosystems.

Integrated resource management

Making judgments about resource management while taking into account other aspects, such as ecological, social, and economic ones, is known as integrated resource management. This strategy acknowledges the connection between resource usage and environmental

repercussions, which calls for interdisciplinary cooperation. Stakeholders can identify trade-offs, advance sustainable practises, and resolve potential conflicts between resource utilisation and human health protection by incorporating environmental health considerations into resource management.

Stakeholder engagement and participation

Diverse stakeholders, such as local communities, indigenous groups, business representatives, and governmental organisations, must be included in effective resource management. These stakeholders must be meaningfully involved and engaged to ensure that decisions are based on local expertise, community needs, and health considerations. Additionally, inclusive processes promote collaboration, increase openness, and trust, which improve resource management outcomes that prioritise environmental health.

Monitoring and evaluation

Environmental health considerations in resource management must include routine monitoring and evaluation. To detect potential effects and track changes over time, monitoring programmes evaluate environmental quality, human exposures, and health outcomes. In order to successfully address new environmental health hazards, decision-making processes are informed by this knowledge, which also permits the implementation of adaptive management solutions.

Policy and regulation

Resource management practises must be integrated with environmental health considerations through the use of policy and regulatory frameworks. In order to ensure sustainable resource usage, pollution control, and health protection, governments and international organisations adopt laws, rules, and standards. These regulations cover things like waste management, workplace health and safety, environmental impact studies, and air and water quality. The appropriate legal framework for directing resource management practises towards ecologically and health-conscious practises is provided by effective policy and regulatory measures.

By integrating these environmental health considerations into resource management, decision-makers can prioritize human health, protect the environment, and promote sustainable development. By adopting a holistic and precautionary approach, involving stakeholders, and implementing robust monitoring and evaluation systems, resource management practices can effectively balance resource utilization with the protection of environmental and human health.

Conclusion:

Natural resources and environmental health have a complicated and interconnected relationship. Resource use that is not sustainable endangers ecosystems, biodiversity, and human health significantly. We can ensure peaceful coexistence with nature for future generations by acknowledging this relationship, putting sustainable resource management practices into practice, and encouraging a sense of communal responsibility towards environmental health.

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ENVIRONMENTAL ORGANIZATION IN INDIA

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Abstract:

In global environment the both living and non-living items can be found in the natural environment since they develop naturally without human interference. In a significant way, human actions change the natural order of things and have frequently caused the environment to deteriorate. It is obvious what it implies to enhance a child's or family's health. Environmental health refers to how the environment around us affects our health as well as how our actions have an impact on the environment's health. We can become ill from contaminated food, drink, or air. We can harm ourselves and the earth if we are careless with how we use the air, water, and land. Our environment and health are both protected when we take action. When people realize that a health issue affects the entire community as opposed to just one individual or group, they typically take action to improve environmental health. People are more inclined to band together to effect change when a problem is shared. In order to foster a safe environment, we relate the tale of a community health organization in this chapter.

Keywords: Environment, Environmental Health, Environmental Organization.

Introduction:

As the environment has deteriorated over time, environmental organisations in India have developed. Global warming, deforestation, excessive use of fossil fuels, and destruction of the environment's natural resources are just a few of the effects that human actions have on the consequences that are already being held in the ecosystem. Over time, irresponsible human behaviour has contributed to the sudden climatic threat that is endangering the welfare of our world.

India's environmental organizations offer a wide range of services aimed at making the nation cleaner and pollution-free. The natural world, whether healthy or specific geographical area, can be referred to as the environment. The environment is mostly impacted by humans and its actions. For instance, deforestation, excessive reliance on fossil fuels, excessive mining, and poor disposal of non-biodegradable waste all have a negative impact on the ecosystem. The problem of climate change that currently threatens the future of our entire planet is mostly caused by some of these human actions. To help save the environment as we know it, a number of environmental organizations and people have emerged. In this article, we examine a few of India's leading environmental groups that are leading the charge in promoting environmental protection.

Environmental organizations

Our world isn't actually doing well, in case you missed it. And the environment should be our main priority, not finding efficient ways to help it. That is, if we are to preserve future generations as well as ourselves. Plastic waste in our oceans and deforestation are both contributing to climate change, which is already in progress. Everything is a little too much. The saddest part is that we alone are responsible for all of this; we are the primary offenders. We steadily harm ourselves by using plastics every day, felling unnecessary trees, burning fossil fuels, etc. Even if the preceding line was horrifying, there is hope; it's not all bad news. Everyone of us has the ability to change things. Realising our past errors and devising solutions to clean up the damage is what matters most.

We must find ways to protect the ecosystem, or else we will all perish along with it. Yet how can we accomplish this? What are the difficult decisions that each of us must make? Together, let's investigate some of the best ways to protect the environment with the aid of Indian environmental organisations.

Top indian environmental organizations

1. Chintan

Chintan is one of the leading environmental organisations in India, and its influence can be seen all around the country. The group makes ensuring that resources are used more sensibly and without harming the environment or the less fortunate. Its goal is to reduce consumption that is not sustainable and waste creation. Additionally, it collaborates with local governments to improve trash management, which in turn reduces environmental and air pollution. More so than other groups, marginalised communities, children and women are the main emphasis of Chintan. In essence, the organisation is focused on environmental justice and collaborates with numerous people or organisations in the community. One of the most well-known environmental groups in India, it aims to achieve sustainable production, consumption, and waste disposal.

2. Greenpeace India

This is one of the top environmental NGOs in India, and it works in over 55 other nations worldwide. It is a branch of the global environmental organisation Greenpeace in the Americas, Europe, Asia, and the Pacific.

Greenpeace India runs four distinct campaigns, namely:

- Stop climate change
- Preserving the oceans
- Sustainable agriculture
- Prevention of another nuclear catastrophe

By attacking the mechanisms that endanger our environment, the organisation takes a nonviolent, innovative approach to paving the path for a greener, more peaceful planet. Greenpeace India receives the majority of its financing (60%) from Indian contributors, the remainder (38%) from Greenpeace International-Netherlands, and only 1% from the Climate Works Foundation in the US.

In order to reduce its exposure to political interference, Greenpeace India claims that it does not accept money from companies, political parties, or other intergovernmental organisations. They may continue to be impartial in safeguarding the environment in this way.

3. Help Delhi Breathe

This non-profit environmental group was established in 2015 to assist in resolving Delhi, India's air pollution crisis. Delhi becomes one of the most polluted regions in the globe as air pollution in the city hits historic heights. The Help Delhi Breathe movement was sparked by this situation.

The organization's major objective is to raise awareness of the risks posed by these air pollution levels among city dwellers and encourage them to develop long-term solutions to the issue. The movement develops several initiatives urging people to band together and change this circumstance.

Carbon dioxide, nitrogen dioxide and sulphur dioxide are only a few of the gaseous pollutants from burning fossil fuels that contribute to Delhi's air pollution. The same gases that are causing hazardous climate change are to blame. The mission of Help Delhi Breathe is to provide accurate information to all city residents, promote clean public transport, and aid Delhi in implementing clean, renewable solar energy.

4. Clean Air Asia, India

There are additional Clean Air Asia branches in China and the Philippines in addition to this one. Since 2008, the organisation has been operating in India. Clean Air Asia's mission is to reduce air pollution in various Indian cities in order to create cleaner, more habitable cities, much like the "Help Delhi Breathe" organisation. One of India's leading environmental organisations, it is effective in changing things. They concentrate on areas where populations are at risk from air pollution, such as Delhi, and work to improve the situation.

The organization's primary activities in India include collaborating with different Indian cities to ensure the management of high-quality air. This entails offering scientific advice to city governments to help improve air quality, educate the public about cleaner air, and promote sustainable transportation. In order to assess the management readiness to implement the clean air action plans, Clean Air Asia, an organisation based in India, is currently working with more than 30 cities.

5. The Wildlife Protection Society of India

The Wildlife Protection Society of India (WPSI) began working in 1994 to tackle the severe wildlife situation in India. Belinda Wright, a photographer and filmmaker before her love of conservation took over, formed WPSI. WPSI, one of India's leading environmental organisations, collaborates with numerous government agencies to prevent poaching and the expanding illegal wildlife trade. For instance, wild tigers are frequently trafficked in India and are one of the most endangered species there.

Recently, WPSI has also focused on the problem of conflicts between people and animals and has supported numerous research initiatives. The group has a group of committed

environmentalists working to secure a greener future and a harmonious coexistence of people and nature.

6. Navdanya

Another NGO promoting environmental protection in India is Navdanya. Its goal is to support organic farming, seed saving, farmers' rights, and biodiversity conservation. Vandana Shiva, one of the most well-known environmentalists in the world, co-founded the organisation in 1984. It focuses on assisting and guiding environmental advocacy and preservation in India and elsewhere. The group, which is a component of the "Terra Madre slow food movement," is made up of a network of organic farmers and seed savers spread throughout about 16 Indian states. More than 500,000 farmers have been trained by the organisation in sustainable agriculture and food sovereignty, and 122 community-based seed banks have been established around the nation.

Navdanya also contributed to the creation of India's largest "direct marketing, fair trade organic network." The group has lobbied for "seed protection" through the Convention on Biological Diversity and has partnered with numerous grassroots organisations, citizens' movements, NGOs, and governments to oppose GMOs.

7. Toxics link

This group is made up of people who want to cleanse nature of poisons in order to achieve environmental justice. Toxics Link collects data on the many environmental poisoning sources and disseminates it to the general public. They also work to provide sustainable, healthy, and clean alternatives for India and the rest of the world.

Toxics Link develops a range of public awareness initiatives, such as film festivals, media campaigns, and educational initiatives to foster the next generation of environmentalists. Toxics Link mainly addresses the following issues:

- Chemical and health - Chemicals in products, pesticides, POPs (persistent organic pollutants), mercury in products, lead in paints, mercury in healthcare, and chemicals in products Biomedical waste, electronic waste, hazardous waste, municipal garbage, solar waste, and plastic waste are all examples of waste related to sustainability.
- The Delhi Ridge, Yamuna Manifesto, and Yamuna Elbe Green Initiatives.

This particular environmental NGO in India has goals and initiatives that have the potential to make a significant difference down the road.

8. Environics Trust

Another environmental NGO that aims to ensure environmental protection in India is this one. The fundamental objective of Environics Trust is to provide novel, scientifically supported solutions to urgent environmental issues. Environics is a phrase that refers to "the study of how the environment influences human behaviour," however this organisation has a more all-encompassing strategy. According to Environics Trust, the environment and social behaviour are mutually influencing one another.

Through a number of initiatives that centre on the communities it partners with, the organisation investigates this important subject. For instance, it works directly with marginalised groups in addition to providing research and evaluation services to both national and international agencies.

9. Hara Jeevan

In an effort to reduce pollution in Delhi, Mohit Saini founded the environmental non-profit organisation, Hara Jeevan. He founded this organisation because he was motivated by his idea that there should be a healthy balance between humans and nature. To assist in achieving this goal, Hara Jeevan works to heal the human mentality and repair the natural world. The group wants to improve Delhi's environment and raise the standard of living for people there by planting and maintaining 100 million trees by the year 2040. The pillar projects of Hara Jeevan include:

- Planting and sustenance of trees
- Waste management
- Youth education

All these are designed to help revert the rising environmental pollution in Delhi and re-establish a clean, livable environment.

10. Forrest (Forest Regeneration and Environment Sustainability Trust)

FORREST is an NGO that was founded in 2015 that works to conserve the environment, foster a closer relationship between people and nature, and advance peaceful coexistence. In order to achieve its objectives, the organisation concentrates on six key areas. These consist of:

- Habitat restoration
- Water conservation
- Education and awareness
- Biodiversity conservation
- Natural farming
- Waste management & composting

For the benefit of everyone, FORREST seeks to create natural ecosystems that include abundant flora and fauna, clean-flowing rivers, and natural wetlands. This will have ultimately resolved the global crisis brought on by climate change.

11. Fiinovation

This renowned social responsibility (CSR) consultant, who is based in Delhi, works in a variety of social development sector disciplines, with a particular emphasis on CSR and sustainability. This research-based NGO delivers proficiency across a range of industries, including

- Healthcare
- Education
- Environment
- Skill development

- Livelihood

Fiinovation is one of India's leading environmental organisations and is home to Asia's first "proposal and research lab." The laboratory concentrates its study on the aforementioned five fields. Fiinovation has recently been working on relief projects related to awareness, COVID-19, education, and the environment. According to Fiinovation, a company's operations will have an impact on the people both inside and outside the organisation. Because of this, it encourages various businesses to develop regulations that will lessen adverse consequences. For instance, businesses should make an effort to lower their carbon footprint by putting in place the required production procedures.

12. Avani

An indigenous Indian NGO called Avan works to conserve the environment throughout the nation. Avan was first founded in 1997 as the "Kumuon chapter of Barefoot College," and in 1999 it was officially registered as a not-for-profit company. Avani is a company based in the Kumaon region of the Indian state of Uttarakhand. Its guiding principles include sustainability and community empowerment. Its varied network of staff, volunteers, and interns, who breathe life into its community-based development programmes, is what allows it to flourish.

Avani is continually developing new strategies to generate a sustainable, conservation-oriented source of revenue for these communities because it is headquartered in a location where subsistence farming is the primary source of income for households. The name "Avani" of the organisation comes from a Hindu phrase that means the Earth. The organisation strives arduously to protect the environment while also giving marginalised communities sustainable empowerment, and it does so in this spirit. The sole tenets of the Avani environmental organisation are the preservation of traditional knowledge, fair commerce, and the environment.

13. Institute for Sustainable Communities (ISC):

ISC has overseen more than 115 community-based sustainability initiatives in more than 30 nations since its founding in 1991. ISC is a global organisation that is present not only in India but also in the US, Bangladesh, and China. An autonomous non-profit organisation, it works to reduce climate pollution in these nations through community-based solutions. ISC essentially collaborates with nearby businesses and communities to design and carry out eco-friendly projects that inspire communities to:

- Introducing clean water, air and land to the communities
- Resource conservation and introduction of energy efficiency measures
- Reduce the causes of climate change and adapt to the local effects of the same
- Sustainable rebuilding after disasters

The group strives to make local institutions and communities more effective in addressing social, economic, and environmental problems and coming up with long-lasting solutions. ISC is unquestionably one of India's leading environmental organisations for good reason.

Ways to help the environment

1. Improve your eco credentials with small changes

There are certainly a few easy changes you might make in your home to help protect our beautiful world. Even seemingly insignificant actions like turning off your lights, moving to reusable items (like tote bags), and switching to eco-friendly toilet paper can have a big impact. To limit your usage of plastic, get a transportable, reusable coffee cup, switch to shampoo bars, and use washable cleaning cloths rather than sponges. Making a few sustainable changes will significantly benefit the environment.

2. Reduce your waste

One of the main contributors to climate change is food waste. It is one of the best things we can do to protect the environment. Global food waste costs $1 trillion annually. That amounts to one billion. Making a shopping list and scheduling your meals for the upcoming week is one of the best strategies to avoid food wastage. This makes it easier for you to refrain from picking up extra food that you could end up tossing out since you didn't consume it. Buying locally grown food can also help cut down on transportation expenses and emissions.

3. Travel responsibly

With cars and other large vehicles making significant contributions to climate change and greenhouse emissions, transport is unquestionably one of the largest pollutants of our world. Utilise more eco-friendly transportation to lessen your carbon footprint. Cycling and walking are considerably better for the environment and for your health. It doesn't care if you step all over it; it's preferable than throwing out toxic carbon fragments. Try taking a staycation if that isn't feasible! Consider staying in your own country rather than taking a quick trip abroad.

10% of your yearly emissions can be attributed to short-haul travel. Investigate your neighbourhood instead; you never know what you might discover. Some of the most beautiful vacation destinations are frequently right in your backyard! These are just a few easy ways that YOU, yes YOU, may contribute to protecting our priceless planet. In the broad scheme of things, these might seem really insignificant and insignificant, but imagine if we all performed these? The environment would be cleaner and greener. The future of our planet and everything on it is still hopeful. Even though it might seem insurmountable, if we all work together, we can make a significant difference.

4. Conserve electricity

One of the best methods to protect the environment is to reduce energy use. Finding strategies to consume less electricity at home will benefit the environment as well as your wallet. Try these quick tips to help reduce energy consumption around your home:

- Replace your incandescent lighting with energy-saving LEDs or CFLs. Use a smart or programmable thermostat to help manage your home's temperature automatically throughout the year.

- Use intelligent power strips to help electronics shut off when not in use. When you leave your devices plugged in when not in use, they generate wasted phantom power. When you want to cut down on energy waste, smart power strips are really useful.
- When buying new home appliances such an oven, dishwasher, refrigerator, TV, water heater, dehumidifier, dryer, etc., spend your money on ENERGY STAR certified models.
- Always keep your HVAC system in good working order. Its furnace, coil, vents, and air filters should all be repaired, changed, and maintained.
- Fix air leaks at the edges of doors and windows. Techniques for air-sealing include weather stripping and caulking.
- To save electricity, lower the temperature of your freezer, refrigerator, and water heater.
- Reduce the amount of hot water used when washing dishes or clothes.
- Install solar panels or employ other renewable energy sources, such as wind turbines.
- Insulate your house to the recommended level of heat resistance ("R-Value") for the climate where you live.
- Combine using the air conditioning system and ceiling fans. Use only the ceiling fans when it's not too hot outside to maintain the ideal temperature inside your home.

5. Check your water consumption

A simple method to protect the environment at home is to use less water. Change how you drink water to save water.

- Fix leaky faucets
- Turn off the water while brushing your teeth, and only turn it on when you need to rinse.
- Invest in rain gutters and downspouts to collect
- Use rainwater.
- Shorten your shower.
- Only wash or do dishes when the machine is full.
- Aerate faucets, use sprinklers, install efficient showerheads
- Install low-flow restrictors to use water more wisely.

6. Recycle and reuse to help save the environment at home

There are many things that you can keep after using them. To help protect the environment, you can repurpose, recycle, or reuse them in numerous ways. To transform that undesirable or worthless item into a gem, all you need to do is exercise a little creativity. It's rewarding and one of the best ways to protect the environment to turn waste into beautiful items like toys, jewellery, or artwork. Additionally, it discourages you from making fresh purchases, which need a lot of resources to produce, and keeps products out of landfills and garbage cans. Craft ideas will help you unleash your creativity. Use objects you already have, like old bins, to grow succulents instead of buying new pots.

Kids also like creating new things. Therefore, think about making entertaining creative projects for your children instead of dumping things in the trash. For instance, they can make

caterpillars out of egg cartons. Make sure you are knowledgeable on what can and cannot be recycled at home in your trash cans. You can learn how to recycle particular products, such as broken gadgets, batteries, or appliances. Find the proper disposal locations or drop-off stations for the neighbourhood municipality if they cannot be recycled.

7. Choose reusable over single-use

Plastics and single-use items end up in a landfill someplace. All of these wastes have the potential to be extremely harmful to our planet, the soil, the oceans, and marine life. We must encourage the usage of reusable things if we want to protect the environment. If we stop using throwaway straws, cups, grocery bags, cutlery, and other containers, we can help the earth. Less waste will accumulate in landfills as a result of switching to reusable items and educating people on their use. That is how to stop pollution in the environment, and it greatly contributes to maintaining the safety of the earth for all living things.

8. Plant vegetables

Growing your own vegetables is a great method to protect the environment, among the many other options available. But be careful not to use pesticides or herbicides when planting your crops. This will make it easier for you to consume locally grown, fresh organic food. Avoid GMOs and use the proper seeds. The best seeds to start with are heirloom varieties. Making your own compost can give you peace of mind that the food you are feeding your family is organic and chemical-free. Utilising pesticides causes environmental destruction, including the eradication of moths, butterflies, beetles, spiders, ladybirds, and bees—all of which are essential to maintaining our diversity.

9. Use reusable or biodegradable shopping bags

Recycling plastic shopping bags is another excellent approach to protect the earth. It's not necessary to purchase a new shopping bag each time you go to Walmart. Invest in a reusable bag, such as a cloth shopping bag, that you may use each time you go shopping. Biodegradable plastic bags cannot be used. As a result, they end up in landfills when you put them in the trash. As a result, they contaminate our oceans, put marine life in peril, and get into our food supply. Try utilising reusable shopping bags to protect the environment as a result.

Biodegradable ones are also a great choice if you don't want to go the reusable route. The majority of biodegradable bags are created from sustainable resources that break down quickly. They are quickly converted by bacteria and other biological entities into water, carbon dioxide, and heat.

10. Share the knowledge and inspire others

Most environmental saboteurs lack knowledge about the facts or the best approaches to protect our environment. Make it your responsibility to inform everyone around you about the various everyday activities they may carry out at home, at the office, or in the classroom to protect the environment.

Conclusion:

Environmental organisations' primary goal is to protect the environment and improve the earth for coming generations. Candidates studying for the UPSC must be familiar with the environmental groups operating in India. Environmental organisations in India are currently trying very hard to have an impact. They are actively taking steps to raise awareness of a variety of issues, including global warming, sustainable development, the conservation of wildlife, and many others. A thorough examination of the operation and effects of these environmental groups in India is essential if you want to comprehend them better. If everyone participates, the small actions you take to motivate others could have a significant ripple effect.

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ROLE OF AN INDIVIDUAL IN THE CONSERVATION OF NATURAL RESOURCES

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Abstract:

Resources that are natural including forests, water, land, food, minerals, and energy resources are crucial to a country's economic development. The preservation of natural resources can benefit greatly from human involvement. Individuals can contribute a little effort to the conservation of these resources, which are a gift from nature to mankind. Natural resources that are essential for humans are mentioned in the description of these resources. These include natural gases, plants, animals, coal, water, and air. In accordance with this concept, people typically invest resources to gain more resources, recover from losses, and protect from resource loss. By removing forests, the land is left vulnerable to wind and water erosion. Due to ineffective farming methods, fertile soil is depleted and lost to erosion. The fuel supply is running low. Air and water are contaminated. Many resources will be depleted if they are handled irresponsibly. Renewable resources will, however, endure a lot longer if exploited properly and effectively. People may cut down on waste and use natural resources wisely by practicing conservation.

Keywords: Natural resources, environment, conservation, renewable and non-renewable resources.

Introduction:

The world's most beautiful creature in nature. The best of God's creations is nature since it never does harm to anyone unless we, as humans, make it harsh. The God who created us carefully intended for us to coexist with his other creations, especially the natural resources that their purposes for creation had damaged. For the current and future generations to survive peacefully on this planet, we as human resources should be the first and foremost to conserve all resources, both directly and indirectly. As human being, our role is to protect natural resources and environmental health for the prevention of environmental hazards.

Definition of natural resources

Natural resources are products of the earth that help sustain life and provide for human needs. Air, water, soil, metals, fuels, forests, and all such things are included in natural resources

Conservation of natural resources

Natural resource conservation is a crucial technique to save the ecosystem to survive in the present and enter a peaceful future. The contemporary way of living and technological advancement has a highly negative effect on natural resources. Natural resources like coal and oil are running out extremely quickly, and after they are gone, we will need to rely on alternative energy sources. So, it is imperative that we humans operate in a way that assures the preservation of natural resources. There are several strategies for protecting natural resources. The primary principle of conservation is to use natural resources as efficiently as possible while avoiding resource waste. Simply acting by the circumstances will ensure that little natural resources are used. For instance, walking or riding a bike can occasionally save a lot of fuel. Using public transportation (such as metro trains and city buses) can also help to save a lot of oil. Water conservation is aided by using less water while cleaning, bathing, etc.

Fuels called "fossil fuels" are made from the remnants of extinct species. Coal, natural gas, and oil are a few examples of fossil fuels. Some methods for conserving fossil fuels have previously been considered. Many nations have begun using hydropower and solar electricity as green energy sources. Water, sunshine, or wind may all be used to create electricity, which helps conserve valuable fossil resources like coal. Resources that arise naturally and cannot be created by humans are known as natural resources. Humans use natural resources for a variety of reasons, with certain adaptations. Natural resources include things like air, water, soil, metals, fuels, forests, and other similar items.

Types of natural resources

Renewable resources

These resources are plentiful and won't run out after being consumed. Among these are soil, wind, and solar energy.

Non-renewable resources

If humans fail to deploy them wisely, these resources, which only existent in little amounts, could rapidly run out. These resources include things like water, minerals, and fossil fuels.

Necessity of conservation:

The significance of protecting natural resources is to:

- Save natural resources (such as fossil fuels) for future generations.
- Avoid using natural resources for human consumption.
- Sharing of natural resources equally among all people
- Stop the loss of forests.
- Utilise renewable energy sources to reduce costs rather than fossil fuels.
- Reducing air pollution
- Increase the development of alternative energy sources Contribute to the improvement of human and animal health

Conservation of natural resources

The preservation of these resources ensures that they will be around for future generations. It involves preserving species variety, genetic diversity, ecosystem diversity, and environmental services including nitrogen cycling. While conservation and preservation both pertain to the preservation of nature, they approach this goal in different ways. While preservation refers to keeping nature free from human use, conservation aims to allow humans to utilize it sustainably for things like hunting, logging, or mining.

- Because natural resources are being depleted so quickly, conservation of these resources is crucial.
- Pollution, population growth, expanding urbanization, and industrialization all seriously damage natural resources.
- Depletion of natural resources has negative consequences on the environment, which in turn hurts human life.
- The conservation of natural resources is crucial since non-renewable resources, such as fossil fuels (coal, petroleum, etc.), are depleting at an accelerated rate and won't replenish for thousands of years after they are spent.

Objectives

Limiting environmental deterioration is referred to as "environment protection," which also encompasses resource conservation. Its three key goals are as follows:

1. To avoid harm and suffering
2. To increase output and enjoyment
3. To keep the environment in balance.

Ways to conserve natural resources

1. Taking public transportation and favouring short-distance cycling or walking.
2. By not using plastic bags or other items made of plastic.
3. Making use of kitchen garbage as manure rather than fertilizers.
4. Reducing the use of fuels like coal, gasoline, etc.
5. Energy conservation at home (water and electricity).
6. Making use of recyclable plastics.

Sustainable use of natural resources

A practice known as sustainable use of natural resources allows people to utilize the resources at their disposal without harming the environment. Sustainable usage is distinct from conservation, which focuses on protecting or preserving what already exists rather than promoting expansion.

The goal of sustainable use is to guarantee that we have access to enough natural resources. Sustainable use entails leaving enough for others to utilize as well and not taking more than we require.

There are numerous instances of how natural resources are used sustainably.

Reforestation

A significant majority of the trees planted by the community in the case of community reforestation are young seedlings, indicating that they will eventually mature into mature trees. In addition to offering homes for birds and other creatures, mature trees can also decrease cities' heat indexes.

Sun

A natural resource that can be used to generate sustainable energy is the sun.

Water

Farmers can irrigate their crops using an aquifer in their region when using water resources sustainably. As a result, people can grow crops without being concerned about their water requirements. They might instead concentrate on raising crops that will do well in the marketplace.

Biodiversity conservation

The term "biodiversity" often refers to the abundance of species. It may be described as the species diversity in a given region. For the harmony of nature, biodiversity must be preserved. Based on the location of the conservation, we may distinguish between two forms of conservation.

- *In-situ* conservation
- *Ex-situ* conservation

Environmental science has several conservation methods. These fall within the two groups that are listed above. Typically, a Latin term, in-situ. Ex denotes outside, whereas in implies within. A method of conservation called in situ involves preserving a species in its natural habitat. Ex situ, on the other hand, refers to the sort of conservation when we keep any species away from where it normally lives.

***In-situ* conservation**

In-situ conservation involves preserving a specific species in its native environment. On-site conservation of genetic resources is another name for it. Compared to *Ex-situ* conservation, it has several benefits. For conservation, no cutting-edge technology is needed. It is also economical because we are storing any species in its native environment. Additionally, doing research in an *In-situ* setting is feasible. Additionally, it is flexible. National parks and wildlife sanctuaries are two examples of *In-situ* conservation.

***Ex-situ* conservation**

Ex-situ conservation refers to the preservation of a species away from its natural habitat. In other words, it refers to the method of conservation in which we protect a certain species away from its natural environment. It aids in the preservation of endangered species. In *Ex-situ* conservation, we can transport a certain species to a location with the right natural resources for its preservation. Examples of *Ex-situ* conservation include zoos, aquariums, zoological parks, and botanical gardens.

Ex-situ conversions have the advantage of being a low-maintenance method for increasing the reproduction of vulnerable species.

Role of an individual in the conservation of natural resources

Numerous natural resources, including forests, water, soil, food, mineral, and energy resources, are essential to a country's prosperity. While national and international conservation efforts are in progress, small-scale activities for the preservation of natural resources can have a big impact. There are various things people can do to support resource conservation. Just a few examples include turning off lights, fixing leaking faucets, and recycling materials like paper, aluminium cans, glass, and plastic. Utilizing public transit, carpooling, walking, biking, and running errands all contribute to fuel efficiency and a reduction in the number of pollutants discharged into the environment. People can plant trees to provide homes for squirrels and birds. One can bring their reusable bags to the grocery shop. Additionally, instead of utilizing throwaway containers, customers can take their reusable water bottles and coffee mugs. If every one of us made even tiny efforts to conserve, it would add up to a significant conservation effort.

I. Conserve water

- Avoid running the water while brushing, shaving, washing, or taking a bath.
- Inspect pipes and toilets for water leaks, and fix them right away. 640 liters of water will be wasted per month due to a tiny pinhole leak.
- To increase watering effectiveness and decrease evaporation, use sprinkler irrigation and drip irrigation. Install a simple system to collect rainwater and typically wasted water from sinks, clothes washers, bathtubs, and other sources so that it can be used to irrigate plants.
- Construct a rainwater collection system for the home. This is being done even by the Indian President.

II. Conserve energy

- When not in use, turn off lights, fans, and other appliances.
- Seek out as much heat from natural sources as can. If it's a sunny day, dry the garments in the sun as opposed to a dryer.
- Cook your meals using a solar cooker on sunny days to make them more nutrient-dense and lower the LPG costs.
- Grow climbers and deciduous trees in the correct locations around home to provide shade, a pleasant wind, and relief from the extreme summer heat. Electricity costs for air conditioners and coolers will be eliminated as a result.

III. Protect the soil

- As far as possible, avoid uprooting the trees when building the house. Plant a quick-growing natural ground cover in the disturbed areas.
- Compost your kitchen trash and use it in flower pots or kitchen garden. Avoid irrigating the plants with powerful water flows as this would wash the soil away.

- If you are the owner of agricultural land, avoid over-irrigating it without adequate drainage to avoid salinization and waterlogging.
- Use mixed cropping to prevent the depletion of some specific soil nutrients.

IV.Promote Sustainable Agriculture

- Don't throw away food. Take all the food to can. Utilize fewer insecticides.
- Use organic fertilizers primarily for fertilizing your crop.
- Consume seasonal and local vegetables. Energy used for storage, transportation, and preservation is greatly reduced. Combine horticulture with biological control techniques to get rid of pests.

V. Conservation of forests

Use non-timber goods, plant more trees, manage grass growth, use as little paper and fuel as possible, and avoid clearing the forest to build roads.

VI. Conservation of food resources

Prepare the necessary quantity of food, then donate it to those in need. Avoid keeping excess food grains in storage and keep pests away from them.

Groups for conservation

Conservation activities involve businesses, international organizations, and certain governments. The UN promotes the establishment of national parks all around the world. To increase awareness of water conservation, the UN also created World Water Day.

Governments pass legislation outlining the proper use of land as well as the locations that should be preserved as parks and wildlife refuges. Along with enforcing these rules, governments also require factories to build pollution-control equipment to safeguard the environment. Last but not least, governments frequently offer incentives for resource conservation, the employment of clean technology, and the recycling of obsolete items.

There are numerous global organizations devoted to conservation. Members advocate for causes like preserving rainforests, defending endangered species, and purifying the air. Governments and commercial organizations joined to form the International Union for the Conservation of Nature (IUCN) in 1948. The IUCN aims to preserve environments and wildlife. The committee suggested a global conservation strategy in 1980. Many governments have created their conservation plans based on the IUCN model. The IUCN also keeps track of the condition of vulnerable national parks and preserves, endangered wildlife, and other environmental conditions around the globe.

Ways for individuals to save energy

It is crucial for individuals to actively participate in energy conservation as the world's energy demand rises. Here are some ideas for how people might save energy:

- Use energy-efficient appliances: Making the switch to more energy-efficient equipment, such as LED lamps, refrigerators with the Energy Star label, and washing machines, will help you use less energy overall.

- Reduce, reuse, recycle: These three actions can help you conserve energy and resources.
- Reduce your consumption of power by taking easy measures like disconnecting chargers when not in use, turning off lights and devices when not in use, and relying on natural light instead of artificial lighting.
- Improved insulation can help to save money on heating and cooling expenses for the house.
- Drive less: Consumers may save energy and cut greenhouse gas emissions by taking the bus, carpooling, bicycling, or walking instead of driving.
- Utilise renewable energy: To lessen reliance on non-renewable energy sources, think about investing in renewable energy sources like solar or wind power.
- Inform others: Share knowledge and motivate others to engage in energy conservation.

Law enforcement for conservation

The Indian constitution contains several acts and regulations pertaining to the preservation of natural resources. Among them are the following:

- Wildlife Protection Act, first passed in 1972 and revised in 1991
- Forest (Conservation) Act, passed in 1980
- National Forest Policy, adopted in 1988

Role of nurse in conservation of natural resources

- The noble profession of nurse fulfils the original intent of its formation.
- Similar to the profession, it aids in saving the lives of the suffering patients in life-threatening situations.
- The most important component of saving lives is nursing care. The nurse's responsibility to protect the environment is equally vital.
- The reason should nurses participate in raising awareness about preserving and maintaining the natural resources while imparting health education on specific steps to lead a life of good health.
- Therefore, through their services in health education, nurses should be included in the management of protecting natural resources.
- Make a role play for school children about the value of protecting nature resources because they are the generation that will survive in our world in the future.
- Make a health presentation on the utilisation of natural resources since they enable one of life's most critical processes, respiration (the exchange of CO2 and O_2), which allows every one of us to breathe.
- Consider including the issue of resource conservation in your nursing studies so that you may advance the survival of the globe from the start.

Conclusion:

The next generation will require the protection of natural resources. Our responsibility is to protect them for the future. The preservation of biodiversity is crucial for future generations. Natural resource preservation is crucial to preserving the ecology and long-term viability of these

resources for our coming generations. According to the notion of sustainable development, we should use our resources wisely so that they can be preserved for future generations.

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UTILIZATION OF WATER RESOURCES IN ENVIRONMENT HEALTH

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Abstract:

Water information is fundamental to national and local economic well-being, protection of life and property, and effective management of the Nation's water resources. The USGS works with partners to monitor, assess, conduct targeted research, and deliver information on a wide range of water resources and conditions including streamflow, groundwater, water quality, and water use and availability. Water is one of the natural resources, which are found in an adequate amount. It is an essential source for the existence of life on the planet earth. It is widely used for various purposes such as drinking, washing, bathing, cleaning, cooking, irrigation, and other industrial and domestic uses. Environmental health is a discipline that examines human health effects from exposures to harmful agents in the environment. The environment may include the outdoors, home, workplace, or public buildings

Keywords: streamflow, irrigation, water quality

Introduction:

Water resources are used for agricultural, industrial, domestic, recreational, and environmental activities. Majority of the uses require fresh water. However, about 97 percent of water found on the earth is salt water and only three percent is fresh water.

Nowadays, our country's economy is constantly rising. In the process of economic growth, our country's industry's demand for water resources is also increasing. However, in the process of industrial water use, there are many unreasonable water consumption situations.

A large amount of industrial waste water and sewage are discharged into the river, causing certain damage to the quality of water resources. This situation not only damages the environment, but also makes the water resources unusable. Therefore, when the industry discharges the sewage, the sewage needs to be treated so as not to damage the water quality of the river. In the use of water resources, it is necessary to implement scientific methods to enable sustainable exploitation of water resources.

Importance of water resources in the environment

Water-related ecosystems including lakes, rivers, wetlands and groundwater – supply water and food to billions of people, provide unique habitats for many plants and animals and protect us from droughts and floods. Water-related ecosystems possess enormous biological, social, educational and economic values.

Water is essential for crop production. For the production of crops, freshwater resources are widely used in India. Water is important for the growth of plants throughout their life in massive quantities. Artificial irrigation of water is done through the use of water resources. amount, timing and intensity rates are largely affected. It impacts the flux and storage of water in surface and subsurface reservoirs.

Issue of water contamination

Industries use of fresh water –let out contaminated warm water which is harmful for ecosystems.

Run offs from agricultural fertilizers into nearby water bodies cause "Eutrophication" – Presence of algae blooms whose decay robs the water of oxygen.

Domestic sewage let into water causing a range of diseases –Typhoid, Food poisoning and Hepatitis. Almost 25% of the world population affected by water contamination causing 5 million deaths a year.

Sources of water pollution

Water is sometimes referred to as the universal solvent, as it dissolves more substances than any other liquid. However, this ability means that water is easily prone to pollution. Below are just some of the many ways that water pollution can occur.

Sewage and wastewater

After being used, water becomes wastewater. Wastewater can be domestic, such as water from toilets, sinks, or showers, or from commercial, agricultural, or industrial use. Wastewater also refers to rainwater that washes oil, grease, road salt, debris, or chemicals from the ground into waterways.

The UN estimates that 80% of waste water returns to the ecosystem without being treated or reused. In 2017, the UN found that 2 billion people worldwide did not have access to facilities such as toilets or latrines. The organization also discovered that 673 million people openly defecate outside.

Agriculture

The agriculture industry is one of the biggest consumers of fresh water. In the U.S., it is responsible for around 80% of the nation's water consumption. Agriculture is also the main source of pollution in rivers and streams in the U.S.

One way that agriculture causes water pollution is through rainwater. When it rains, pollutants, such as fertilizers, animal waste, and pesticides get washed from farms into waterways, contaminating the water.

Contaminates from agriculture usually contain high amounts of phosphorous and nitrogen, which encourage the growth of algal blooms. These blooms produce toxins that kill fish, seabirds, and marine mammals, as well as harming humans.

Additionally, when these algal blooms die, bacteria produced as the algae decompose use up oxygen in the water. This lack of oxygen causes "dead zones" in the water where fish cannot live.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) estimat that there are roughly2,45,000 square kilometers of dead zones globally.

Plastics and garbage

Approximately we produce 1.4 billion tons trusted sources of waste each year. Of this annual waste, 10% comprise plastics. Due to the widespread use of plastics, experts estimate that 4.8–12.7 million tons of waste enter the ocean each year. Plastic and garbage can enter the water in many ways:

- debris falling off ships
- trash blowing into the ocean from landfills
- garbage swept into the sea via rivers from people discarding used items such as food packages
- people throwing their trash on to the beach

Once in the water, plastic and garbage can harm marine life and human health. Fish may eat trash, mistaking it for food, and end up dying.

As plastic slowly breaks apart, microplastics form. These are small fragments of plastic that are less than 5 millimeters in size. Fish may consume these microplastics, which may then be eaten by humans.

The UN state that plastic debris in the ocean causes the deaths of over a million seabirds each year. Plastic debris is also responsible for the deaths of more than 100,000 marine mammals annually.

Oil

Oil pollution can occur when oil tankers spill their cargo. However, oil can also enter the sea via factories, farms, and cities, as well as via the shipping industry.

Radioactive waste

Radioactive waste can endure in the environment for thousands of years, making safe disposal difficult. If improperly disposed of, it can enter the water, making it hazardous to humans, marine life, and the environment.

Fracking

Fracking is the process of extracting oil or natural gas from rock. The technique uses large amounts of water and chemicals at high pressure to crack the rock. The fluid created by fracking contains contaminants that can pollute underground water supplies.

Water pollution and human health

The following are some negatives ways that water pollution can directly affect human health.

Ingesting microplastics

A person may ingest microplastics via drinking water or through eating contaminated seafood. At Tokyo Bay in 2016, scientists examined 64 anchovies for microplastic consumption -77% trusted source had microplastics in their digestive systems. People have also discovered them within salt, beer, and other food items.

Studies show microplastics may cause oxidative stress inflammatory reactions, and metabolic disorders in humans. However, further research is needed to confirm these effects.

Consuming water contaminated by sewage

The WHO note that, globally, around 2 billion trusted soirce Source people use a drinking water source with fecal contaminants. Contaminated water can harbor bacteria, such as those responsible for diarrhea, cholera, dysentery, typhoid, hepatitis a and polio.

According to the UN, every year approximately 297000, children under five die from diseases linked to poor sanitation, poor hygiene, or unsafe drinking water.

Drinking water containing chemical waste

Chemical pollutants, such as pesticides, fertilizers, and heavy metals can cause serious health problems if ingested. In 2014 residents in Flint, Michigan, experienced water contamination due to inadequate testing and treatment of their water supply. The contaminated water caused rashes, hair loss, and itchy skin. Lead levels in the bloodstream of children who drank the water doubled.

A person who ingests chemical toxins in their water can be risk at risk of.

- cancer
- hormone disruption
- altered brain function
- Damage trusted source to immune and reproductive systems
- cardiovascular and kidney problems

Swimming in contaminated water can also trigger:

1. rashes
2. Pink eye
3. respiratory infections
4. hepatitis

Combatting water pollution

A person who wishes to reduce water pollution can help by:

i. Reducing plastic usage and recycling plastics when possible
ii. Disposing of household chemicals properly
iii. Keeping up with the maintenance of their vehicle to ensure it is not leaking harmful substances
iv. Avoiding using pesticides
v. Making sure to clean up dog waste
vi. Making sustainable choices regarding food and drinks
vii. Considering going vegan or vegetarian.

Conclusion:

Water pollution is a serious environmental issue that can be caused by many contaminants. Human health can be affected by consuming, entering, or washing in polluted water. There are various ways to help to limit water pollution.

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SUSTAINABLE CONSERVATION OF NATURAL RESOURCES

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Abstract:

Numerous natural resources, including forests, water, soil, food, mineral, and energy resources, are essential to a countries good fortune. While national and international conservation efforts are under progress, individual efforts for the preservation of natural resources can have a big impact.

Keywords: Role, Individual, Conservation, Natural Resources

Introduction:

A resource is anything that humans may utilize to fulfil their needs and desires, and a natural resource is one that can be obtained directly from nature. Natural resources are defined as "resources that exist without the actions of humanity" in a straightforward manner. Natural resources are defined as "stocks of materials that exist in the natural environment that are both scarce and economically useful in production or consumption, either in their raw state or after a minimal amount of processing, according to WTR, 2010".

Ramade (1984) defined a resource as a type of energy or material that is necessary for the survival of species, populations, and ecosystems. Natural resources refer to the entirety of ecological factors including energy, matter, space, time, and diversity. Resources cannot literally refer to things or substances; rather, they refer to the function or activity that a thing or substance may do to achieve a specific goal, like sating a need. Resources are therefore tools for achieving specific goals. We only regard a product or substance to be a resource if it satisfies our requirements because the component of fulfilment is so crucial.

Natural Resources are the many goods and services that nature provides that are necessary for life to exist on this planet. Natural resources include things like water, air, soil, minerals, coal, forests, agriculture, and wildlife. Any substance used or necessary to maintain life or a means of subsistence is referred to as a source. In other words, resources are all those needs that communities, populations, and organisms have that tend to promote energy accumulation through increased availability. Resources include things like air to breathe, water to drink, land to live on and grow food, forests to make wood and paper from, ores for metals like iron, copper, and aluminium, and coal, oil, and natural gas to make energy.

Types of natural resources

Natural resources come in a wide range of locations, quantities, and qualities. While some of the resources are necessary for survival, others serve more as societal needs. The various categories of natural resources include the following:

1. Considering the point of origin

Biotic resources are those that are derived from living things and organic matter. These include the resources that can be gathered from forests, animals, and microbes. Since they are made from decomposed organic material, biotic natural resources also include fossil fuels like coal and petroleum, among others. Abiotic resources: these resources originate from inorganic, non-living matter. Land, clean water, air, and heavy metals (gold, iron, copper, silver, etc.) are some of these resources.

2. According to their developmental stage

Potential resources are those that already exist in a region and might be utilized later. For instance, until the petroleum is actually extracted from sedimentary rocks and used, it is just a prospective resource.

Actual resources are those that have undergone an assessment, had their quantity and quality determined, and are now in use. Technology is a requirement for the development of actual resources.

Reserve resources are the portion of an actual resource that can be profitably produced in the future. Stock resources are those that have been examined but cannot be utilized because of a lack of technology. Hydrogen is a prime example of a stock resource.

3. Based on their distribution or ownership

Individual resources are those that are privately owned by individuals. It includes farmland, urban property such as houses, plots, and other buildings, plantations, pasture fields, ponds, wells, and so on.

Community resources are those that are available to all members of the community, such as public parks, picnic spaces, playgrounds, and burial and burying grounds in rural areas as well as village ponds, grazing grounds, and burial grounds.

National resources, resources that belong to the nation as a whole are referred to as national resources since the government is legally allowed to take possession of even private property for the sake of the public. Examples include all minerals, water resources, forests, wildlife, land inside political boundaries, and the ocean up to 12 nautical miles offshore. International resources are freely accessible to all nations and know no borders. Beyond 200 kilometers of the Exclusive Economic Zone, which is part of the open ocean, it also includes sunshine, air, and ocean resources.

4. Based on their usefulness: Natural resources include things like land, water, food, energy, forests, and other resources.

5. Based on accessibility or exhaustibility

Inexhaustible resources: resources that cannot be consumed by human consumption are said to be inexhaustible. As an illustration, consider the power of the sun, the wind, the rain, the tides, hydropower, atomic energy, etc.

Exhaustible resources: Due to their limited availability on earth, they are likely to run out if continuously used. There are renewable and non-renewable forms of exhaustible resources.

1. Non-renewable resources: they can only be replaced after a very long period or cannot be recycled. As an example, consider biological species, minerals, fossil fuels, etc.

2. Renewable resources: These are resources that can be replenished and replicated through physical, chemical, or mechanical processes. Examples include: water, soil fertility, wild animals, aquatic life, humans, etc.

Effects of resource depletion

1. Air pollution
2. Effects on health
3. Climate change
4. Forestry loss
5. Plant and animal extinction
6. Mineral and element depletion
7. A lack of water
8. Oil scarcities
9. A lack of petrol
10. Affects the economy

Role of an individual

Forests, water, land, food, minerals, and energy resources are examples of natural resources that are crucial to a country's economy and development. Humans can contribute significantly to the preservation of natural resources. These resources, which are a gift from nature to humans, can be conserved with a little aid from individuals.

Below is a basic explanation of what each person may do to protect various kinds of natural resources:

Roles in water conservation

- Irrigate lawns, plants, and crops in the evening to reduce evaporation losses because applying water during the day will result in more water loss due to a higher rate of evaporation.
- By utilising the right amount of water in washing machines, dishwashers, and other household appliances, you may increase water efficiency.
- Install toilets with low water use that require fewer flushes.
- Inspect pipes and toilets for water leaks, and fix them right away.
- Don't leave the water flowing while the faucets are off.
- Use recycled washing-machine water for gardening.
- Setting up a rainwater collection system to store water for later use.

Ways for individuals to save water

1. Fix leaks: Leaks, regardless of how little, can waste a lot of water. Look for leaks in your faucets, pipelines, and toilets and fix them right away.

2. Install water-efficient appliances: Upgrading to water-efficient equipment will help you use less water. Examples include low-flow toilets, showerheads, and washing machines.

3. Use effective irrigation techniques. Watering plants or lawns early in the morning or late in the evening will reduce evaporation. Driveways and pavements can be cleaned without a hose by using a broom.

4. Shorten the shower time use: may save a lot of water by taking shorter showers.

5. Use drought-tolerant plants: Select drought-tolerant plants for your landscaping because they need less water and upkeep.

6. Collect rainwater. Rainwater can be collected and stored in a tank or barrel for use in outside activities like watering plants.

7. Use caution: Use caution while using water for routine tasks like cleaning dishes, brushing your teeth, and doing laundry.

Ways for individuals to save energy

1. Use energy-efficient appliances: Switching to energy-efficient appliances will help you use less energy. Examples include LED lightbulbs, refrigerators with the Energy Star label, and washing machines.

2. Reduce, reuse, recycle: These three practices can help you conserve energy and materials.

3. Use less electricity: Can save energy by using natural light instead of artificial light, unplugging chargers when they're not in use, and turning off lights and electronics when they're not in use.

4. Increase insulation: Home's insulation can be improved, which will help you spend less on heating and cooling.

5. Drive less: Driving less can save energy and lower greenhouse gas emissions than taking the bus, carpooling, biking, or walking.

6. Use renewable energy: To lessen reliance on non-renewable energy sources, think about investing in renewable energy sources like solar or wind power.

7. **Educate General Public**: Spread knowledge and urge others to practice energy conservation.

Keep the soil healthy

- Use compost or organic manure to keep the soil fertile.
- Avoid irrigating plants with water that is flowing quickly to prevent soil erosion.
- To preserve soil, spray watering should be used.
- Create a landscape with a lot of grass to help bind the soil and prevent erosion.
- Grow trees, herbs, and ornamental plants in your garden to provide vegetative cover.
- Create compost from vegetable scraps for use in kitchen gardening.

Methods that enable individuals to preserve the health of the soil

1. Reduce tillage: Lessen soil disturbance caused by tillage, which can help with soil erosion and structure.

2. Plant cover crops, such as grasses or clover, to aid in reducing soil erosion and enhancing soil fertility.

3. Use compost: To increase soil fertility and structure and lessen the quantity of trash sent to landfills, use compost rather than chemical fertilizers.

4. Conserve water: good water management practices can assist maintain soil moisture and lessen soil erosion. These practices include lowering runoff and increasing infiltration.

5. Minimize pesticide use: Pesticides should be used sparingly because they can harm species that live in the soil and pollute the environment.

6. Encourage sustainable agriculture: Encourage sustainable agricultural practices that safeguard soil health, such as integrated pest management, crop rotation, and conservation tillage.

7. Spread knowledge and inspire people to safeguard the health of the soil.

Encourage sustainable farming

- To ensure the sustainability of agriculture, diversify cropping patterns and cultivate need-based crops.
- Keep soil fertility high
- Use fertilizers, insecticides, and other chemicals as effectively as possible throughout the cultivation and processing of agricultural products.
- Preserve grains in storage to reduce losses.
- Develop indigenous dairy breeds for environmentally friendly dairy production systems.
- Use post-harvest technologies to increase value

Techniques for promoting sustainable agriculture by individuals

A strong and resilient food system must include sustainable agriculture, and individuals are essential in spreading this practice. Individuals can support sustainable agriculture in the following ways:

1. Support local and organic farmers: Purchasing locally and organically farmed food helps farmers who practise sustainable farming methods.

2. Grow your own food: Create a vegetable garden, no matter how tiny, to learn more about sustainable farming practices and the origins of your food.

3. Buy from farmers' markets: Buying from farmers' markets is a terrific way to support regional farmers and discover sustainable farming methods.

4. Inform others: Spread the word about sustainable agriculture and nudge people in that direction.

5. Advocate for policy change: Promote conservation programmes, research funding, and educational initiatives as examples of policies that support sustainable agriculture.

6. Reduce food waste: To reduce the quantity of food that goes to waste, plan meals, shop sensibly, and store food correctly.

7. Pick products produced sustainably: When shopping for food and other items, look for products produced sustainably, such as those that bear certifications like USDA Organic or Fair Trade.

Sustainable resource use for a sustainable lifestyle

The number of resources consumed by civilization has multiplied over the past 50 years. The lifestyles of consumers in industrialized and developing nations differ significantly. In

emerging nations, urbanization has altered the way of life of the middle class, placing a greater demand on the usage of natural.

Thought to make up only 22% of the world's population, more developed countries (MDCs) use 88% of its natural resources. These countries are responsible for a major portion of the world's pollution, 73% of the energy used globally, and 85% of the world's wealth.

Less developed nations (LDCs) on the other hand, who account for 78% of the world's population yet utilize just 12% of natural resources, 27% of energy, and 15% of global GDP, are seeing moderate industrial growth.

The wealth divide between affluent and poor is very wide. The wealthy have gotten richer in today's developing world, while the poor are getting poorer overall. Unsustainable growth has resulted from this. The management of natural resources is a subject of growing international importance. A more equitable allocation of resources and income is the answer to this issue.

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ECOLOGICAL PYRAMID IN FOOD CHAIN AND FOOD WEBS

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Abstract:

Ecological pyramids are graphical representations that show how trophic relationships and energy flow are organized in a hierarchical manner within ecosystems. The dynamics of food chains and food webs, which are essential to ecological stability and the preservation of biodiversity, are better understood to these pyramids. In order to comprehend the complex interrelationships among creatures within an ecosystem, it is important to understand the basic principles and significance of ecological pyramids. Researchers can forecast future outcomes and create efficient conservation plans by researching these disturbances. In conclusion, ecologists and conservationists to fully understand the complexity of food chains and food webs, ecological pyramids are effective tools. The delicate balance of nature can be managed and preserved with the help of knowledge of the trophic interactions and energy flow within ecosystems, which promotes the sustainable coexistence of all organisms in our constantly changing environment. We may create a deeper understanding of the interconnectedness of life and work to protect the biodiversity that nourishes us all through continued research and application of ecological pyramid concepts.

Keywords: Ecological Pyramid, Food Chain, Food Webs

Introduction:

A graphic depiction of the distribution of biomass or energy throughout an ecosystem is called an ecological pyramid. The biomass is distributed based on how many distinct species are present at each trophic level. A trophic level is formed by each link or level of the food chain. At the lowest trophic level, there are autotrophs or producers. They clean up solar energy and make it available to customers or heterotrophs. Small carnivores or secondary consumers arrive at the third, followed by herbivores or prime consumers at the second. In an ecosystem, plants use solar energy to transform inorganic substances into energy-dense organic substances. Photosynthesis is the process of using the sun's energy to transform soil minerals (such as magnesium or nitrogen) into green leaves, carrots, or strawberries. Only the first step in a series of energy conversions is photosynthesis. Numerous animal species will consume the products of the process of photosynthesis. Deer-eating shrub leaves, bunnies eating carrots, or worms eating grass are a few examples.

These plant-based foods, organic substances, and energy are transported from plants to animals: These creatures reside in Lum eaten by other animals, once more transferring chemical molecules and energy from one animal to another. worm-catching birds, foxes devouring rabbits or zebras.

Ecological pyramid

The relationship between the different organisms in an ecosystem is also described using the ecological pyramid. The perfect pyramid displays who gets eaten by whom and the direction of the energy flow. In an ecological pyramid, energy moves from bottom to top, so the primary consumers—those who eat these plants—receive their energy from the autotrophs, who are also the primary producers. The energy is then transferred to the secondary consumers, who eat the main consumers, at the following stage. The above diagram is completed with this hierarchical structure.

Food chain

The flow of energy in an ecosystem is a one-way process. The sequence of organisms through which the energy flows, is known as the food chain.

Food web

A food web can be defined as a network of food chains which are interconnected at various tropic levels, so as to form a number of feeding connections amongst different organisms of a biotic community. It's also known as a consumer-resource system.

Types of Ecological Pyramid

There are three different types of ecological pyramids. These are listed below:

- **Pyramid of Numbers**
- **Pyramid of Biomass**
- **Pyramid of Energy**

Pyramid of Numbers

The number of creatures present at each trophic level, which constitutes that level for the pyramid, is taken into account in this ecological pyramid. Going higher up the pyramid results in a decrease in the number of organisms. The producers at the bottom of the ecological pyramid are those who are most numerous and hence make up its base.

Pyramid of Biomass

This ecological pyramid builds up the pyramid by taking into account the amount of biomass produced at each trophic level. With the exception of rare circumstances, such as marine ecology, where there is fewer phytoplankton than the dependent zooplankton, this pyramid is often upright. The highest degree of biomass in this pyramid is found in the producers or autotrophs. Primary consumers at the next level have less biomass than producers, while secondary consumers have less biomass than primary consumers. The level of the pyramid with the least biomass is therefore found at the top.

Pyramid of Energy

This pyramid illustrates how energy moves from producers to consumers in that direction. Since the energy flow within a food chain is always unidirectional, the pyramid is

always in an upright position. The production level, consumer level, and decomposer level are the three levels of the traditional energy pyramid. In an ecological pyramid, energy moves from bottom to top, so the primary consumers—those who eat these plants—receive their energy from the autotrophs, who are also the primary producers.

The energy is then transferred to the secondary consumers, who eat the main consumers, at the following stage. The green plants that employ photosynthesis to make their own food are found at the base of the pyramid, at the producer level. Animals that consume the plants at the producer level make up the consumer level. The summit of the pyramid, or the decomposer level, comprises creatures that are in charge of disintegrating dead matter.

The energy pyramid displays the quantity of energy at each trophic level as well as the energy that is lost during the transition to the next level. It also depicts the energy flow across each trophic level. In plainer terms, the pyramid aids in quantifying the movement of nutrients from one organism to another within the food chain. Because the energy level only drops as it rises from one level to the next, the energy pyramid is always upright. Because some energy is wasted as heat, each trophic level has around 10 times less energy than the one before it.

Importance of the ecological pyramid

The ecological pyramid is extremely important to an ecosystem for the reasons listed below.

- An ecological pyramid aids in quantifying energy in a food chain and demonstrates how well energy is transported from one level to the next.
- This pyramid also highlights the feeding habits of the many creatures in the various ecosystems and illustrates the relationships between the various levels within it.
- The ecological pyramid also aids in reestablishing balance and monitoring the overall health and condition of an ecosystem. Additionally, it clarifies how any additional ecosystem dams can be avoided.

Limitations of the ecological pyramid

- The ecological pyramid has certain inherent drawbacks since it ignores some crucial factors. Following is a discussion of these:
- Saprophytes are overlooked and treated as inconsequential in the ecosystem by the ecological pyramid despite the fact that they are crucial to preserving the ecosystem's balance.
- The concept of climate or seasons is entirely unassumed in this pyramid, and neither are diurnal or seasonal fluctuations.
- Simple chains are a rarity in themselves, yet the ecological pyramid still applies in these situations.
- The idea of a food chain is not explained by the ecological pyramid either.
- The rate of energy transfer from one trophic level to the next is not discussed in this pyramid in any detail.
- The ecological pyramid largely ignores vital energy sources like trash and humus, despite their unrivalled significance to the ecosystem.
- The existence of the same species at several levels of a pyramid is not taken into account.

Food chains and food webs

The chain of energy from one species to another in this manner can continue a few more times, but ultimately it comes to an end. It finishes with the dismembered corpses of animals that are consumed as food or bacteria and fungi provide food for us. These creatures, also known as Decomposers consume food from deceased animals and decompose it. Simple nutrients are formed from complex organic compounds. Decomposers Because they look out for one another, perform a crucial function in this world. reducing (cleaning) a lot of dead material. There are extras with a greater diversity of decomposing organisms than 100,000. The soil receives simpler nutrients that can be used again plant life. Restarting the chain of energy transformation.

Producer

Autotrophs are organisms that make their own food, such as plants. As was previously said, autotrophs transform inorganic substances into organic substances. Because every species in the environment depends on them, they are referred to as producers.

Consumers

Heterotrophs are any organisms that cannot manufacture their own food and hence require producers. Because they rely on others, heterotrophs in an ecosystem are known as consumers: They feed by consuming other living things. There are various consumer levels. Primary consumers are species that obtain their food directly from producers, i.e., organisms that consume plants or plant-related organisms. The grasshopper is the main consumer in the illustration above. Secondary consumers are organisms that consume primary consumers. Tertiary consumers are those who get their food from secondary consumers. In the illustration above, the hawk serves as a tertiary consumer and the snake as a secondary one. Some creatures, like the squirrel, exist at various levels. The squirrel is a main consumer when it consumes acorns or fruits (which are plant products), but it is a secondary consumer when it eats insects or fledgling birds. Consumers also depend on the class bed. They can be herbivores, carnivores, omnivores, or scavengers depending on what they eat.

The previous image makes the idea of the food chain appear quite easy, but it is actually more complicated. Consider this. How many different species of cats are there? How many distinct types of food does the hawk eat, according to the Facts about Red-tailed Hawks page? There isn't simple, independent food available. ecological chains, but many interconnected chains and intricate food systems that resemble a web and hence are referred to as food webs. Discussed how energy and organic compounds are moved from one trophic level to the next in the preceding sections. The efficiency of the transfer, which would transfer 80% or more of the energy in a highly efficient transfer, was not covered. Very little energy, less than 20%, would be transported in a transfer with low efficiency. Not every animal or plant in a typical food chain is consumed by the trophic level above it. There are also parts or materials (such as beaks, shells, bones, etc.) that are not consumed. Because of this, there is inefficient transmission of matter and energy from one trophic level to the next. By measuring or sizing the energy at one trophic level and then at the following, one can determine the energy transfer. Energy is measured in terms of the clone. About 10% of the energy is transferred from one trophic level to the next. Say there

are 10,000 people who have the potential to significantly alter ecosystems. Because living beings make up a sizable percentage of every ecosystem, any activity that impacts the ecosystem is likely to also affect the species that live there.

The majority of interactions between species occur through a relationship of feeding. Using food chains is the simplest approach to illustrate these relationships. Food networks show who consumes whom in an ecosystem. In the red squirrel, a herbivore, consumes the pine tree's seeds, which are then consumed by the weasel, a carnivore. The goshawk, a top carnivore, then consumes the weasel. A portion of the chemical energy contained in the pine seeds is transferred through the red squirrel, weasel, and goshawk in this food chain. Food chains demonstrate how energy moves across an ecosystem in this way. Keep in mind that all living things constantly use energy and release it into the environment. As a result, energy is continuously lost across the entire food chain. The position of an organism along a food chain is described by ecologists using the term trophic level, also known as feeding level. The lowest, or first, trophic level is occupied by producers. Carnivores occupy the third and fourth trophic levels, while herbivores are found in the second trophic level.

Natural systems do not have food chains. They serve to illustrate basic feeding interactions. Food chains are a portion of the more intricate webs of connections that exist between species. Pine seeds are eaten by several animals. Red squirrels consume a variety of foods and are prey to many different predators. Using a food web is a more precise, but still insufficient, way to depict interactions. This depicts a number of linked food networks.

Consumers consume multiple species, making food webs extremely complicated. Because there are so many interactions, one species' susceptibility to the extinction or decline of another species is generally lessened. Complex food webs are regarded to be more stable than simple food webs because of this. To predict what might happen when a species is introduced to or withdrawn from an ecosystem, food webs are important tools. For instance, if a species is eliminated from a food chain, the species it feeds on may experience a sharp increase in population. On the other hand, a newly introduced species' population may upset the entire food chain.

Human impact on food chains and webs

Ecosystems can be significantly impacted by humans. Because living beings make up a sizable percentage of every ecosystem, any activity that impacts the ecosystem is likely to also affect the species that live there. The food chains and webs that the organisms are a part of will also be impacted if organisms.

Conclusion:

The above content that clears the ecological pyramid is one of the important things in the human ecosystem. It’s a single chart that shows the food consumption of various categories of live things. And gives a description of the various stages. Its starts at the bottom producer such as plants, herbivorous, carnivorous and ends with omnivorous. It allows us to observe the changes in the ecosystem due to several factors.

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DEFORESTATION

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Abstract:

Deforestation is conceived as a word more "physical" than "social" in policies and practices so far. But it is the time to rethink about it. At the moment, the majority of forest destruction in the globe, including India, is caused by decisions made "socially" by the power-center, or by so-called "illegal" or extra-legal actions that have grown through intricate socioeconomic and political dialectics. Even the effects of deforestation are drawing an increasing number of social controversies that have a far greater impact than their physical counterparts, such as soil erosion, biodiversity loss, and weather imbalances. Furthermore, 95 percent of the population lives in villages. As a result, there is a great reliance on the forest for food, grazing, firewood, fertiliser, building materials, and medicines. However, access to those forest resources is limited by many forest laws with colonial legacies that give rise to shady practises and incite deforestation, which are largely found in the district.

Keywords: Agriculture, Urbanization, Desertification, Soil Erosion, Bio-diversity.

Deforestation:

"Deforestation is changing our climate, harming people and the natural world. We must, and can reverse this trend." – Jane Goodall.

Introduction:

Deforestation refers to the removal of forests and trees from a terrain. This may be done for a variety of purposes, including clearing land for agriculture or other land uses like harvesting for wood resources. Deforestation is a pervasive issue that exists all over the world and has existed for a long time, despite the fact that we may not see or hear about it frequently.

True, there are many trees on the planet; in fact, forests encompass one-quarter of all land areas; but the issue is the rate at which they are harvested. Humans are currently destroying forests at a rate of 36 football fields per minute. I believe that deforestation has negative consequences that can only be minimised by taking the correct actions at the right time.

A sustainable future entails making the world a better and safer environment for everyone while not eliminating opportunities for future generations.

Definition

The Food and Agriculture Organization (FAO, 1993) of the United Nations defines deforestation as 'change of land use with depletion of tree cover to less than 10 per cent.
Deforestation is the clearing of large tracts of forest for the sake of timber production, subsistence crop planting, or grazing.

According to the definition used in FAO's Global Forest Resources Assessment (FRA), deforestation is "the conversion of forest to other land use independently of whether human-induced or not".

Causes

A. Minning and fuel: The everincreasing population has let to increase in requirement of non-renewable energy.

B. Climate: Forest loss is both a cause and an effect of global warming. It can harm the forest by causing forest fires and drying out tropical forests.

C. Urbanization: With the increase in population, it has become necessary to develop a great number of buildings.

D. Agricultural expansion: In the recent times, agricultural expansion has become a latest cause for deforestation due to ever increasing overpopulation.

E. Timber production: Over population has caused a major impact on cutting the trees for timber especially for furniture.

Effects of deforestation

Deforestation has an impact on the ecosystem and the natural cycles that govern life on Earth, as well as on human societies and the animals that rely on forests for habitat.

Natural effects

- **Soil erosion and desertification:**
  Trees and natural vegetation aid in the retention of soil. When they are removed, the nutrient-rich topsoil erodes and is readily washed or blown away by severe rains or wind. Rough, sandy particles that cannot retain water are left behind, rendering the ground unfit for crop cultivation and eventually turning it into a desert. Because trees manage the water cycle, destroying them results in drier local climates, increasing the danger of desertification.
- **Climate change:**
  When forests are cut down, tremendous amounts of carbon are released into the atmosphere. Deforestation contributes for approximately 10% of anthropogenic carbon emissions. Tropical forests are under such severe threat that they have shifted from being a net carbon sink to a net source, emitting more than they can store.
- **Floods:**
  A landmark **study published in Global Change Biology in 2007** found evidence from around the globe that deforestation increases the frequency of flooding events as well as making the impacts more severe — increasing the length of floods, the number of people

displaced and killed and the physical damage caused. Various further studies have also revealed the different ways that deforestation increases floods. For example, a 2012 study published in Water Resources Research on deforestation in Canada found that felling large areas of forest in snowy regions can double or even quadruple the number of large floods around the streams and rivers that pass through those forests by exposing snow to sunlight and making it melt faster. A 2022 study published by PNAS found that coastal cities in West Africa are experiencing more frequent thunderstorms and flash flooding due to deforestation, which alters the local climate.

Health effects

Deforestation has a number of detrimental effects on public health. Forest clearing has fragmented wildlife habitat, increasing the spread of new infections from wildlife to humans. According to the World Wildlife Fund, the loss of forest threatens future medical resources. Deforestation raises the risk of death by contributing to and increasing the effects of climate change, such as floods, particularly in areas of the world that are more sensitive to extreme weather. When we lose forests, we also lose a source of more direct health benefits such as improved mental and physical well-being and cleaner air.

- **Food insecurity:**

  Forests supply food for millions of people and fuel for 2.4 billion people, primarily in underdeveloped countries. Forests are an important component of food production beyond their borders because they maintain soil quality, regulate climate, and provide habitat and food for a varied range of species. All of these advantages are jeopardised by deforestation, which also contributes to the strain on world food supplies caused by climate change.Effects of Deforestation on Biodiversity
- **Habitat loss:**

  Forests are home to a wide range of ecosystems, including trees, plants, animals, insects, microbes, and carbon-sequestering fungi. This habitat is fragmented and degraded as a result of deforestation, diminishing or eliminating its capacity to support other species.
- **Wildlife extinction:**

  Many forest-dwelling species struggle to thrive in the patches of forest that remain when their habitat is destroyed. Smaller regions of habitat can only support a species' smaller populations, limiting its gene pool and making them more vulnerable to hunting, poaching, and predators. Because some species are restricted to specific forest locations, they are vulnerable to extinction if their habitat is lost.
- **Acidic oceans:**

  Carbon dioxide in the atmosphere dissolves into the oceans, lowering the pH and causing acidification. Because forests are such significant carbon sinks, deforestation causes more carbon dioxide to end up in the oceans because less is absorbed by trees.

Types of deforestation

1. **Clear-cutting deforestation**

- Clear-cutting is the removal of all trees from a location in order to grow a fresh, even-aged stand of timber.
- The practice is subject to much criticism. Opponents cite soil and water degradation, ugly denuding of landscapes and other damages.
- Nonetheless, it is preferred since it is the most cost-effective method of collecting trees.

2. **Slash-and-burn deforestation**

- Another type of deforestation is slash-and-burn. This method is used by several indigenous peoples in the tropics.
- A forest area is cleaned by felling trees and burning the wood. Crops are subsequently planted in the newly formed space, and the land is farmed for several years.
- The land eventually becomes unproductive, the region is abandoned, and a new section of forest is cut down. It is a sort of nomadic agriculture, as the name implies.

Prevenive measures to conserve forest

- Begin by hugging a tree. It’s that easy. This is the quickest way to appreciate the vital part it plays in your life.
- Start planting trees. That’s the sum of the domestic campaign so far. Soon, all the neighbors will be carbon copying each other.
- Stop printing and go paperless. Many of us still have the bad habit of not understanding how to correctly use computer files and folders, whether at home or at work. Instead, we print. And, you know what, many of us do it when we think no one is looking. So, there you have it. You know it's wrong.
- Recycle paper and cardboard. It is because one tonne (2,000 pounds) of recycled paper saves the lives of 17 trees. Every year, these 17 trees sequester around 250 pounds of CO_2 from the atmosphere. If only 10% of the paper used by the average American was recycled in a year, 25 million trees would be preserved, and 367 million pounds of CO_2 would be absorbed by these trees.
- When shopping, try to buy mostly recycled things. The majority of recycled materials do not come from deforested areas or rainforests.
- Recycle as much as possible at home. By extension, you are continuing your proactive effort to redirect demand for land removal.
- You may help reduce illegal logging by purchasing only Forest Stewardship Council (FSC) certified sustainable wood products. The Forest Stewardship Council (FSC) is now the best global standard in forest management, providing a structure for interested parties to work towards responsible forest management.
- Reduce your meat consumption and eat as many vegetarian dishes as possible in the kitchen. It's a best practise, and a healthy one at that. It's difficult and time-consuming to find beef products that haven't been harvested on land that was formerly densely forested.

- When it comes to meat, avoid purchasing items coming from areas where forests have been removed. If you're willing to go the whole hog at this point, you'll need to take extra care and time examining the product labels. You'll also need to brush up on your knowledge of the international corporations that manufacture these pre-packaged grocery items.
- To get these things right, especially when shopping for recyclable and sustainable products and meat, read the labels on everything you buy. Buying organic products instead is a much safer and time-saving choice. However, avoid multinational corporations that have arrogantly jumped on the organic bandwagon in order to increase sales.
- Palm oil is an edible vegetable oil obtained from the palm fruit of the African oil palm tree. According to the World Wildlife Fund, an area of rainforest the size of 300 football fields is removed every hour to make room for palm oil cultivation.
- Do not use firewood to heat up your fireplaces. It takes a few hours to burn the firewood but takes years to grow a single tree. Live in such a way that your activities cause minimum impact on the environment.
- Practice eco-forestry It is a restorative forest management strategy that is not centred on economic production. Certain trees are deliberately plucked while inflicting minimal damage to the rest of the forest in this practise. The long-term goal of this strategy is to methodically down mature trees while keeping the forest ecosystem substantially untouched.
- Encourage people to live in a way that is environmentally friendly. Bring in more people in your town and inform them about how trees are being destroyed at an alarming rate and what efforts we must take to reduce our carbon imprint on the environment.
- On a much bigger, political and/or corporate scale, it would be excellent to become a serving member or volunteer of any international and locally-focused organisations that work to protect forests from destruction and to implement sustainable forestry practises.

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ENVIRONMENTAL HEALTH TOWARDS USE AND EXPLOITATION OF MINERALS

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Abstract:

Natural resources are the foundation of our economy and well-being, including metals, industrial minerals, water, and soil. We must be aware of the origins and mining processes of these basic minerals. Maintaining, wisely using, and enhancing natural resources is necessary for sustainable development, as is balancing environment, the economy, and social justice. There are four broad guidelines that are presented for implementing sustainable development for both renewable and non-renewable resources. Examples of the use of particular materials from antiquity to the present are shown, together with examples of regional distribution, usage (as opposed to consumption), resource lives, the supply-and-demand cycle, recycling, and substitution in contemporary society. The effectiveness with which resources are used has to meet the demand of sustainable development. There is discussion about learning curve examples. To prevent unfavourable mining sector expansion and resource consumption in those areas, industrial countries must impart their cutting-edge technologies to emerging nations. If the environmental impact of the exploitation of non-renewable minerals is to be reduced, the mining industry must use the finest technology currently available, take economic factors into account, and create environmental rules. The element of natural attenuation with regard to the resources soil and water is far more important than the production of non-renewable resources under the viewpoint of sustainable development and the capacity of the Earth's pollutant sinks.

Keywords: Natural resources, sustainable development, unfavourable mining, environmental impact, Earth's pollutant.

Introduction:

A mineral is an entirely inorganic substance that naturally occurs in the crust of theplanet. More than 2,000 minerals have been discovered, the majority of which are inorganic and created by different combinations of elements. Minerals are naturally occurring substances or substances that have undergone lengthy inorganic processes to produce. The majority of these more than 3000 species of minerals have chemical composition, crystal, hardness, colour, and opacity. The foundation of our civilisation is mineral resources. The earth's crust is the source of all materials (fuels, metals, water, etc.) required by contemporary society, whether directly or indirectly.

Minerals are naturally occurring substances with a specific structure and chemical makeup that can be found underneath the earth's crust. Ores are the minerals from which metals and nonmetals are mined. Mineral deposition is a natural process that creates rock. Three categories of rocks can be distinguished based on their origin: Igneous rock, sedimentary rock, and metamorphic rock.

While non-metallic resources like cement, sulphur, phosphorus, diamonds, and chemical byproducts of petroleum refining are essential to industry, the ores produce metals like iron, copper, aluminium, gold, silver, and platinum. Depending on which anion or anionic group is more prevalent, minerals can be categorised as: Silicate minerals (i), native elements (ii), sulphur minerals (iii), oxydes(iv), halides (v), hydroxides (vi), carbonate and nitrate minerals (vii), sulphur minerals (viii), and sulfurates (viii), are a few examples of minerals. mineral borates (x) Minerals with the Tung state, chromate, and molybdate symbol are phosphate, arsenate, and vanedate.

Because they are more durable than other materials and can be melted and moulded into shape with good electrical conductivity, all minerals are non-renewable andprecious.

Minerals found in the ocean

It has been discovered that the deep-sea basins hold large amounts of minerals like manganese, cobalt-nickel, and copper. Marine sources of the salt, magnesium, and bromine have also been found. India has three different types of marine mineral resources:

1. **Terrible minerals:** Ilmenite and monazite are found in Maharashtra, Kerala, Tamil Nadu, and Orissa.
2. **Biogenous deposits:** calcium and carbonate are found in Kerala, the Gulf of Kutch, A & Nicobar.
3. **Chemogenous deposits**: including those for copper, cobalt, and manganeseMineral Resource Categories

Metallic mineral resources and non-metallic mineral resources are the two broad kinds of mineral resources.

Minerals with metallic properties

Metallic minerals are hard metals that transfer electricity and heat and have alustrous or shiny appearance. Examples include aluminium, gold, silver, tin, copper, lead, zinc, and other metals.

Metal in its basic form can be found in metallic minerals. Metallic minerals lookshiny and have a metallic appearance. They are possible sources of the metal that can be obtained by mining since they include metals in their chemical makeup. Ferrous metallic minerals and non-ferrous metallic minerals are sub categories of metallic minerals.

Iron-containing minerals, such as iron ore, manganese, and chromite, are referred to as ferrous minerals.

Non-ferrous minerals are those that don't include iron, such as copper, lead, gold, and silver.

Minerals with metallic properties

Non-metallic minerals are a unique class of chemical elements from which melting will not produce any new material. Sand, gravel, gypsum, halite, uranium, and dimension stone are a few examples.

Non-metallic minerals are those that lack a metallic sheen or shine in their appearance. These minerals don't have any metals that can be extracted in them.

Employing minerals

All historical cultures have made use of the resources of the planet. Earth's resources were first used by early humans as water, salt, and primitive rock-based tools. Although the amounts of different mineral resources used by diverse cultures vary greatly, they typically correlate with the level of development and living standards of the country per capita.

The deposits of minerals determine how they are used. While some nations have abundant mineral deposits, others do not. The qualities of a mineral determine its maximum utility. Almost every industry uses minerals. In the jewellery industry, metals including gold, silver, and platinum are used. Copper is used to make pipes and wire as well as coins. Quartz provides silicon, which is used in the computer industry. Because it is naturally light, strong, and long-lasting, aluminiumis employed in the aviation, shipping, and automobile industries.

The Indian hypothesis

India is home to numerous minerals. Minerals can be generically categorized into metallic and non-metallic types based on their physical characteristics. Metallic minerals include manganese, copper, aluminium, zinc, iron, bauxite, gold, andlead. The majority of metallic minerals are found in metamorphic and igneous rocks. Non- metallic minerals include diamond, gypsum, mica, kainite, stones, potash, etc. Manganese: In addition to being utilised in the steel industry, manganese is also employed in the production of paint, glass, pesticides, batteries, chemicals, bleaching powder, etc. In terms of global manganese reserves, India comes insecond. From India, manganese ore is exported.

Iron ore: Steel and iron are produced using iron ore. The different types of iron ore are haematite, limonite, magnetite, and siderite. The majority of manufacturing businesses rely on iron ore as a fundamental and significant raw resource.

Mica: The electrical and electronic sectors use mica. The manufacture of paints, medications, and other products also uses it. Insulation is a characteristic of mica.

Copper: Copper is an excellent electrical conductor. Electric cables, kitchen ware, and alloys are all made using copper. It is also employed in the production of pharmaceuticals. Because it doesn't rust, copper is always in higher demand.

Lead: Lead is a soft and heavy metal. It doesn't heat up easily. It is employed in the production of paints, rubber, glass, and other products.

Bauxite: Raw minerals used in industry include bauxite. Large bauxite ore resources can be found in India. It is utilised in businesses that make electric wires, autos, ships, and other things.

Extraction of minerals

Mining is the term used to describe the process of removing minerals and metalsfrom the earth. The huge variety of metals and minerals that can be acquired by this technique includes gold, silver, diamond, iron, coal, and uranium, to name just afew. Large tracts of land must be cleared for mining operations.

In actuality, mining is where all the materials come from that cannot be gotten through industrial processes or agriculture. For the businesses that own them, mining generates enormous profits and employs a sizable workforce. It is asignificant source of funding for the government as well.

Minerals are physically removed from the Earth's crust through mining. The mineral resources can be utilised both as-is and for the extraction of elements. It is imperative to safeguard minerals because they are finite resources.

Exploration, mining, and mine reclamation are the three main phases of mineral extraction.

These are typically the stages of mineral prospecting while mining.

Area selection:

The most crucial step is choosing a region where it will be feasible to rapidly, cheaply, and conveniently locate ore resources.

Generational target:

This phase entails mapping, geophysics, and testing of the region's surface and subsurface minerals in order to investigate the geology.

Resource evaluation:

This step informs you of the type and quantity of minerals present. Drilling is primarily used to do this.

Reserve definition

Mineral reserves are created by turning ore resources into reserves. Similar toresource appraisal, but much completer and more detailed Profit Planning: This process entails designing a mine to assess the deposit's commercially recoverable component.

Mine construction: Mine construction is the process of actually creating themine. You must ensure that an ore body is accessible.

Mining: The actual extraction of minerals from the earth takes place during this stage. Depending on the type of mine it is and what you want to extract fromtheearth, there are numerous ways to do this.

Ecological rebuilding: This refers to restoring the land as much as possible to its pre-mining state.

Methods for mining and quarrying: The size, shape, depth below the surface, andgrade of the deposit all affect the method utilised to extract minerals. Surface mining and underground mining are the options available.

Surface mining: Surface mining is more affordable, safer, and has less difficulty with air, electricity, water, and rock handling. Surface mining, however, has a worseeffect on the environment than underground mining. Therefore, surface mining operations cause more substantial surface disturbance.

In open pit mines: Drilling, blasting, loading, transporting, and dumping the ore out of the pit are all steps in the extraction process in open pit mines. In strip mining, the overburden is removed and dumped to the back, and the ore is scooped up and placed into trucks. Strip mining is used to extract coal, clay, bauxite, tar sands, phosphates, iron ores, etc.

Deep mines: Utilising underground mining techniques, deep mines are removed. Themajority of mines employ drilling, blasting, and mechanical digger removal onto shaft-accessed subterranean railway carriages or dump trucks in order to recover or develop their mineral.

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Hydraulic mining separates soft mineral grains like clay or kaolin from dense mineral grains like gold by using high-pressure water jets to wash soft sediments down an incline towards a concentration facility.

Solution mining (leaching) entails dissolving the ore with a liquid (water, cyanide, etc.) to obtain the desired ore (Au, Ag, U, S, NaCl, etc.). *In-situ* leaching is the term used when ore is extracted locally using solution mining.

General Impacts of mining on the environment

Energy consumption: Massive amounts of energy are needed for mining. Large vehicles are needed to transport the ore and rock over long distances, which uses up a lot of energy in the form of petrol. Transporting the minerals from underground mines requires complex hoisting devices, which also use energy. Deep underground mine temperature control also requires a lot of energy. Energy is also required by pneumatic equipment, which is widely employed in the mining sector. Metal and ore smelting demandsalotof energy.

Air: Mining has a significant impact on the air's quality. Dust may be created during the mining process because miners must blast through rock to reach the minerals. Because methane is a greenhouse gas, it is released from coal mines and it plays apart in environmental problems. When radioactive materials are detected in the ore, dust is released from non-vegetated or uncapped tailing dams, and radiationis produced. Unsafe smelting operations with insufficient safeguards may pollutetheair with heavy metals, such as sulphur dioxide. Because of all the poisons that areemitted into the air, the gold mining industry is one of the most harmful in the world. Smog and acid rain are further mining side effects.

Water: Although part of the water used in mines is recyclable, they use a lot of it. Minerals containing sulphides have a deleterious effect on groundwater. Both surface and subterranean mines are responsible for this. Because they are sources of acidic drainage water, tailing dams

and waste rock heaps also have an impact onsurface and subsurface water. Explosives often leave behind harmful chemical deposits that contaminate mine water and raise its salinity.

"*In situ*" mining, in which a solvent seep into unmined rock and leaches minerals, can directly contaminate groundwater. The flora and fauna of the water bodies are undoubtedly harmed by the release of poisonous chemicals into the water. Inaddition to the pollution, neighbouring water supplies are needed for mining processes. Water, for instance, is used to remove impurities fromcoal. As aresult, the river or lake where the water is being used has less water in it. These bodiesof water do not contain enough water for the organisms there to survive. Mining operations reveal previously hidden metal sulphides. They are transformed into metal oxides and powerful sulfuric acid when they come into contact with air oxygen. Such substances damage nearby rivers with heavy metals when they interact with local waters. Various stages of mining involve the usage of chemicals like mercury, cyanide, sulphuric acid, arsenic, and methyl mercury. The majority of the chemicals cause water pollution by being released into adjacent bodies of water. Even though these chemicals are disposed of into aquatic bodies using tailings (pipes), a leak is always possible. The pollutants enter the groundwater and contaminate it as they slowly permeate through the layers of the soil. Land: The consequences of mining on the land are a major source of environmental concern. For a mine to be constructed, trees must be felled, and this could result inthe destruction of entire forests. Large amounts of rock must be moved during mining, and surface mining has significant effects on the surrounding terrain. Additionally, mining operations may cause erosion, which is risky and terrible for the environment.

River banks are destroyed, and the way a river runs, where a river flows, what lives in a river, etc. are all altered. Chemical waste still leaks into the soil in considerable quantities despite efforts to release it through pipelines into the neighbouring rivers. As a result, the chemical makeup of the land is altered. In addition, the harmful compounds render the soil unsuitable for plant growth. Additionally, the polluted environment is unfriendly to the survival of the creatures that inhabit the soil.

Large-scale logging: Large tracts of forest must be cleared in order to allow miners to dig into the ground. For this reason, extensive deforestation is necessary in the locations where mining must be done. To build roads and housing for the mine workers, it is also necessary to clear vegetation in the nearby areas in addition to the mining area. The presence of humans introduces more environmental harming actions. For instance, a number of coal mine operations discharge dust and gas into the atmosphere. Therefore, oneof the main contributors to deforestation and pollution are mining.

Ecosystem damage: Mines significantly harm the ecosystems in their immediate vicinity. Numerous sorts of mines have an impact on numerous types of ecosystems. Many of the poisons and tailings that are released from mines can affect and disrupt the health and way of life of animals. Mining can utterly devastate ecosystems by altering the daily life of the creatures and upsetting the delicate balance of the entire system.

Decrease in biodiversity: Many different types of species live in the forests that are cut down for mining. Many creatures lose their habitat as a result of indiscriminate forest removal. This threatens the existence of numerous animal species. Numerous plants, trees, birds, and other species that live in forests are seriously threatened by the act of cutting down trees.

Health and safety: Mining is frequently quite dangerous yet it may also be relatively safe. Because of the poor vision and ventilation, as well as the risks associated with rock falls, underground mining is typically more dangerous than surface mining. Dustposes the greatest health hazards since it can impair breathing. After the metalsor minerals have been removed, the liquid waste is occasionally dumped in a miningpit. They turn into a still pool of water as the mine tailing fills the pit. This creates a breeding habitat for organisms like mosquitoes and other insects that spreadwater- borne diseases.

Environmental effects of mining:

The effects of mining are largely plain to see. Environmental issues related to mining include the destruction of land that would otherwise be suitable for agricultural, urban, or recreational use, the degradation of the immediate environment due to noise and airborne dust, and the creation of potentially hazardous environments for both workers and the general public. However, because mining is a relatively transient industry, there is much that can be done to minimise environmental harm during mining and to rehabilitate the area afterward. Today, legislation has beenpassed at nearly all levels in many nations to ensure that severe limitations won't render mining utterly unprofitable. Unfortunately, the lack of effective regulations over some mining operations in the past has left the earth's surface scarred and made many members of the public resistant to new mining operations in their communities.

Fortunately, even once mining is over, many underground mines don't leave muchofa trace. They are typically filled over time by ground water seeping up through them, although the rocks are typically sturdy enough to support even in the presence of abandoned mine holes and passages. The old mines can occasionally be put to excellent use. Old underground mines can be used as grain and seed storage, nuclear waste disposal sites, and truck parking.

When an open pit mine closes, a sizable hole is left behind, and there isn't any waste rock immediately accessible to replace it. The slopes of the pits are frequently too steep for planting. The bottom of the pit might flood and turn into an artificial lakeif the water table is high enough. As a result, it is challenging, if not impossible, toreclaim particularly large open pit mines. Waste rock may be poured into smaller open pits. Surface mines may be reclaimed in some locations to create small lakes and wetlands that are home to fish, birds, and other species.

However, a new danger known as subsidence can be experienced. Unlike openpit and strip mines, underground mines do not cause the surface to be drastically disrupted. Homes might become uninhabitable and transportation can become significantly impeded due to subsidence under towns and roadways. Changes in the distribution and chemistry of surface waters or ground water maycause environmental disruption over a larger area in addition to the effects that mining activities may have on the terrain. When water passes through mines or

landfills, it becomes acidified and eventually makes its way into nearby rivers, streams, or groundwater systems. Abandoned mine operations may have animpact on numerous waterways.

Getting rid of mining waste:

Waste rock is produced by almost all mining operations, and frequently in significant quantities. Waste from strip mining can be used in reclamation, but for underground mining operations and the majority of open pit mining, another disposal strategy must be devised. Typically, this just entails dumping the trash in piles near tothemine workings at the surface. Sometimes the leftover rock is reinserted into the mine apertures. The potential for sliding makes waste rock piles potentially hazardous. Mining waste alternatives, such as using them to fill land, are typically prohibitively expensive and unfeasible. It is possible to decrease waste disposal slopes and re-vegetate the area.

Ocean mining and dredging:

Dredging is the process of using equipment like bucket-ladder dredges, drag-lined redges, or suction dredges to remove unconsolidated material fromrivers, streams, lakes, and shallow oceans. Dredging doesn't cause mechanical pollution, but it can spread enormous amounts of fine sand and silt, which has a negative impact on fish and other wildlife that depend on clean water to survive. The biological system and ocean water are significantly impacted by the ocean mining for Mn nodules. Ocean mining operations alter currents, sedimentation patterns, and erosion patterns.

Drilling for wells and producing:

Oil, gas, brine, and geothermal fluids are all produced and explored using drilling wells. Risks from blowouts and fires can significantly increase pollution. Seepage and spillage of oil and brine must be tightly controlled.

Consequences of resource consumption for the environment:

Fossil fuel combustion in buildings, residences, and vehicle engines releases gases, particulates, and extra heat into the atmosphere. Nuclear fuel consumption produces harmful radioactive waste that needs particular disposal. Producing metals and minerals and refining oil both produce waste and pollution.

Acid contamination:

Acid in the form of acid mine drainage and acid rain is the most significant contaminant of the hydrosphere. More pynte is dissolved by acid mine drainage created as pyrite dissolves, amplifying the impact.

The use of fossil fuels:

Air pollution is produced by the combustion of fossil fuels in vehicles, power plants, and heating systems. Air pollution is also produced by smelting and the burningof solid waste.

Getting rid of nuclear waste:

The extraction and processing of uranium ores, the production of nuclear fuel, theuse of fuel in nuclear power plants, and the production of nuclear weapons all produce waste that needs to be disposed of. Radioactive waste disposal is still anissue that needs to be addressed. In

general, low-level wastes have radioactivity that is less than 1000 times what the environment can tolerate. These wastes are produced in significant amounts at uranium mines. Roughly 95% of the radiation comes from high-level radioactive wastes from the nuclear power sector.

Potential remedy to lessen the unpleasant effects:

To lessen environmental damage without seriously interfering with the mineral supply. We think that the "sustainable mining" approach of mining can help achieve this goal. The effect of mining on the environment can be lessened through sustainable mining. It is a significant step towards becoming more ecologically and environmentally conscious. Being more environmentally and ecologically friendly is a significant step. They will provide the minerals and metals society need while also exhibiting awareness of social, economic, and environmental concerns. Through their exploration, discovery, development, production, distribution, and recycling of theproducts, they exhibit these characteristics. By promoting the safe and environmentally-friendly production, use, and recycling of metals and minerals, minimising environmental impacts throughout the mine's development, from exploration to closure, collaborating with communities on the issues of abandoned mines, and utilising new technology and innovations to practise continuous improvement, mining companies should continue to contribute to the protection of the employees, communities, customers, and the environment. The fact that mining corporations lack the resources to adopt sustainable mining without outside financial aid is one of the main issues with it. The size of all non- essential mining must be kept to an absolute minimum.

For the different types of contamination, there are a number of alternative treatments for abandoned mine sites that pollute the environment.

Acid mine drainage: Several different chemicals, including calcium carbonate, calcium hydroxide, calcium oxide, sodium carbonate, sodium hydroxide, and anhydrous ammonia, can be used to treat acid mine drainage. These compounds neutralise the acid.

Tailings: Disposing of tailings has never been easy. They have historically been disposed of in a variety of ways, practically none of which were eco-friendly: inponds, rivers, oceans, etc. There are two less obtrusive and more environmentally friendly approaches that can be utilised, though. The first is disposal in mine voids or caves under the surface. This approach is advantageous because it prevents the cavernfrom collapsing, drains less minerals into the water table, and conceals the unsightly tailings. The other technique involves adding tailings to closed open-pit mines. Themain benefits of this approach are that it closes the hole and eliminates the sight of the tailings. Unfortunately, there is not much we can do to reduce the pollution already present inthe air. All we can do is stop more people from entering it.

Land contamination: Reclamation of abandoned mines must be made mandatory in order to effectively address land contamination.

Water pollution: Most types of water pollution can be neutralised. Pumping other acidic chemicals present in the water to treatment facilities can also treat them.

Conclusion:

Long-lasting inorganic processes are used to create minerals. Minerals are non-renewable and finite resources. To accommodate the nation's steadily growing population, mining has risen significantly. Minerals in some areas are in danger of going extinct due to incorrect and excessive use. Therefore, mineral conservation is necessary. Minerals that are not absolutely necessary should not be used or accepted. Mineral conservation is greatly aided by contemporary technology. Recycling is the ideal method of reusing minerals. Because of the numerous ethical issues that the globalisation of environmental concerns creates and the needtosolve them, miners must exploit and use minerals in an environmentally sustainable manner.

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