

BBA 1ST SEMESTER

Unit-1st

What do you mean by environmental education?

Environmental education is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions.

Environment can be defined as a sum total of all the living and non-living elements and their effects that influence human life. While all living or biotic elements are animals, plants, forests, fisheries, and birds, non-living or abiotic elements include water, land, sunlight, rocks, and air.

The environment(Protection) act 1986 define environment in section 2(a) as ‘environment includes water , air , land , and the interrelationship. Which exist among and between air ,water land human beings plants, micro organism and other creatures and property.

TYPES OF ENVIRONMENT →

→ **Bio-physical environment:** -It is essential life-supporting environment. The bio-physical environment includes land, air, water, plants and animals, buildings and other infrastructure, and all of the natural resources that provide our basic needs and opportunities for social and economic development. A clean, healthy environment is important for people's physical and emotional wellbeing. At a fundamental level, factors such as clean air and good quality drinking water are vital for people's physical health.

→ **Social environment:** -social environments includes the immediate social relationships, and cultural settings within which defined groups of people function and interact. Components of the social environment include built infrastructure; industrial and occupational structure; labour markets; social and economic processes; wealth; social, human, and health services; power relations; government; race relations; social inequality; cultural practices; the arts; religious institutions and practices; and beliefs about place and community

→ **Economic environment:** -The economic environment is the sum total of the economic conditions and the nature of the economy in which the people has to live and compete. The economic conditions of people also have a huge impact on their physical health, mental health and education. People with low income, don't have access to good education and health facilities.

→ **Psychological environment:** is the interaction of the various sources of stress in our lives and how we respond to them, both individually and as communities. The Psychological environment enables us to understand the personality of an individual.

Components of Environment:-

The four major components of environment include lithosphere, hydrosphere, atmosphere and biosphere, corresponding to rocks, water, air and life respectively.

- **Lithosphere** - is derived from the word "sphere," combined with the Greek word "lithos" which means rock. The lithosphere is the solid outer section of Earth which includes Earth's crust (the "skin" of rock on the outer layer of planet Earth), as well as the underlying cool, dense, and fairly rigid upper part of the upper mantle. The lithosphere extends from the surface of Earth to a depth of about 44-62 mi (70-100 km). The main component of lithosphere is earth's tectonic plates.

- **Hydrosphere**- comprises of all forms of water bodies on earth including marine (oceans, seas) freshwater (rivers, lakes, ponds, streams) and groundwater resources etc. It covers 71% of earth's surface. 97% of water found on Earth is in the oceans in the form of salt water. Only 3 % of water on Earth is freshwater. Out of this, 30.8% is available as groundwater and 68.9% is in frozen forms as in glaciers. Amount of 0.3% is available in rivers, reservoirs and lakes and is easily accessible to man.

- **Atmosphere**- is gaseous layer enveloping the Earth. The atmosphere with oxygen in abundance is unique to Earth and sustains life. It mainly comprises 78.08% nitrogen, 20.95% oxygen, 0.93% argon, 0.039% carbon dioxide, and traces of hydrogen, helium, and noble gases. The amount of water vapour present is variable (0-3%).Earth's atmosphere has a series of layers, each with its own specific traits. Moving upward from ground level, these layers are named the troposphere, stratosphere, mesosphere, thermosphere and exosphere. The troposphere is the lowest layer of our atmosphere. Starting at ground level, it extends upward to about 11 km (about 33,000 feet) above sea level. The next layer up is called the stratosphere.

- **Biosphere** refers to all the regions on Earth where life exists. The ecosystems that support life could be in soil, air, water or land. The term Biosphere was coined by Geologist Edward Seuss who used this term for place on Earth where life can be found. Biosphere refers to the sum total of all living matter, the biomass or biota. It extends from the polar ice caps to the equator, with each region harbouring some life form suitable to the conditions there.

Environment functions

(1) Provides the supply of resources

- The environment offers resources for production.

- It includes both renewable and non-renewable resources.
- Examples: Wood for furniture, soil, land, etc.

(2) Sustains life

- The environment includes the sun, soil, water, and air, which are essential for human life.
- It sustains life by providing genetic and biodiversity.

(3) Assimilates waste

- Production and consumption activities generate waste.
- This occurs mostly in the form of garbage.
- The environment helps in getting rid of the garbage.

(4) Enhances the quality of life

- The environment enhances the quality of life.
- Human beings enjoy the beauty of nature that includes rivers, mountains, deserts, etc.
- These add to the quality of life.

Environmental Factors Affecting Living Organisms

1. Environmental Factors (Terrestrial)

- Abiotic factors: non-living factors e.g. aspect: north-facing slopes are cooler and darker than south facing slopes in Northern hemisphere
- Biotic factors: living factors, e.g. food availability: more food will enable more organisms to live
- Climatic factors: effects of weather, e.g. rain: more rain means more water, which supports more life
- Edaphic factors: effects of soil, e.g. soil pH: pH affects growth of particular plants as pH affects enzyme action. Most plants grow at soil pH of 6.5 to 8.5

2.Environmental Factors (Aquatic) Aquatic habitats have unique problems in comparison to terrestrial habitats. These problems include:

- Light penetration e.g. plankton grows better in the upper layers of water due to higher light intensity.
- Currents transport organisms. Plants and animals subsequently get washed away unless they attach themselves to objects (e.g. limpets and many seaweeds).
- Wave action moves and damages organisms
- Salt content results in organisms adapting to freshwater or saltwater. This causes issues with water moving in or out of organisms and their cells.

- Tides e.g. the amount of time organisms are exposed or submerged. Shore plants lose water at low tide. Organisms on shore have shells or mucilage to retain water

3. **Temperature:** influences most plant processes, including photosynthesis, transpiration, respiration, germination, and flowering. As temperature increases (up to a point), photosynthesis, transpiration, and respiration increase. When combined with day-length, temperature also affects the change from vegetative (leafy) to reproductive (flowering) growth

4. **Water and Humidity:** Most growing plants contain about 90 percent water. Water plays many roles in plants. It is:

- A primary component in photosynthesis and respiration
- Responsible for turgor pressure in cells (Like air in an inflated balloon, water is responsible for the fullness and firmness of plant tissue.
- A solvent for minerals and carbohydrates moving through the plant
- Responsible for cooling leaves as it evaporates from leaf tissue during transpiration
- A regulator of stomata opening and closing, thus controlling transpiration and, to some degree, photosynthesis
- The source of pressure to move roots through the soil
- The medium in which most biochemical reactions take place

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES-

Definition The word environment is derived from the French word “environ” meaning surroundings. Hence, everything surrounding us is called environment. Every organism is surrounded by materials and forces that constitute its environment. It is the environment from where every organism must derive its requirement. The environment creates favourable conditions

for the existence and development of living organisms. The survival of any organism requires a steady supply of materials and removal of waste products.

The natural environment encompasses all living and non-living things. This environment encompasses the interaction of all living species, climate, weather, and natural resources that affect human survival and economic activity. Environmental studies is multi-disciplinary because it comprises various branches of studies like chemistry, physics, medical science, life science, agriculture and public health. It is the science of physical phenomena in the environment. Environmental studies deals with every issue that affects an organism. It is an applied science as it seeks practical answers to making human civilization sustainable on the earth's finite resources.

The environment is constituted by the interacting systems of physical, biological and cultural elements inter-related in various ways, individually as well as collectively. These elements are

(1) Physical Elements Space, landforms, water bodies, climate, soils, rocks and minerals. They determine the variable character of the human habitat, its opportunities as well as limitations

(2) Biological Elements Plants, animals, microorganisms and human beings constitute the biosphere.

(3) Cultural Elements Economic, social and political elements are essentially manmade features, which constitute the cultural milieu.

The scope of environmental studies include:

1. Developing an awareness and sensitivity to the environment and its related problems.
2. Motivating people for active participation in environmental protection.
3. Developing skills to find solutions to environmental problems.

4. Imbibe and inculcate in others the necessity for conservation of natural resources.

Environmental study is necessary for human beings, and it is a broad field that encompasses a wide range of topics related to the natural environment and the impact of human activities on it. The key areas to focus on in this study are

- i. **Conservation of natural resources:** Natural resources (i.e., air, water, soil, sunlight, etc.) are the sources for human beings from the earth without which human beings cannot survive. Conservation means to protect and take care of. In today's world, human activities have caused an irreparable damage to the environment. Without these natural resources, human life is nothing on this earth. Hence, it is important to protect or conserve the natural resources in such a way that they meet the needs of our present and future.
- ii. **Ecological aspects:** This involves the study of the physical and biological components of ecosystems and how they interact with each other. Ecological aspects include the study of ecosystems, biodiversity's and the impact of human activities on the natural environment. Ecological aspects are a critical component of environmental studies, informing efforts to manage and conserve ecosystems for future generations.
- iii. **Pollution of natural resources:** This includes study of various pollution of natural resources like water pollution, air pollution, and soil pollution. The aim is to understand the source of pollution and its effects on the environment and human health.
- iv. **Control of pollution:** This involves developing strategies and policies to reduce and control pollution. This includes measures such as pollution prevention, waste reduction, and the use of cleaner technologies.

Importance of environmental studies:

According to National Education Policy 1986, "it is a basic need to develop consciousness regarding the environment in children, youth, older people and in all citizens, and every field." Environment studies enlighten us, about the importance of protecting and conserving our indiscriminate release of pollution into the environment. Some important features that make environmental studies significant are as follows:

- v. Environmental studies provide basic knowledge of the environment to all individuals and help in understanding present environmental projects.
- vi. It helps us to know a more sustainable way of living and provides the necessary skills to solve environmental problems.
- vii. It helps us to use natural resources more efficiently.
- viii. The significance of environmental concerns such as global warming, ozone depletion, acid rain, marine pollution, and biodiversity are widely acknowledged as not limited to specific countries but rather having global implications. Therefore, addressing these issues necessitates international collaboration and collective efforts.

Natural resources-

Natural resources are materials and components that can be found within the environment. Some common examples of natural resources include water, air, soil, plants, animals, and minerals. These resources can be renewable or non-renewable. Water is a renewable resource that is necessary for life.

What are the Types of Resources?

Renewable and Non-Renewable Resources

(1) Renewable resources

- Renewable resources are the resources that can never be exhausted or depleted with continuous use.
- There remains a continuous supply of renewable resources.
- **Examples:** Water, trees, etc.

(2) Non-renewable resources

- Non-renewable resources are the resources that get exhausted with their extraction and use.
- **Examples:** Coal, petroleum, iron ore, etc.

The concept of sustainability and sustainable development?

The concept of sustainability is composed of three pillars: economic, environmental and social. Sustainability is about finding the right balance and understating the long-term benefits of economic development that protects the environment and the society.

living within environmental limits, ensuring a strong, healthy and just society, achieving a sustainable economy, promoting good governance and utilising information communication technology as a social responsibility.

Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. To pursue sustainability is to create and maintain the conditions under which humans and nature can exist in productive harmony to support present and future generations.

SUSTAINABLE DEVELOPMENT

The qualitative and quantitative developments of human activity, with the advent of science and technology have been giving positive benefits since ages. However, these benefits have been coupled with resource depletion and ecological degradation as by-products.

By 2050, our planet will need to support some ten billion people compared to about eight billion today. This raises huge challenges in food, clothing and shelter for this rapidly growing population without depleting the world's resources. Development has to visualize in a holistic manner, where it brings benefits to all, not only for the present generation, but also for future generations. There is an urgent need to inter-link the social aspects with development and environment.

Overexploitation of natural resources, particularly by the developed countries, since 1970s is fast heading towards unsustainable growth and collapse of our life-support base. Global concern about the environmental issues was first seriously discussed in **1972 at the Stockholm conference.** However there was no immediate serious follow-up action.

The World Commission on Environment and Development, Brundtland Commission, 1987 defines Sustainable Development as, **“The development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.** It is defined in the **Brundtland Commission Report, “Our Common Future”.** This definition was given by the Norwegian Prime Minister, **G.H.Brundtland,** who was the Director of World Health Organization (WHO).

In 1992, the **UN Conference on Environment and Development (UNCED)** popularly known as **Earth Summit** was held at **Rio de Janeiro, Brazil**. The Rio declaration on **Agenda-21** adopts a global program of action on sustainable development in social, economic and political contexts for the 21st century.

The **Earth Summit II (Johannesburg Summit, 2002)**, reiterated the global commitment to sustainable development to ensure the relationship between nature's resources and human needs which meant that the development which comes at the cost of natural resources should not exceed the Planet's carrying capacity.

Key aspects for Sustainable Development:

Inter-Generational Equity – This emphasizes that we should minimize any adverse impacts on resources and environment for future generations i.e. **we should hand over a safe, healthy and resourceful environment to our future generations**. This can be possible only if we stop over-exploitation of resources, reduce waste discharge and emissions and maintain ecological balance.

Intra-Generational Equity – This emphasizes that the development processes should seek to **minimize the wealth gaps within and between nations**. The technology should address to the problems of the developing countries, producing drought tolerant varieties for uncertain climates, vaccines for infectious diseases, clean fuels for domestic and industrial use. This type of technological development will support the economic growth of the poor countries and help in narrowing the wealth gap and lead to sustainability.

SUSTAINABLE DEVELOPMENT GOALS (SDGs)

The Sustainable Development Goals (SDGs), adopted by the **United Nation's General Assembly in September 2015**, consist of **17 goals** to be achieved by **2030** to make the world a more sustainable and equitable society for all. SDGs aim **to transform our world**. They are a call to action to end poverty and inequality, protect the planet, and ensure that all people enjoy health, justice and prosperity.

They are interlinked i.e. action in one area will affect outcomes in others.



The important components of sustainable development are:

1. Population stabilization.
2. Integrated land use planning.
3. Conservation of Biodiversity.
4. Air and water pollution control.
5. Use of renewable energy resources.
6. Recycling of wastes.
7. Environmental education and awareness at all levels.



Why Is Sustainability Important?

The National Environmental Policy Act of 1969 committed the United States to sustainability, declaring it a national policy “to create and maintain conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations.”

In the years since NEPA was enacted, the public’s interest in sustainability has broadened. According to the National Research Council, there are many additional drivers for sustainability.

Biodiversity Definition

“Biodiversity is the variation among living organisms from different sources including terrestrial, marine and desert ecosystems, and the ecological complexes of which they are a part.”

What is Biodiversity?

Biodiversity describes the richness and variety of life on earth. It is the most complex and important feature of our planet. Without biodiversity, life would not sustain.

The term biodiversity was coined in 1985. It is important in natural as well as artificial ecosystems. It deals with nature’s variety, the biosphere. It refers to variabilities among plants, animals and microorganism species.

Biodiversity includes the number of different organisms and their relative frequencies in an ecosystem. It also reflects the organization of organisms at different levels.

Types of Biodiversity

There are the following three different types of biodiversity:

- Genetic Biodiversity
- Species Biodiversity
- Ecological Biodiversity

Species diversity

Species diversity refers to the variety of different types of species found in a particular area. It is the biodiversity at the most basic level. It includes all the species ranging from plants to different microorganisms.

No two individuals of the same species are exactly similar. For example, humans show a lot of diversity among themselves.

Genetic diversity

It refers to the variations among the genetic resources of the organisms. Every individual of a particular species differs from each other in their genetic constitution. That is why every human looks different from each other. Similarly, there are different varieties in the same species of rice, wheat, maize, barley, etc.

Ecological diversity

An ecosystem is a collection of living and non-living organisms and their interaction with each other. Ecological biodiversity refers to the variations in the plant and animal species living together and connected by food chains and food webs.

It is the diversity observed among the different ecosystems in a region. Diversity in different ecosystems like deserts, rainforests, mangroves, etc., include ecological diversity.

Importance of Biodiversity

Biodiversity and its maintenance are very important for sustaining life on earth. A few of the reasons explaining the importance of biodiversity are:

Ecological Stability

Every species has a specific role in an ecosystem. They capture and store energy and also produce and decompose organic matter. The ecosystem supports the services without which humans cannot survive. A diverse ecosystem is more productive and can withstand environmental stress.

Economic Importance

Biodiversity is a reservoir of resources for the manufacture of food, cosmetic products and pharmaceuticals.

Crops livestock, fishery, and forests are a rich sources of food.

Wild plants such as Cinchona and Foxglove plant are used for medicinal purposes.

Wood, fibres, perfumes, lubricants, rubber, resins, poison and cork are all derived from different plant species.

The national parks and sanctuaries are a source of tourism. They are a source of beauty and joy for many people.

Ethical Importance

All species have a right to exist. Humans should not cause their voluntary extinction. Biodiversity preserves different cultures and spiritual heritage. Therefore, it is very important to conserve biodiversity.

A healthy biodiversity offers many natural services

A healthy biodiversity provides a number of natural services for everyone:

- Ecosystem services, such as
 - Protection of water resources
 - Soils formation and protection
 - Nutrient storage and recycling
 - Pollution breakdown and absorption
 - Contribution to climate stability
 - Maintenance of ecosystems
 - Recovery from unpredictable events

- Biological resources, such as
 - Food
 - Medicinal resources and pharmaceutical drugs
 - Wood products
 - Ornamental plants
 - Breeding stocks, population reservoirs
 - Future resources
 - Diversity in genes, species and ecosystems
- Social benefits, such as
 - Research, education and monitoring
 - Recreation and tourism
 - Cultural values

Biodiversity in India-

India is one of the most diverse nations in the world. It ranks ninth in terms of plant species richness. Two of the world's 25 biodiversity hotspots are found in India. It is the origin of important crop species such as pigeon pea, eggplant, cucumber, cotton and sesame. India is also a centre of various domesticated species such as millets, cereals, legumes, vegetables, medicinal and aromatic crops, etc.

India is equally diverse in its faunal wealth. There are about 91000 animal species found here.

However, diversity is depleting at a drastic rate and various programmes on biodiversity conservation are being launched to conserve nature.

Also read: Ecology

To know more about what is biodiversity, its definition, types and importance of biodiversity, keep visiting BYJU'S or download the BYJU'S app for further reference.

ECOSYSTEM-

“Eco-system is defined as a self regulating group of biotic communities of species interacting with their non living environment exchanging energy and matter.” Study of ecosystems is called as Ecology or the study of organisms in their natural home interacting with their surroundings is called Ecology.

STRUCTURE OF ECO-SYSTEM

The structural attributes (components) of these components are:

A. Biotic components: These constitute all the living members of an eco-system. Ex. Plants, animals and micro organisms. These are of three types:

1. • Producers
2. • Consumers
3. • Decomposers

Producers- These are constituted mainly by green plants. Green plants trap solar energy and converts into potential chemical energy in the process called photosynthesis. These species are also known as Photo- autotrophs. The plant species which live inside the ocean waters prepare their food in the absence of sunlight by the oxidation of chemicals and they are known as chemo-autotrophs and the process is called chemosynthesis. (Sulphur bacteria)

Consumers- Organisms which get their food by feeding on other organisms are called consumers.

a. Herbivores- they feed on plant species (primary producers) eg- rabbit, insects

b. Carnivores- they food on herbivores and other carnivores eg- frog, snake

c. Omnivores- they feed on both plants and animals. Eg- humans

d. Detritivores- they feed on parts of dead organisms, waste of living organisms etc. Eg earthworms, ants.

Decomposers- they derive their food by breaking down the complex organic molecules to simple organic compounds and finally to inorganic nutrients. Eg- bacteria, fungi

B. Abiotic components: - Abiotic components of an eco-system consist of non living substances and factors. They are broadly divided into Physical and chemical factors.

- Physical factors include temperature, wind, soil type, water availability, humidity, precipitation, light, etc.
- Chemical factors include nutrients like Carbon, Nitrogen, Phosphorous, potassium, topography, pH of the soil, etc.

FUNCTIONS OF ECO-SYSTEM:

Eco-systems have some functional attributes due to which components remain and running together. The tendency of every eco-system depends on various function performed by the structural components of the eco-system.

The main functional attributes of eco-system are:

- I. Food Chain & Food Web.
- II. Energy flow
- III. Ecological pyramids
- IV. Ecological regulation
- V. Ecological succession

- I. **Food chain:** The transfer of food, energy from producers through a series of organisms with repeated eating and being eaten is known as a food chain.

Grass- Grasshopper- Frog -Snake –Peacock

- II. **Energy flow-** All eco-systems are energy driven complexes. The energy concerned to eco-system is light energy, chemical energy, heat energy and the source of all these energies is “solar energy”. This energy gradually transfers to light, chemical and heat energy. 1% of total energy falling on plants used for photosynthesis and this is only source of energy for proper functioning of the eco-system. The fixation of solar energy by the plants and its utilization in the form of food by

- III. **Ecological pyramids:** The graphical representation of structure and function of tropic levels of an ecosystem, starting with producers at the top and each successive tropic level forming the apex is known as an ecological pyramid. In a food chain starting from the producers to the consumers, there is a regular decrease in the properties (i.e., energy, biomass and the number of organisms) Since some energy is lost in each tropic level, it becomes progressively smaller at

the top. Ecological pyramids are of three types: 1. Pyramid of Numbers 2. Pyramids of Energy and 3. Pyramid of Biomass

- IV. **Ecosystem Regulation:** Ecosystem itself tries to resist to any environmental stress tries to disturb the normal ecosystem and maintain the equilibrium with the environment.
- V. **Ecological succession:** Any community tries to maintain the equilibrium with the prevailing condition of the environment. It changes with the changing environmental conditions. Sometimes the activities within the community itself or environmental changes can effect a change in the community. Eco-system development may be defined as “it is an orderly process of community development that involves changes in species structure of community processes.” Finally it ends in a stabilized eco-system.

UNIT-2ND

MAJOR BIOMES

Biomes definition

Biogeography is the study of the geographic distribution of living organisms. To help make sense of distribution patterns, biogeographers may divide the world into different biomes.

A **biome** is a global community of biological organisms living within a similar type of climate.

Biomes take into account living organisms' interactions with each other and their physical surroundings. Additionally, biomes span the entire world. For example, an orang-utan from Sumatra and a jaguar from the Amazon Rainforest are both members of the Tropical Rainforest biome, even though they would never naturally interact with each other.

Biomes as global ecosystems

An **ecosystem** consists of a community of living organisms and their interactions with each other and their physical environment within a particular location. The components of an ecosystem are either **biotic** (living) or **abiotic** (non-living, like rocks and bodies of water). Ecosystems also include **habitats**, which are the living conditions for a species within an ecosystem.

Characteristics of biomes

There are lots of different characteristics for each biome. Let's explore them.

Tropical rainforest

The **tropical rainforest** biome is characterised by dense vegetation, high humidity, high heat, and high precipitation. Tropical rainforests also have very high biodiversity; many different types of plants and animals live in tropical rainforest ecosystems throughout the world. Most tropical rainforests are found around the equator.

Temperate deciduous forest

The **temperate deciduous** forest biome includes temperate forests that experience four seasons. Deciduous trees and shrubs drop their leaves in the autumn to conserve resources in the winter. Most temperate deciduous forest ecosystems are found in the United States and Europe.

Savanna grassland

Savanna grasslands are plains with a sparse population of spread-out trees. Savanna grasslands tend to be relatively dry and warm, which means most vegetation includes hardy grasses and shrubs. Most savanna grasslands experience two seasons, dry and rainy.

Temperate grassland

Temperate grasslands are dominated by shrubs and grasses; you will find very few trees here. The weather may be dry or humid, but temperate grasslands are not as consistently warm as savanna grasslands.

Polar

The **polar** biome includes most of the Arctic (North Pole) and Antarctic (South Pole). It's cold. Very cold. Most of the polar biome experiences below-freezing temperatures for most of the year and the ground is usually covered in permanently frozen ice. Polar ecosystems are a type of **cold environment**. Another major type of cold environment is the **tundra**, which is often classified as a separate biome from the polar biome.

Desert

Deserts are the driest places on earth; on average, they receive less precipitation than anywhere else. As a consequence, they have relatively little biodiversity. There are essentially two major types of deserts: [hot deserts](#) and cold/temperate deserts. While both of them are very dry, hot deserts experience sweltering daytime heat while cold desert temperatures tend to be milder. Often, hot deserts and cold deserts are treated as distinct biomes.

Coral reef

The coral reef biome is an aquatic biome found throughout our world's oceans. It includes all of the various coral reef ecosystems in the world. Corals that build reefs can create habitats for dozens of species of fish and crustaceans.

Significance of Biomes

1. Biomes help us to understand how ecosystems differ from each other.
2. Monitor changes occurring in various ecosystems.
3. It helps to estimate the productivity of the ecosystems and the effect of climatic changes on them.
4. To understand the type and significance of interactions with various plants and animals.
5. The resources, habits, and habitats are dictated by the biome one lives on.
6. Various ecological services like carbon sinks, natural resource reserves, etc. are unique to each biome.

What are the Major Biomes of the World?

Coniferous Forest

The coniferous woodland biome is found in the south of the Arctic tundra. It extends from Alaska, across North America, to the Atlantic Ocean, and crosswise over Eurasia. The biggest stretch of coniferous woods on the planet, in the Northern Hemisphere, is known as the “Taiga(TY-guh) or boreal forests.” These woodlands are comprised principally of cone-bearing trees, for example, spruce, fir, and hemlock, which are appropriate for the cool atmosphere.

Deciduous Forest

This biome is in the Northern Hemisphere. Significant areas of [deciduous forest](#) are found in eastern North America, Europe, and East Asia. The word “Deciduous” means “out at a certain season.” This is why Deciduous means a forest where leaves fall out of the trees during winters. The characteristic rotting of the fallen leaves enhances the dirt and helps to support a variety of types of animal and plant life.

Desert

A desert is a zone where almost no life exists, primarily due to an absence of water. Researchers gauge that around one-fifth (20%) of the world’s surface is

desert that receives little (less than 50cm/yr) or almost no rainfall. Deserts can be found on every continent, aside from Europe. There are two main types of desert that you can find: hot and dry, and freezing and cold. The absence of water and extraordinary heat or cold makes this biome a poor choice for most life structures. A large portion of the plants you'll see in the desert are types of cacti. The Great Basin, the Mojave, the Sonoran, and the Chihuahuan are the four major deserts in North America.

Grasslands

Grasslands are areas with hot, dry atmospheres that are ideal for developing food. They are known all through the world by distinctive names (prairies in the United States; veld in Africa, etc.). This inland biome is made of tremendous regions of green fields. It gets so little rain that not very many trees can develop. The U.S. prairies are utilized to feed cows and to raise grain crops.

Mountains

Mountains exist on all the main continents of the earth. A large portion of the world's mountains lies in two very large chains. The Circum-Pacific chain, regularly called the Ring of Fire, runs from the west bank of the Americas through New Zealand and Australia and up through the Philippines to Japan. The other significant chain, called the Tethyan range, extends from the Pyrenees to the Alps to the Himalayas until finally ending in the area around Indonesia.

Rainforests

[Tropical rainforests](#) are found in Asia, Africa, South America, Central America, and on a significant number of the Pacific islands. They are frequently found along the equator. A large portion of the world's tropical rainforests is in the South American nation Brazil. There are different sorts of rainforests as far and wide as possible, as well. For instance, northern Australia has a "dry rainforest" that encounters a dry season every year, and the blustery Pacific Northwest in the United States has a "mild rainforest" that is made up of evergreen trees. [Tropical rainforests](#) get no less than 70 inches of rain every year and have a greater number of types of plants and creatures than any other biome.

Arctic Tundra

The [Arctic tundra](#) is a frosty, unlivable, treeless territory of low, swampy fields in the far north around the Arctic Ocean. It includes the northern terrains of Europe, Asia, and North America, and also the greater part of Greenland. An

alternate sort of tundra is the elevated tundra, which is a biome that exists at the highest points of high mountains. This is the world's coldest biome. Since the sun does not actually rise in these biomes for almost half of the year, it is not bizarre for the temperature to be below -20 degrees (Fahrenheit) in winter.

Chapparral Biome

This biome is also known as the Mediterranean scrub forest. Communities are dominated by shrubs and are known as chaparral. It experiences hot, dry summers; cool, moist winters; thin, nutrient-poor soils; periodic fires. This is marked by limited winter rain followed by drought the other times of the year. The temperature is moderate under the influence of cool, moist air of the oceans. The biome extends along the Mediterranean.

Freshwater Biome

Water is a major natural resource that is the basis of life. It supports life, and countless species live in it for all or part of their lives. Freshwater biomes supply us with our drinking water and water for crop irrigation. This water biome is named for the low concentration of salt found in the water. Because salt is important for the body to function properly, the plants and animals here have many adaptations that help them save salt. This includes most ponds, streams, lakes, and rivers

Marine Biome

This water biome is the largest biome in the world, as it includes the five major oceans that cover 70% of the Earth. Marine water has high levels of salt, so animals and plants living here have adaptations that help them get rid of salt or take on water.

The world's oceans affect the global climate highly, as forests do. Water has a high capacity for absorbing heat, and because the Earth is mostly covered with water, it keeps the temperature of the atmosphere fairly constant and able to support life. In addition to this climate-buffering capacity, the oceans contain several billion photosynthetic planktons, which account for most of the photosynthesis occurring on Earth. Without these, there might not be enough oxygen to support such a large world population and complex animal life.

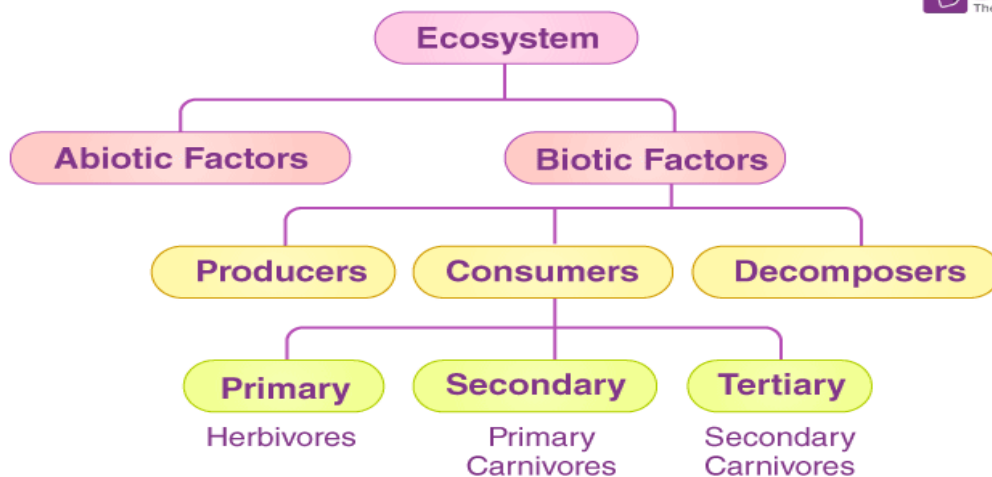
Structure of the Ecosystem-

The structure of an ecosystem is characterised by the organisation of both biotic and abiotic components. This includes the distribution of energy in **our environment**. It also includes the climatic conditions prevailing in that particular environment.

The structure of an ecosystem can be split into two main components, namely:

- Biotic Components
- Abiotic Components

The biotic and abiotic components are interrelated in an ecosystem. It is an open system where the energy and components can flow throughout the boundaries.



Biotic Components

Biotic components refer to all living components in an ecosystem. Based on nutrition, biotic components can be categorised into autotrophs, heterotrophs and saprotrophs (or decomposers).

- **Producers** include all autotrophs such as plants. They are called autotrophs as they can produce food through the process of photosynthesis. Consequently, all other organisms higher up on the food chain rely on producers for food.
- **Consumers** or heterotrophs are organisms that depend on other organisms for food. Consumers are further classified into primary consumers, secondary consumers and tertiary consumers.
 - **Primary consumers** are always herbivores as they rely on producers for food.
 - **Secondary consumers** depend on primary consumers for energy. They can either be carnivores or omnivores.

- **Tertiary consumers** are organisms that depend on secondary consumers for food. Tertiary consumers can also be carnivores or omnivores.
- **Quaternary consumers** are present in some food chains. These organisms prey on tertiary consumers for energy. Furthermore, they are usually at the top of a food chain as they have no natural predators.
- **Decomposers** include saprophytes such as fungi and bacteria. They directly thrive on the dead and decaying organic matter. Decomposers are essential for the ecosystem as they help in recycling nutrients to be reused by plants.

Abiotic Components

Abiotic components are the non-living component of an ecosystem. It includes air, water, soil, minerals, sunlight, temperature, nutrients, wind, altitude, turbidity, etc.

Functions of Ecosystem

The functions of the ecosystem are as follows:

1.
 1. It regulates the essential ecological processes, supports life systems and renders stability.
 2. It is also responsible for the cycling of nutrients between biotic and abiotic components.
 3. It maintains a balance among the various trophic levels in the ecosystem.
 4. It cycles the minerals through the biosphere.
 5. The abiotic components help in the synthesis of organic components that involve the exchange of energy.

Types of Ecosystem

An ecosystem can be as small as an oasis in a desert, or as big as an ocean, spanning thousands of miles. There are two types of ecosystem:

- Terrestrial Ecosystem
- Aquatic Ecosystem

Terrestrial Ecosystem

Terrestrial ecosystems are exclusively land-based ecosystems. There are different types of terrestrial ecosystems distributed around various geological zones. They are as follows:

1. Forest Ecosystem
2. Grassland Ecosystem
3. Tundra Ecosystem
4. Desert Ecosystem

Forest Ecosystem

A forest ecosystem consists of several plants, particularly trees, animals and microorganisms that live in coordination with the abiotic factors of the environment. Forests help in maintaining the temperature of the earth and are the major carbon sink.

Grassland Ecosystem

In a grassland ecosystem, the vegetation is dominated by grasses and herbs. Temperate grasslands and tropical or savanna grasslands are examples of grassland ecosystems.

Tundra Ecosystem

Tundra ecosystems are devoid of trees and are found in cold climates or where rainfall is scarce. These are covered with snow for most of the year. Tundra type of ecosystem is found in the Arctic or mountain tops.

Desert Ecosystem

Deserts are found throughout the world. These are regions with little rainfall and scarce vegetation. The days are hot, and the nights are cold.

Aquatic Ecosystem

[Aquatic ecosystems](#) are ecosystems present in a body of water. These can be further divided into two types, namely:

1. Freshwater Ecosystem
2. Marine Ecosystem

Freshwater Ecosystem

The freshwater ecosystem is an aquatic ecosystem that includes lakes, ponds, rivers, streams and wetlands. These have no salt content in contrast with the marine ecosystem.

Marine Ecosystem

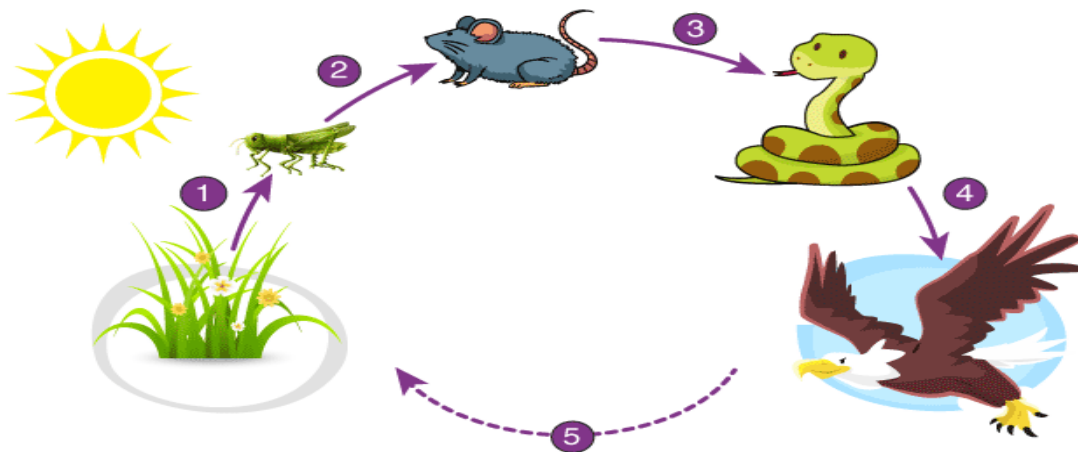
The marine ecosystem includes seas and oceans. These have a more substantial salt content and greater biodiversity in comparison to the freshwater ecosystem.

Important Ecological Concepts-

1. Food Chain

The sun is the ultimate source of energy on earth. It provides the energy required for all plant life. The plants utilise this energy for the process of photosynthesis, which is used to synthesise their food.

During this biological process, light energy is converted into chemical energy and is passed on through successive trophic levels. The flow of energy from a producer, to a consumer and eventually, to an apex predator or a detritivore is called the food chain.



Food Chain

- | | | |
|-----------------------------------|---|----------------------------|
| 1 The grasshopper eats the plants | 2 The mouse eats the grasshopper | 3 The snake eats the mouse |
| 4 The eagle eats the snake | 5 When the eagle dies, fungi break down the body and turn them into nutrients | |

2. Ecological Pyramids

An ecological pyramid is the graphical representation of the number, energy, and biomass of the successive trophic levels of an ecosystem. Charles Elton was the first ecologist to describe the ecological pyramid and its principals in 1927.

The biomass, number, and energy of organisms ranging from the producer level to the consumer level are represented in the form of a pyramid; hence, it is known as the ecological pyramid.

The base of the ecological pyramid comprises the producers, followed by primary and secondary consumers. The tertiary consumers hold the apex. In some food chains, the quaternary consumers are at the very apex of the food chain.

3. Food Web

Food web is a network of interconnected food chains. It comprises all the food chains within a single ecosystem. It helps in understanding that plants lay the foundation of all the food chains. In a marine environment, phytoplankton forms the primary producer.

Main article: [Food web](#)

Preservation of ecosystems:

- Ecosystem preservation is an effort to protect the components in an ecosystem in order to maintain its natural state.
- One of the conservation measures is to gazette the forest reserve to maintain the natural beauty of its flora and fauna.
- The forest reserve is protected from any development activities.
- 90% of the upper part of the Belum Forest has not been explored and is a place of research.

Restoration of ecosystems:

- Ecosystem restoration means efforts to renew and restore natural ecosystems that have been degraded, damaged or destroyed by human activities.
- Reforestation and the planting of land cover crops are among the remedial measures that can be taken to ensure the continuity of natural resources for future generations.

What is Biodiversity Conservation?

Biodiversity conservation is the protection and management of biodiversity to obtain resources for sustainable development.

Biodiversity conservation has three main objectives:

- Sustainable utilization of species and ecosystem.
- To maintain life To preserve the diversity of species.
- -supporting systems and essential ecological processes.

Also Read: [Biodiversity in Plants and Animals](#)

Let us have a detailed look at biodiversity and its conservation notes to explore the strategies and concepts of biodiversity conservation.

Biodiversity and its Conservation Methods

Biodiversity refers to the variability of life on earth. It can be conserved in the following ways:

- In-situ Conservation
- Ex-situ Conservation

In-situ Conservation

In-situ conservation of biodiversity is the conservation of species within their natural habitat. In this method, the natural ecosystem is maintained and protected.

The in-situ conservation has several advantages. Following are the important advantages of in-situ conservation:

1. It is a cost-effective and convenient method of conserving biodiversity.
2. A large number of living organisms can be conserved simultaneously.
3. Since the organisms are in a natural ecosystem, they can evolve better and can easily adjust to different environmental conditions.

Certain protected areas where in-situ conservation takes place include national parks, [wildlife sanctuaries](#) and biosphere reserves.

National Parks

These are small reserves maintained by the government. Its boundaries are well demarcated and human activities such as grazing, forestry, habitat and cultivation are prohibited. For eg., Kanha National Park, and Bandipur National Park.

Wildlife Sanctuaries

These are the regions where only wild animals are found. Human activities such as timber harvesting, cultivation, collection of woods and other forest products are allowed here as long as they do not interfere with the conservation project. Also, tourists visit these places for recreation.

Biosphere Reserves

[Biosphere reserves](#) are multi-purpose protected areas where the wildlife, traditional lifestyle of the inhabitants and domesticated plants and animals are protected. Tourist and research activities are permitted here.

Also Read: [National Parks And Sanctuaries](#)

Ex-situ Conservation

Ex-situ conservation of biodiversity involves the breeding and maintenance of endangered species in artificial ecosystems such as zoos, nurseries, botanical gardens, gene banks, etc. There is less competition for food, water and space among the organisms.

Ex-situ conservation has the following advantages:

1. The animals are provided with a longer time and breeding activity.
2. The species bred in captivity can be reintroduced in the wild.
3. Genetic techniques can be used for the preservation of endangered species.

Also Read: [Difference between a wildlife sanctuary and national park](#)

Strategies for Biodiversity Conservation

Following are the important strategies for biodiversity conservation:

1. All the varieties of food, timber plants, livestock, microbes and agricultural animals should be conserved.
2. All the economically important organisms should be identified and conserved.
3. Unique ecosystems should be preserved first.
4. The resources should be utilized efficiently.
5. Poaching and hunting of wild animals should be prevented.
6. The reserves and protected areas should be developed carefully.
7. The levels of pollutants should be reduced in the environment.
8. Deforestation should be strictly prohibited.
9. Environmental laws should be followed strictly.
10. The useful and endangered species of plants and animals should be conserved in their nature as well as artificial habitats.
11. Public awareness should be created regarding biodiversity conservation and its importance.

Why should you conserve Biodiversity?

It is believed that an area with higher species abundance has a more stable environment compared to an area with lower species abundance. We can further claim the necessity of biodiversity by considering our degree of dependency on the environment. We depend directly on various species of plants for our various needs. Similarly, we depend on various species of animals and microbes for different reasons.

Biodiversity is being lost due to the loss of habitat, over-exploitation of resources, climatic changes, pollution, invasive exotic species, diseases, hunting, etc. Since it provides us with several economic and ethical benefits and adds aesthetic value, it is very important to conserve biodiversity.

UNIT-3

Pollution-

Pollution is the introduction of harmful materials into the environment. These harmful materials are called pollutants. Pollutants can be natural, such as volcanic ash. They can also be created by human activity, such as trash or runoff produced by factories. Pollutants damage the quality of air, water, and land.

Pollution is the introduction of substances (or energy) that cause adverse changes in the environment and living entities .”

Pollution need not always be caused by chemical substances such as particulates (like smoke and dust). Forms of energy such as sound, heat or light can also cause pollution. These substances that cause pollution are called pollutants.

Pollution, even in minuscule amounts, impacts the ecological balance. Pollutants can make their way up the food chain and eventually find their way inside the human body. Read on to explore the types of pollution and their implications.

Types of Pollution

As stated before, there are different types of pollution, which are either caused by natural events (like forest fires) or by man-made activities (like cars, factories, nuclear wastes, etc.) These are further classified into the following types of pollution:

- **Air Pollution**
- **Water Pollution**
- **Soil Pollution**
- **Noise Pollution**

Besides these 4 types of pollution, other types exist such as light pollution, thermal pollution and radioactive pollution. The latter is much rarer than other types, but it is the deadliest.

Air pollution- Air pollution refers to the release of harmful contaminants (chemicals, toxic gases, particulates, biological molecules, etc.) into the earth’s atmosphere. These contaminants are quite detrimental and in some cases, pose serious health issues. Some causes that contribute to air pollution are:

- Burning fossil fuels
- Mining operations
- Exhaust gases from industries and factories

The effects of air pollution vary based on the kind of pollutant. But generally, the impact of air pollution ranges from:

- Increased risk of respiratory illness and cardiovascular problems
- Increased risk of skin diseases
- May increase the risk of cancer
- Global warming
- Acid rain
- Ozone depletion
- Hazards to wildlife

What you can do about air pollution-

1. Drive your car less. ...
2. Keep your car in good repair. ...
3. Turn off your engine. ...
4. Don't burn your garbage. ...
5. Limit backyard fire in the city. ...
6. Plant and care for trees. ...
7. Switch to electric or hand-powered lawn equipment. ...
8. Use less energy.

Water pollution -Water pollution is said to occur when toxic pollutants and particulate matter are introduced into water bodies such as lakes, rivers and seas. These contaminants are generally introduced by human activities like improper sewage treatment and oil spills. However, even natural processes such as eutrophication can cause water pollution.

Other significant causes of water pollution include:

- Dumping solid wastes in water bodies
- Disposing untreated industrial sewage into water bodies
- Human and animal wastes
- Agricultural runoff containing pesticides and fertilisers

The effects of water pollution are very pronounced in our environment. Furthermore, toxic chemicals can bioaccumulate in living beings, and these chemicals can travel their way up the food chain, ultimately reaching humans.

What you can do about Water pollution-

1. Use Less Plastic
2. Reuse Items
3. Recyclable Options
4. Do Not Dispose of Oils in the Sink
6. Handle Toxic Chemicals Properly
7. Shop to Stop Water Pollution
8. Do Not Throw Away Medicines
9. Avoid Throwing Household Items In Toilets
10. Dishwashing or Laundry
11. Limit the Use of Detergents and Bleaches
12. Avoid Pesticides
13. Oil Spill
14. Stop Chemical Pollution
15. Clean Up Litter

Soil pollution- Soil pollution, also called soil contamination, refers to the degradation of land due to the presence of chemicals or other man-made substances in the soil. The xenobiotic substances alter the natural composition of soil and affect it negatively. These can drastically impact life directly or indirectly. For instance, any toxic chemicals present in the soil will get absorbed by the plants. Since plants are producers in an environment, it gets passed up through the food chain. Compared to the other types of pollution, the effects of soil pollution are a little more obscured, but their implications are very noticeable.

Some of the common causes of soil pollution are:

- Improper industrial waste disposal
- Oil Spills
- Acid rain which is caused by air pollution
- Mining activities
- Intensive farming and agrochemicals (like fertilisers and pesticides)
- Industrial accidents

Prevention and control measures of soil pollution

The following measures should be taken to prevention of soil pollution-

1. Use of pesticides should be minimized.
2. Use of fertilizers should be judicious.
3. Cropping techniques should be improved to prevent growth of weeds.
4. Special pits should be selected for dumping wastes.
5. Controlled grazing and forest management.
6. Wind breaks and wind shield in areas exposed to wind erosion.
7. Planting of soil binding grasses along banks and slopes prone to rapid erosion.

Noise pollution -Noise pollution refers to the excessive amount of noise in the surrounding that disrupts the natural balance. Usually, it is man-made, though certain natural calamities like volcanoes can contribute to noise pollution.

In general, any sound which is over 85 decibels is considered to be detrimental. Also, the duration an individual is exposed plays an impact on their health. For perspective, a normal conversation is around 60 decibels, and a jet taking off is around 150 decibels. Consequently, noise pollution is more obvious than the other types of pollution.

Noise pollution has several contributors, which include:

- Industry-oriented noises such as heavy machines, mills, factories, etc.
- Transportation noises from vehicles, aeroplanes, etc.
- Construction noises
- Noise from social events (loudspeakers, firecrackers, etc.)
- Household noises (such as mixers, TV, washing machines, etc.)

Noise pollution has now become very common due to dense urbanisation and industrialisation. Noise pollution can bring about adverse effects such as :

- Hearing loss
- Tinnitus
- Sleeping disorders
- Hypertension (high BP)
- Communication problems

How can we control Noise Pollution

1. Running TV and Radio at low volume.
2. Use less Horns while driving.
3. We should plant more trees. Trees cut sound and help in reducing Noise Pollution.

4. We should use Loudspeakers at low volume and should not play music too loudly during parties.
5. We should not burst crackers.

Environmental laws-

History of environmental laws in India:

The detailed and developed framework for environmental protection came after the UN conference on Human Environment in Stockholm, in 1972.

This led to the formation of the National Council for Environmental Policy and Planning in 1972 within the science and technology department.

This was set up to establish a regulatory body for the overview of the environmental-related issues and concerns.

This council was later converted to the Ministry of Environment and Forests.

The government of India has made numerous acts to protect the environment and biodiversity. The important and impactful environmental laws and acts are listed and explained below.

(1) The Wildlife (Protection) Act, 1972

The Act provides for the protection of wild animals, birds, and plants; and for matters connected therewith or ancillary or incidental thereto. It extends to the whole of India.

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

Objective: To provide prevention and control of water pollution. Maintaining or restoring of wholesomeness and purity of water in the various sources of water.

(3) The Air (prevention and control of pollution) act, 1981

The act targets to control and prevent air pollution in India and its main objectives are:

- To provide for prevention, control, and abatement of air pollution.
- To provide for the establishment of the boards at the central and state levels to implement the act.

(4) The Environment (Protection) Act, 1986

This act was passed under **article 253 (legislation for giving effect to international agreements)**

This was passed in the wake of the **Bhopal gas tragedy** in December 1984.

It was enacted to achieve the UN conference on the human environment, 1972-Stockholm declaration.

Eco-sensitive zones or ecologically fragile areas are notified by MoEFCC under EPA, 1986 – 10 km buffer zones around protected areas.

Statutory bodies under the EPA, 1986:

1. **Genetic Engineering Appraisal Committee**
2. **National Coastal Zone Management Authority** (later converted to **National Ganga Council** under Ministry of Jal Sakthi)

(5) The energy conservation act, 2001

It was enacted as a step towards improving energy efficiency and reducing wastage. It specifies the energy consumption standards for equipment and appliances.

It prescribes energy consumptions norms and standards for consumers. It prescribes energy conservation building codes for commercial buildings.

(6) Biological diversity act 2002

It was implemented to give effect to **CBD, Nagoya Protocol**.

To check biopiracy, protect biological diversity, and local growers through a three-tier structure of central and state boards and local committees.

To set up National Biodiversity Authority (NBA), State Biodiversity Boards (SBBS), and Biodiversity Management Committees (BMCS).

(7) Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (FRA)

The act recognizes and vests the forest rights and occupation in forest land in **Forest Dwelling Scheduled Tribes (FDST)** and **Other Traditional Forest Dwellers (OTFD)** who have been residing in such forests for generations. This act comes under the aegis of the Ministry of Tribal Affairs.

The act also establishes the responsibilities and authority for sustainable use, conservation of biodiversity, and maintenance of the ecological balance of FDST and OTFD.

It strengthens the conservation regime of the forests while ensuring the livelihood and food security of the FDST and OTFD.

(8) The National Green Tribunal Act, 2010

It was established in concurrence to Rio Summit 1992 to provide judicial and administrative remedies for the victims of the pollutants and other environmental damage.

It also agrees with article 21, the Right to a healthy environment to its citizens of the constitution.

(9) Compensatory Afforestation Fund Act, 2016

The CAF Act was enacted to manage the funds collected for compensatory afforestation which till then was managed by ad hoc Compensatory Afforestation Fund Management and Planning Authority (CAMPA).

INTERNATIONAL AGREEMENT & PROGRAMME-

MEAs are international instruments states enter into, addressing particular environmental issues. They play a vital role in the development of overall environmental frameworks from the global, regional, national to sub-national levels of governance and cooperation. Some MEAs are legally-binding such as Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, and the Stockholm Convention on Persistent Organic Pollutants. Some are voluntary agreements among nations, among these are the Convention on Biological Diversity (CBD), United Nations Framework Convention on Climate Change

(UNFCCC), United Nations Convention to Combat Desertification, Conservation of Migratory Species of Wild Animals (CMS), and the Convention on Wetlands (Ramsar Convention).

Most of these MEAs are outcomes of international conventions that parties (governments), and non-parties (civil society, scientists, private sector, indigenous people, etc.) participate in. Together, they forge agreements and pledge to take action to solve environmental issues. International frameworks are adopted at country level resulting into policies, plans, programs and activities implemented across sectors of the society. The Philippines' Wildlife Act (RA 9147), National Integrated Protected Areas System (RA 7586 and 11038), Clean Air Act (RA 8749), Ecological Solid Waste Management Act (RA 9003), the Indigenous Peoples Rights Act (8371), Philippine Plant Variety Protection Act (RA 9168), Toxic Substances & Hazardous & Nuclear Wastes Control Act (RA 6969), are some of the policy outcomes arising from our country's commitments in various global treaties.

The Department of Environment and Natural Resources (DENR) represents the Philippines in many of these MEA meetings. Other government agencies participate in international conventions related to trade, transboundary crime, sustainable development, health, human rights, geopolitical matters, among others.

Multilateral Environmental Agreements in Biodiversity

The Biodiversity Management Bureau (BMB) of the DENR is the focal agency representing the Philippines in several MEAs related to biodiversity conservation. It negotiates on the country's behalf, measures and actions that aim to tackle drivers of biodiversity loss. Country positions and commitments are drafted in consultation with various stakeholders, including scientific and technical experts.

Convention on Biological Diversity (CBD)

Convention on the Conservation of Migratory Species of Wild Animals (CMS)

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

The Convention on Wetlands (Ramsar Convention)

Coral Triangle Initiative (CTI)

ASEAN Working Group on Nature Conservation and Biodiversity (AWGNCB)

ASEAN Working Group on Coastal and Marine Environment (AWGCME)

COMMUNICATION AND PUBLIC AWARENESS PROGRAMME-

Environmental communication serves to raise awareness, change behaviour, influence public opinion, advocate for policies, address conflicts and pass

legislation. The citizens` involvement in environmental management and protection depend, largely, on their level of awareness about environmental issues.

Importance of Environmental Awareness

We wish to have a good life for our children. We can ensure our children and future generations enjoy the best quality of life by taking small steps every day towards protecting the planet.

One of the first steps to becoming more environmentally conscious or environmentally aware is by reducing our energy usage. This may also mean driving less polluting vehicles.

Environmental awareness is critical because it can help us to become aware of the impacts on the Earth created by human activities, leading to global warming. It can also help us to create a more sustainable world by promoting renewable resources, such as solar, wind and **water**.

Causes of Environmental Pollution

The **environmental pollution** that we face today is caused by many factors. A major cause of environmental pollution is mismanagement of oil production and transportation. Due to this, there are oil spills worldwide that destroy aquatic life. Another issue related to environmental pollution is **global warming**. The increase in greenhouse gases causes a rise in the planet`s atmospheric temperature.

International organizations related to environment conservation

Earth System Governance Project (ESGP)

Established When and by Whom: Developed under the auspices of the International Human Dimensions Programme on Global Environmental Change. It started in January 2009.

Headquarter: The Earth System Governance Project Office is hosted at Lund University, Sweden.

Key Functions:

The Earth System Governance Project aims to contribute to science on the large, complex challenges of governance in an era of rapid and large-scale environmental change.

Global Environment Facility (GEF)

Established When and by Whom: The Global Environment Facility was established in October 1991 as a \$1 billion pilot program in the World Bank to assist in the protection of the global environment and to promote environmental sustainable development.

Headquarter: Washington, District of Columbia, United States of America

Key Functions:

The Global Environment Facility (GEF) unites 183 countries in partnership with international institutions, civil society organizations (CSOs), and the private sector to address global environmental issues while supporting national sustainable development initiatives.

Funding: The GEF also serves as the financial mechanism for the following conventions:

- **Convention on Biological Diversity (CBD)**
- **United Nations Framework Convention on Climate Change (UNFCCC)**
- **UN Convention to Combat Desertification (UNCCD)**
- **Stockholm Convention on Persistent Organic Pollutants (POPs)**
- **Minamata Convention on Mercury**

Global Green Growth Institute

Established When and by Whom: GGGI was first launched as a think tank in 2010 by Korean President Lee Myung-bak, and was later converted into an international treaty-based organization in 2012 at the Rio+20 Summit in Brazil.

Headquarter: It is headquartered in Seoul, Republic of Korea

Key Functions: GGGI works to produce three major outcomes: adoption and implementation of green growth plans; provision of research for policymakers; and private sector engagement in the implementation of the national green growth plans.

KIMO (Local Authorities International Environmental Organisation)

Established When and by Whom: KIMO was founded in August 1990 by four municipalities and from this modest start has grown in size to represent over 70 members in Belgium, Denmark, The Faroe Islands, Germany, The Netherlands, Sweden and the United Kingdom.

Headquarter: Esbjerg, Denmark

Key Functions:

- KIMO is committed to the development of sustainable coastal communities by:
- Preventing pollution of the seas and coastal waters of North Western Europe and preserving, improving and enhancing them for future generations
- Protecting coastal communities from the impacts of marine

Intergovernmental Panel on Climate Change (IPCC)

Established When and by Whom: It was first established in 1988 by two United Nations organizations, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), and later endorsed by the United Nations General Assembly.

Headquarter: Geneva, Switzerland

Key Functions:

- The IPCC produces reports that support the United Nations Framework Convention on Climate Change (UNFCCC).
- IPCC reports cover all relevant information to understand the risk of human-induced climate change, its potential impacts and options for adaptation and mitigation.
- The IPCC does not carry out its own original research.

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International Union for Conservation of Nature (IUCN)

Established When and by Whom: The International Union for Conservation of Nature (IUCN) is the world's oldest and largest global environmental organisation.

Founded in 1948, today IUCN the largest professional global conservation network. IUCN has more than 1,200 member organizations including 200+ government and 900+ non-government organizations.

Headquarter: The Union's headquarters are located in Gland, near Geneva, in Switzerland.

Key Functions: Conserving biodiversity is central to the mission of IUCN. The main areas of function are:

1. Science – the IUCN Red List of Threatened Species™.
2. Action – hundreds of conservation projects all over the world.
3. Influence – through the collective strength of more than 1,200 government and non-governmental Member organizations.

United Nations Environment Programme (UNEP)

Established When and by Whom: It was founded as a result of the UN Conference on the Human Environment (Stockholm Conference) in 1972

Headquarter: Nairobi, Kenya

Key Functions:

- It coordinates UN's environmental activities, assisting developing countries in implementing environmentally sound policies and practices.
- Its activities cover a wide range of issues regarding the atmosphere, marine and terrestrial ecosystems, environmental governance and green economy.

World Nature Organization (WNO)

Established When and by Whom: WNO initiative was born in 2010 by states which are threatened by rising sea levels. The WNO Treaty officially entered into force on 1st May 2014.

Location : Geneva

Key Functions:

- It is an intergovernmental organisation which promotes global environmental protection.

International Whaling Organization

Established When and by Whom: The IWC was set up under the International Convention for the Regulation of Whaling which was signed in Washington DC on 2nd December 1946.

Headquarter:

Key Functions:

- The preamble to the Convention states that its purpose is to provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry.

- An integral part of the Convention is its legally binding ‘Schedule.’ The Schedule sets out specific measures that the IWC has collectively decided are necessary in order to regulate whaling and conserve whale stocks.

Bio-carbon Fund initiative

Established When and by Whom: The BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISFL) is a multilateral fund, supported by donor governments and managed by the World Bank. It has been operational from 2013.

Headquarter: USA

Key Functions:

- It seeks to promote reduced greenhouse gas emissions from the land sector, from deforestation and forest degradation in developing countries (REDD+), and from sustainable agriculture, as well as smarter land-use planning, policies and practices.

Arctic Council

Established When and by Whom: The Arctic Council was founded on the initiative of the Government of Finland in September 1989 where officials from the 8 Arctic Countries met in Rovaniemi, Finland, to discuss cooperative measures to protect the Arctic environment.

Headquarter: The location of the Secretariat was rotated biennially with the Chairmanship of the Arctic Council.

Key Functions:

The Arctic Council is an intergovernmental forum promoting cooperation, coordination, and interaction among the Arctic States, Arctic indigenous communities and other Arctic inhabitants on common Arctic issues, in particular on issues of sustainable development and environmental protection in the Arctic.

The main focus areas of the Arctic Council are:

1. The Environment and climate change
2. Bio-diversity
3. Oceans

4. The indigenous Arctic peoples

Funding: By member states

India specific trivia: India is an Observer State

Role of Information Technology in Environment and Human Health!

Information technology has tremendous potential in the field of environment education and health as in any other field like business, economics, politics or culture. Development of internet facilities, Geographic Information System (GIS) and information through satellites has generated a wealth of up-to-date information on various aspects of environment and health.

A number of software have been developed for environment and health studies which are used friendly and can help an early learner in knowing and understanding the subject.

Database on Environment System:

Database is the collection of interrelated data on various subjects. It is usually in computerized form and can be retrieved whenever required. In the computer the information of database and can be very quickly retrieved. The comprehensive database includes wildlife database, conservation database, forest cover database etc. database is also available for diseases like HIV/AIDS, Malaria, Fluorosis, etc.

(a) National Management Information System (NMIS):

NMIS of the Department of Science and Technology has compiled a database on Research and Development Projects along with information about research scientists and personnel involved.

(b) Environmental Information System (ENVIS):

The Ministry of Environment and Forests, Government of India has created an information System called Environmental Information System (ENVIS). With its headquarters in Delhi, it functions in 25 different centres all over the country.

(c) Remote Sensing and Geographical Information System (GIS):

Satellite imageries provide us actual information about various physical and biological resources and also to some extent about their state of degradation in a digital form through remote sensing. Satellite imageries provide us actual information about various physical and biological resources and also to some extent about their state of degradation in a digital form through remote sensing.

(d) Geographical Information System (GIS):

GIS has proved to be a very effective tool in environmental management. GIS is a technique of superimposing various thematic maps using digital data on a large number of inter-related or inter dependent aspects. Several useful soft-wares have been developed for working in the field of GIS.

(e) The World Wide Web:

With resources material on every aspect, class-room activities, and digital files of photos, power-point lecture presentations, animations, web-exercises and quiz has proved to be extremely useful both for the students and the teachers of environmental studies.

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

ADVERTISEMENTS:

(a) Student-friendly features:

These include practice quiz, how to study tips, hyperlinks on every topics with detailed information, web exercises, case studies, environmental

maps, key-terms, career information, current articles, and interactive encyclopaedia and how to contact your elected officials.

(b) Teacher-friendly features:

These include in addition to above supplement resources charts, additional case studies, answers to web exercises, solutions to critical thinking, questions, editing facility to add or delete questions and create multiple version of same test etc. Information technology is expanding rapidly with increasing applications and new avenues are being opened with effective role in education, management and planning in the field of environment and health

Unit-4

What is an Ecosystem?

An ecosystem is a structural and functional unit of ecology where the living organisms interact with each other and the surrounding environment. In other words, an ecosystem is a chain of interactions between organisms and their environment. The term “Ecosystem” was first coined by A.G.Tansley, an English botanist, in 1935.

Read on to explore the structure, components, types and functions of the ecosystem in the notes provided below.

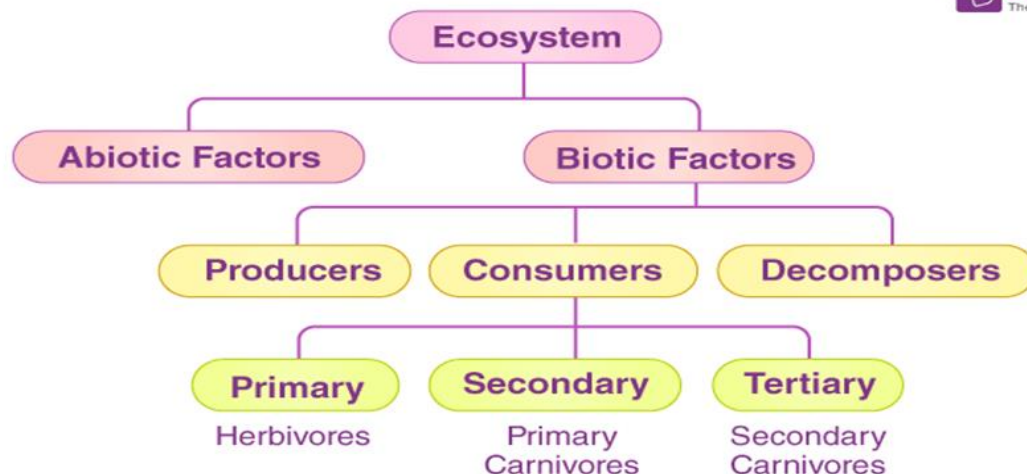
Structure of the Ecosystem

The structure of an ecosystem is characterised by the organisation of both biotic and abiotic components. This includes the distribution of energy in **our environment**. It also includes the climatic conditions prevailing in that particular environment.

The structure of an ecosystem can be split into two main components, namely:

- Biotic Components
- Abiotic Components

The biotic and abiotic components are interrelated in an ecosystem. It is an open system where the energy and components can flow throughout the boundaries.



Biotic Components

Biotic components refer to all living components in an ecosystem. Based on nutrition, biotic components can be categorised into autotrophs, heterotrophs and saprotrophs (or decomposers).

- **Producers** include all autotrophs such as plants. They are called autotrophs as they can produce food through the process of photosynthesis. Consequently, all other organisms higher up on the food chain rely on producers for food.
- **Consumers** or heterotrophs are organisms that depend on other organisms for food. Consumers are further classified into primary consumers, secondary consumers and tertiary consumers.
 - **Primary consumers** are always herbivores as they rely on producers for food.
 - **Secondary consumers** depend on primary consumers for energy. They can either be carnivores or omnivores.
 - **Tertiary consumers** are organisms that depend on secondary consumers for food. Tertiary consumers can also be carnivores or omnivores.
 - **Quaternary consumers** are present in some food chains. These organisms prey on tertiary consumers for energy. Furthermore, they are usually at the top of a food chain as they have no natural predators.
- **Decomposers** include saprophytes such as fungi and bacteria. They directly thrive on the dead and decaying organic matter. Decomposers are essential for the ecosystem as they help in recycling nutrients to be reused by plants.

Abiotic Components

Abiotic components are the non-living component of an ecosystem. It includes air, water, soil, minerals, sunlight, temperature, nutrients, wind, altitude, turbidity, etc.

Functions of Ecosystem

The functions of the ecosystem are as follows:

1.
 1. It regulates the essential ecological processes, supports life systems and renders stability.
 2. It is also responsible for the cycling of nutrients between biotic and abiotic components.
 3. It maintains a balance among the various trophic levels in the ecosystem.
 4. It cycles the minerals through the biosphere.
 5. The abiotic components help in the synthesis of organic components that involve the exchange of energy.

So the functional units of an ecosystem or functional components that work together in an ecosystem are:

- **Productivity** – It refers to the rate of biomass production.
- **Energy flow** – It is the sequential process through which energy flows from one trophic level to another. The energy captured from the sun flows from producers to consumers and then to decomposers and finally back to the environment.
- **Decomposition** – It is the process of breakdown of dead organic material. The top-soil is the major site for decomposition.
- **Nutrient cycling** – In an ecosystem nutrients are consumed and recycled back in various forms for the utilisation by various organisms.

Types of Ecosystem

An ecosystem can be as small as an oasis in a desert, or as big as an ocean, spanning thousands of miles. There are two types of ecosystem:

- Terrestrial Ecosystem
- Aquatic Ecosystem

Terrestrial Ecosystem

Terrestrial ecosystems are exclusively land-based ecosystems. There are different types of terrestrial ecosystems distributed around various geological zones. They are as follows:

1. Forest Ecosystem
2. Grassland Ecosystem
3. Tundra Ecosystem
4. Desert Ecosystem

Forest Ecosystem

A forest ecosystem consists of several plants, particularly trees, animals and microorganisms that live in coordination with the abiotic factors of the environment. Forests help in maintaining the temperature of the earth and are the major carbon sink.

Grassland Ecosystem

In a grassland ecosystem, the vegetation is dominated by grasses and herbs. Temperate grasslands and tropical or savanna grasslands are examples of grassland ecosystems.

Tundra Ecosystem

Tundra ecosystems are devoid of trees and are found in cold climates or where rainfall is scarce. These are covered with snow for most of the year. Tundra type of ecosystem is found in the Arctic or mountain tops.

Desert Ecosystem

Deserts are found throughout the world. These are regions with little rainfall and scarce vegetation. The days are hot, and the nights are cold.

Aquatic Ecosystem

[Aquatic ecosystems](#) are ecosystems present in a body of water. These can be further divided into two types, namely:

1. Freshwater Ecosystem
2. Marine Ecosystem

Freshwater Ecosystem

The freshwater ecosystem is an aquatic ecosystem that includes lakes, ponds, rivers, streams and wetlands. These have no salt content in contrast with the marine ecosystem.

Marine Ecosystem

The marine ecosystem includes seas and oceans. These have a more substantial salt content and greater biodiversity in comparison to the freshwater ecosystem.

Also check: [Habitat Diversity](#)

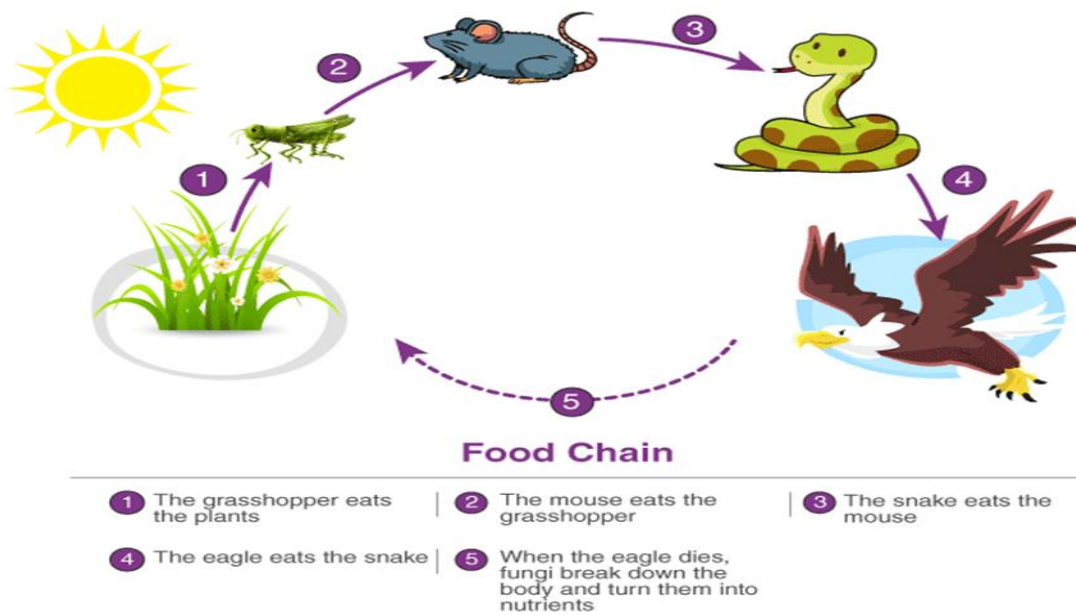
Important Ecological Concepts

1. Food Chain

The sun is the ultimate source of energy on earth. It provides the energy required for all plant life. The plants utilise this energy for the process of photosynthesis, which is used to synthesise their food.

During this biological process, light energy is converted into chemical energy and is passed on through successive trophic levels. The flow of energy from a producer, to a consumer and eventually, to an apex predator or a detritivore is called the food chain.

Dead and decaying matter, along with organic debris, is broken down into its constituents by scavengers. The reducers then absorb these constituents. After gaining the energy, the reducers liberate molecules to the environment, which can be utilised again by the producers.



2. Ecological Pyramids

An ecological pyramid is the graphical representation of the number, energy, and biomass of the successive trophic levels of an ecosystem. Charles Elton was the first ecologist to describe the ecological pyramid and its principals in 1927.

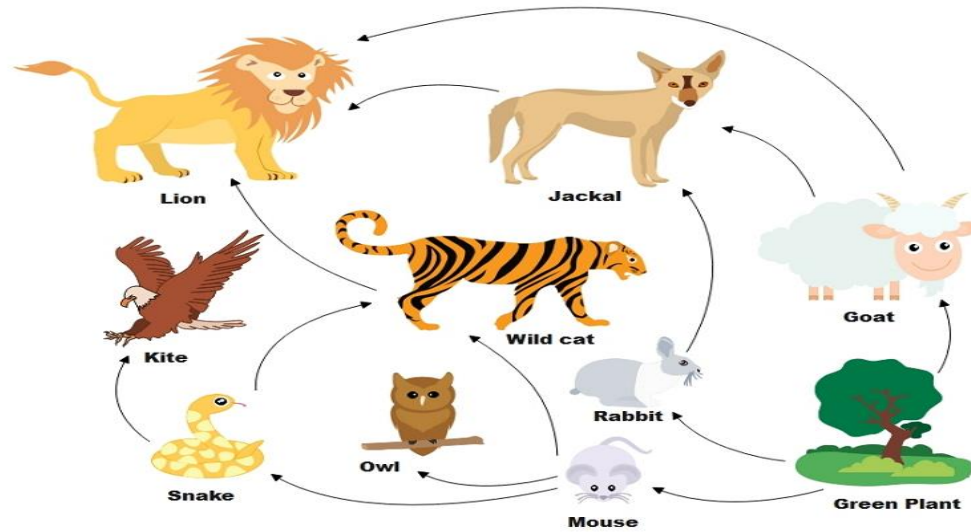
The biomass, number, and energy of organisms ranging from the producer level to the consumer level are represented in the form of a pyramid; hence, it is known as the ecological pyramid.

The base of the ecological pyramid comprises the producers, followed by primary and secondary consumers. The tertiary consumers hold the apex. In some food chains, the quaternary consumers are at the very apex of the food chain.

Grasshopper → Mouse → Cobra → Brown Snake Eagle

3. Food Web

Food web is a network of interconnected food chains. It comprises all the food chains within a single ecosystem. It helps in understanding that plants lay the foundation of all the food chains. In a marine environment, phytoplankton forms the primary producer.



Energy Flow

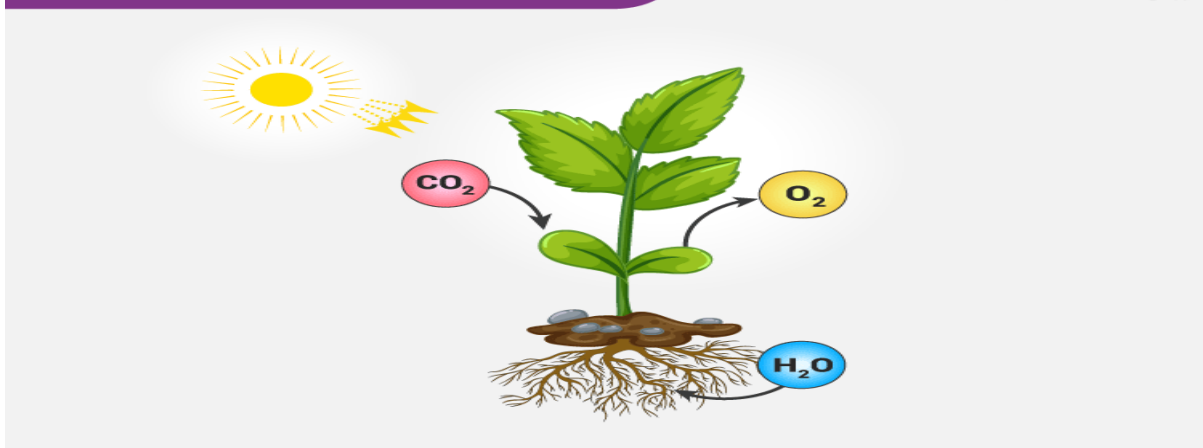
The chemical energy of food is the main source of energy required by all living organisms. This energy is transmitted to different trophic levels along the food chain. This energy flow is based on two different laws of thermodynamics:

- First law of thermodynamics, that states that energy can neither be created nor destroyed, it can only change from one form to another.
- Second law of thermodynamics, that states that as energy is transferred more and more of it is wasted.

Energy Flow in Ecosystem

The energy flow in the ecosystem is one of the major factors that support the survival of such a great number of organisms. For almost all organisms on earth, the primary source of energy is solar energy. It is amusing to find that we receive less than 50 per cent of the sun's effective radiation on earth. When we say effective radiation, we mean the radiation, which can be used by plants to carry out photosynthesis.

PHOTOSYNTHESIS



The energy flow takes place via the food chain and food web. During the process of energy flow in the ecosystem, plants being the producers absorb sunlight with the help of the chloroplasts and a part of it is transformed into chemical energy in the process of [photosynthesis](#).

Trophic level

The producers and consumers in the ecosystem can be arranged into different feeding groups and are known as trophic level or the feeding level.

1. The producers (plants) represent the first trophic level.
2. Herbivores (primary consumers) present the second trophic level.
3. Primary carnivores (secondary consumers) represent the third trophic level
4. Top carnivores (tertiary consumers) represent the last level.

Nutrient Cycle Definition

“A nutrient cycle is defined as the cyclic pathway by which nutrients pass-through, in order to be recycled and reutilised. The pathway comprises cells, organisms, community and ecosystem.”

Energy Flow and Nutrient Cycle

How nutrient cycling differs from energy flow?

The energy flow refers to the transfer of energy from one trophic level to another in the food chain and food web. It is unidirectional and energy is lost from one trophic level to another in the form of heat. Sunlight is the ultimate energy source.

Nutrient cycling is a cyclic process that encompasses the movement of nutrients from the physical environment to living organisms and back to the environment. Nutrients are present on the earth where they are recycled, transformed into different forms and reutilized.

Nutrient Cycle Examples

Nutrient recycling involves both biotic and abiotic components. The main abiotic components are air, water, soil.

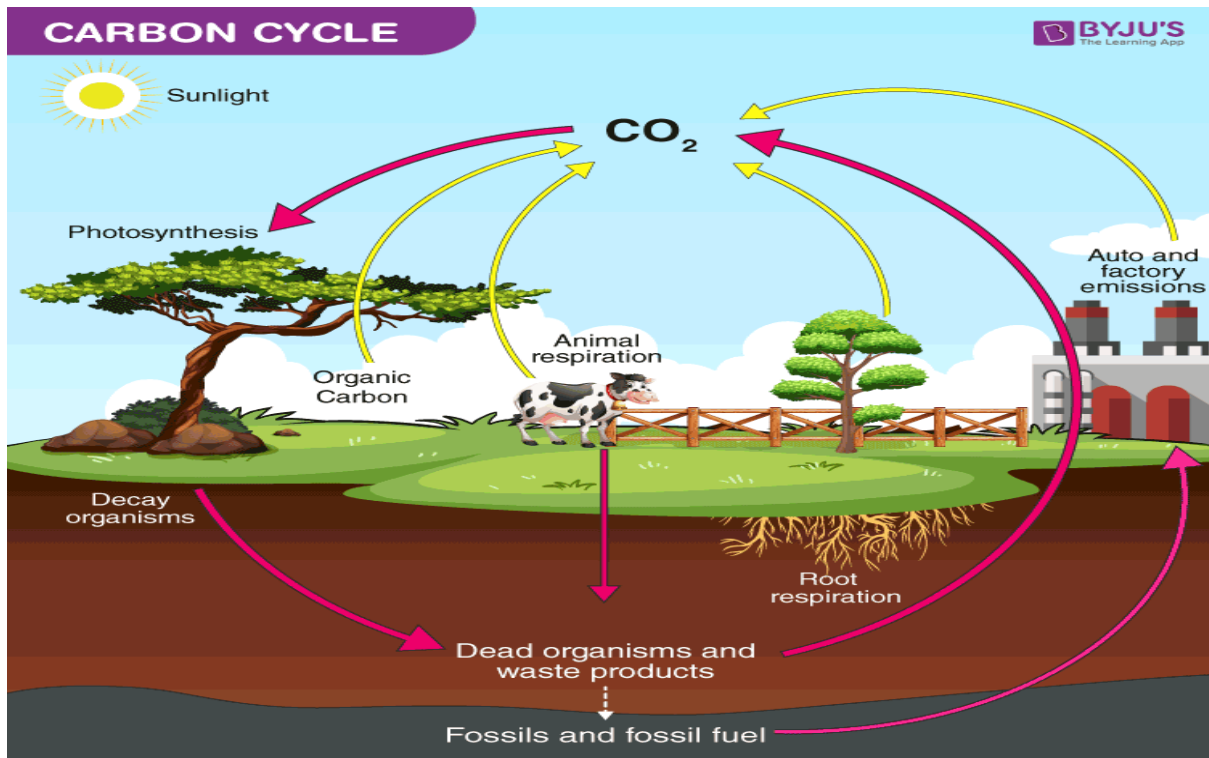
Recycling of Carbon, Hydrogen, Nitrogen and Oxygen occurs in water, air and soil, whereas calcium, phosphorus, potassium, etc. are recycled mainly in soil and are available locally.

The 4 main nutrient cycles are:

1. Carbon Cycle

Carbon is the main constituent of all the living cells. All the organic matter and biomolecules contain carbon.

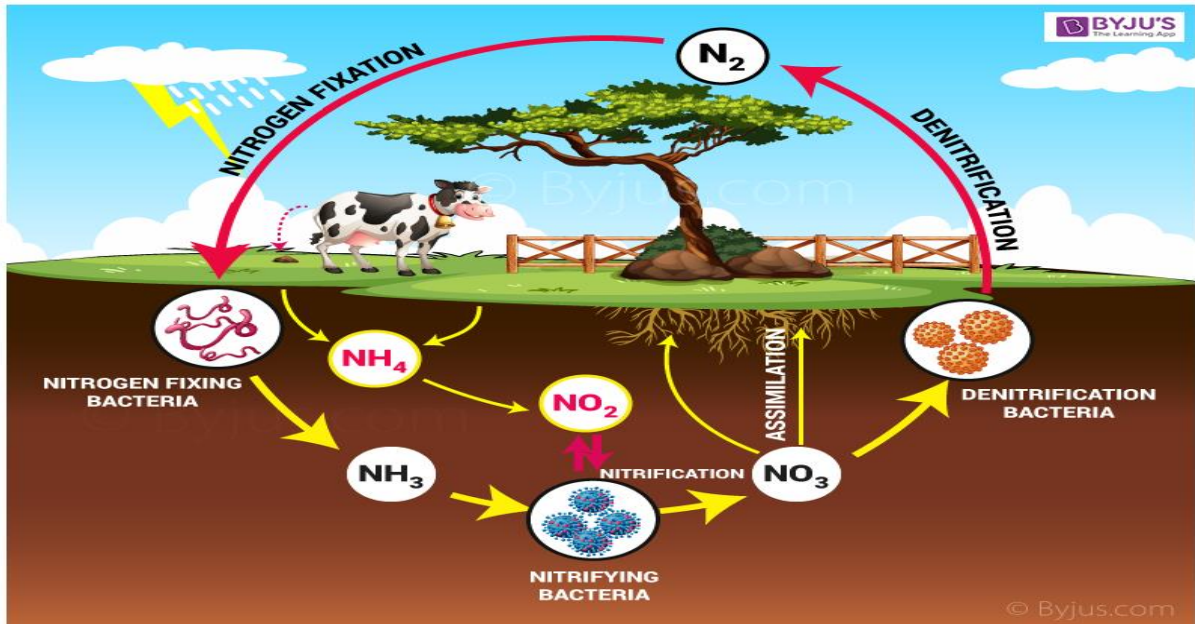
- Carbon is present mainly as carbon dioxide and methane in the atmosphere
- There is a continuous exchange of carbon between biotic and abiotic components by the process of photosynthesis and respiration
- Atmospheric carbon dioxide is fixed by plants in the process of photosynthesis
- All the living organisms release carbon dioxide during respiration
- Carbon is released into the atmosphere by burning of fossil fuels and auto emissions
- Organic carbon from dead and decaying organisms and waste products is released into the atmosphere after decomposition



2. Nitrogen Cycle

Nitrogen is also an essential component of life. Nitrogen cannot be directly utilised by living organisms and has to be converted to other forms.

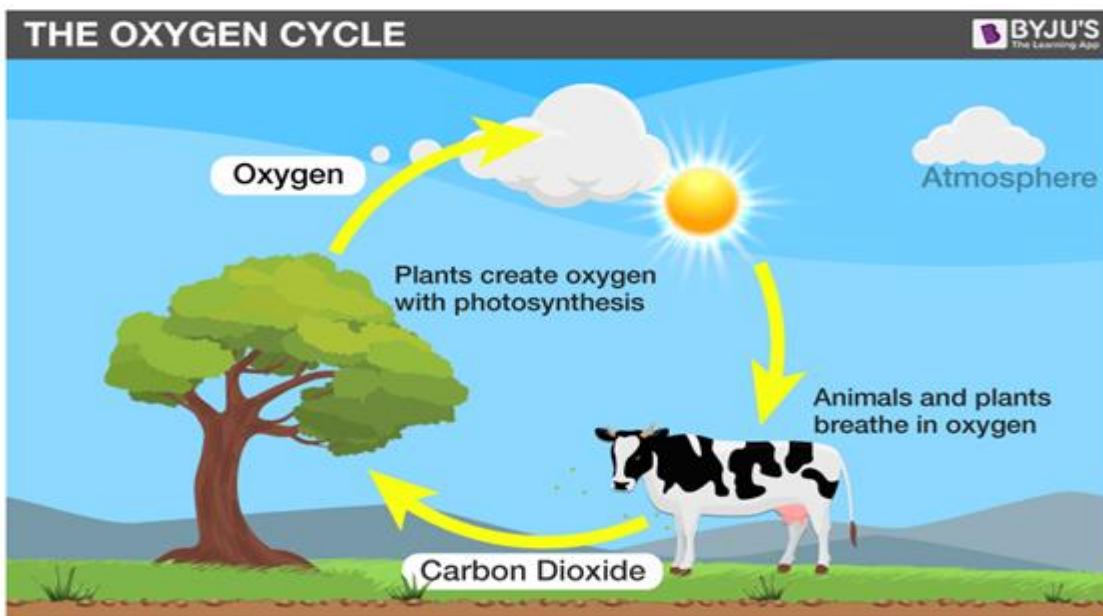
- By the process of nitrogen fixation, nitrogen-fixing bacteria fix atmospheric nitrogen to ammonia and nitrifying bacteria convert ammonia to nitrate. It is then taken up by plants
- Atmospheric nitrogen is converted to nitrates directly by lightning and assimilated by plants
- Decomposers break down proteins and amino acids of dead and decaying organic matters and waste product
- Denitrifying bacteria convert ammonia and nitrates to nitrogen and nitrous oxide by the process of denitrification. In this way, nitrogen is released back into the atmosphere



3. Oxygen Cycle

Oxygen is essential for life. Aquatic organisms are dependent on oxygen dissolved in water. Oxygen is required for decomposition of biodegradable waste products.

- Photosynthesis is the main source of oxygen present in the atmosphere
- Atmospheric oxygen is taken up by living organisms in the process of respiration and release carbon dioxide which is used for photosynthesis by plants

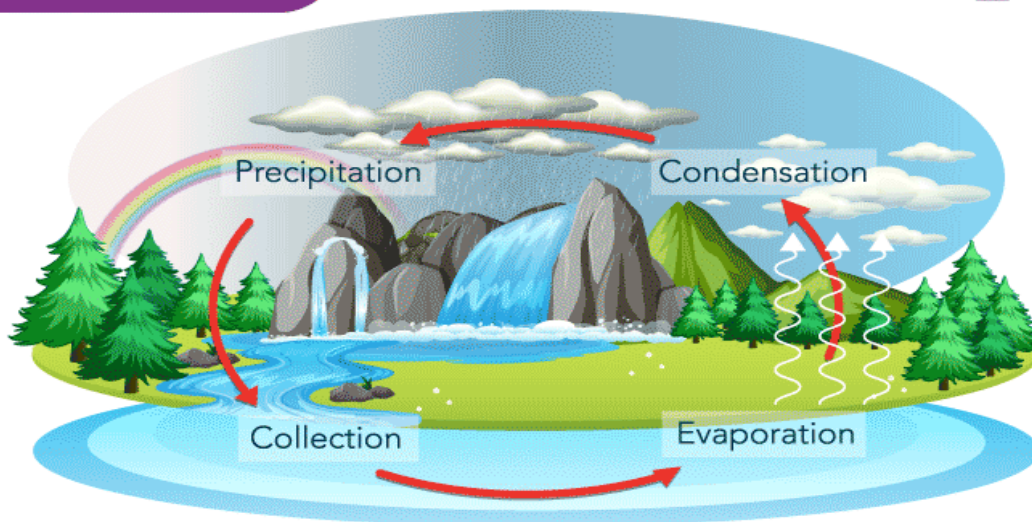


4. Hydrologic or Water Cycle

Water is an essential element for life to exist on earth.

- Water from oceans, lakes, rivers and other reservoirs is continuously converted to vapour by the process of evaporation and transpiration from the surface of plants
- Water vapours get condensed and return by precipitation and the cycle continues
- The water falling on the ground is absorbed and stored as groundwater

WATER CYCLE



Importance of Nutrient Cycling

All living organisms, biomolecules and cells are made up of carbon, hydrogen, oxygen, nitrogen, sulphur and phosphorus. These elements are essential for life. It is important to recycle and continuously replenish nutrients into the environment for life to exist.

Nutrient cycling is important for:

- It is required for the transformation of nutrients from one form to another so that it can be readily utilised by different organisms, e.g. plants cannot take atmospheric nitrogen and it has to be fixed and converted to ammonium and nitrate for uptake.
- Transfer of nutrients from one place to another for utilisation, e.g. air to soil or water
- Nutrient cycles keep the ecosystem in equilibrium and help in storing nutrients for future uptake
- Through nutrient cycling, living organisms interact with the abiotic components of their surroundings

Entities live in an assemblage of populations having at least two different species who are in constant interaction with each other either directly or indirectly within a specific geographical region in an ecological community. The interaction between species forms the basis for many biological processes in ecosystems such as the food chain and the nutrient cycle.

WHAT ARE THE TYPES OF INTERACTIONS BETWEEN ORGANISMS -

The nature of these interactions depends upon the environmental conditions and evolutionary aspects in which they exist. There are several classifications of these interactions which are found in different ecosystems. These interactions can be used as a framework in analyzing the ecological community to describe processes that naturally occur which in turn can be used to predict human modifications that may affect the properties and processes of [ecosystems](#). These interactions can be inter-specific(interactions with different species) or intra-specific(interactions between same species). There are five types of interactions between different species as listed below:

- Competition & Predation
- Commensalism
- Parasitism
- Mutualism
- Amensalism

Competition And Predation

When one entity hunts another animal to suffice its nutritional requirements, it is referred to as predation. A predator is an entity that hunts its prey. For example, a snake eats a frog. Here snake is the predator and the frog is its prey. Competition, on the other hand, is when populations or even an individual compete for food resources. It is often referred to as exploitative or consumptive competition. When there is a competition for territory it is interference competition and preemptive competition is when they compete for a new piece of territory and have arrived first.

Commensalism

It is an imbalanced type of interaction wherein one entity benefits while the other is neither harmed nor benefited. There are four types of commensal associations.

- Inquilinism – An entity occupies living habitat of another species(burrow, nest)
- Chemical commensalism – A bacteria produces a chemical which nurtures another bacteria
- Phoresy – An organism tentatively attaches itself to another entity for transportation requirements.
- Metabiosis – One entity is dependant on the other for survival

Parasitism

One entity benefits from other entities and is harmed, but not necessarily killed. The entity that is harmed is the host and the one benefited is the parasite. When the host is killed, this type of behaviour is referred to as parasitoidism. These parasites can be living on the surface of the host, often addressed as ectoparasites (fleas, leeches) while endoparasites live inside the host. Endoparasites can be subdivided into intracellular parasites (live inside cells) and intercellular parasites (live in spaces between cells).

Mutualism

Both species involved in the interaction are benefited. These interactions take place in three patterns:

- Facultative mutualism – Species survive on their own under favourable conditions
- Obligate mutualism – One species is dependent for survival on the other
- Diffusive mutualism – One entity can live with multiple partners

These relationships have three purposes:

- Defensive mutualism
- Trophic mutualism
- Dispersive mutualism

Amensalism

In this type of interaction, when one population finds itself in danger the other population is not majorly affected. For instance, Tall and wide plants hinder the growth of comparatively smaller plants. Some plants even secrete substances that repress the growth of nearby plants in order to remove competition.

UNIT-5

Environmental Policies & Practices Environmental policy, any measure by a government or corporation or other public or private organization regarding the effects of human activities on the environment, particularly those measures that are designed to prevent or reduce harmful effects of human activities on ecosystems. Environmental policies are needed because environmental values are usually not considered in organizational decision making. There are two main reasons for that omission. First, environmental effects are economic externalities. Polluters do not usually bear the consequences of their actions; the negative effects most often occur elsewhere or in the future.

3 Ways You Can Impact Environmental Policy

1. **Make Your Voice Heard.** The United States' Environmental Protection Agency offers many support programs for state and local governments. ...

2. **Help Change Public Opinion.** ...

3. **Lead By Example – Live What You Preach!** ...

4. **Sources.** Environmental policy can include laws and policies addressing water and air pollution, chemical and oil spills, smog, drinking water quality, land conservation and management, and wildlife protection, such as the protection of endangered species.

Environmental Policies & Practices

The benefits of an environmental policy

Guide An environmental policy should form the foundation of environmental improvements made for your business. The environmental policy can provide significant benefits to your business.

Advantages of an environmental policy Some of the business benefits of an environmental policy include:

- helping you to stay within the law
- keeping employees informed about their environmental roles and responsibilities
- improving cost control

- reducing incidents that result in liability
- conserving raw materials and energy
- improving your monitoring of environmental impacts
- improving the efficiency of your processes

The benefits are not restricted to internal operations. By demonstrating commitment to environmental management, you can develop positive relations with external stakeholders, such as investors, insurers, customers, suppliers, regulators and the local community. This in turn can lead to an improved corporate image and financial benefits, such as increased investment, customer sales and market share. Environmental policy, conservation and the management of natural resources were once the function of appointed officials in the public sector (Mitchell, 1989). More recently, environmental policy and management has been constructed as a broader projects.

Environmental Policies & Practices

Disadvantages of environmental policies:

- 1) Cost is the major disadvantage of a environmental policy as there is need of money to implement it.
- 2) If there is no public support to a policy it would be a failure , also sometime public response can severe for example if you are protecting a natural area and people have high rely on that particular area.

The six laws related to environmental protection and wildlife are

- : 1.The Environment (Protection) Act, 1986;
- 2.The Forest (Conservation) Act, 1980;
- 3.The Wildlife Protection Act, 1972;
- 4.Water (Prevention and Control of Pollution) Act, 1974;
- 5.Air (Prevention and Control of Pollution) Act, 1981 and
- 6.The Indian Forest Act, 1927

Creating an environmental policies: The content of your policy should be based on the results of your assessment, which should have identified the key issues that apply to your business.

Environmental Policies & Practices Your policy should contain brief statements on the following criteria:

- The business mission and information about its operations. Bear in mind that if your business activities or operations change significantly, the policy may need to be amended
- A commitment to continually improve your environmental performance.
- A commitment to effectively manage your significant environmental impacts.
- The expectations that your business has in relation to external parties such as suppliers and contractors.
- Recognition that you will comply with relevant environmental legislation as a minimum level of performance.
- Education and training of employees in environmental issues and the environmental effects of their activities.
- Monitoring progress and reviewing environmental performance against targets and objectives on a regular basis (usually annually or in the first six months initially). See the page in this guide on how to keep your environmental policy up to date.
- A commitment to communicate your business' environmental aims and objectives to all staff, as well as to customers, investors and other external stakeholders .

Environmental Policy: An environmental policy helps set the tone for an organization, facility, or department regarding environmental protection and sustainability, must be clearly articulated from the top, and must permeate all the way throughout an organization, facility, or department's structure. There are many substantial federal, city, or local level laws and regulations regarding protecting the environment. However, in many cases, there is still an awful lot of Environmental Policies & Practices room for improvement when it comes to preventing pollution, saving energy, and limiting greenhouse gases, which

means going far and above compliance. Environmental policies must include a pledge to continually measure and improve environmental performance, and many include a promise to seek ways to reduce energy, limit fuel consumption, lessen emissions, prevent pollution, reduce greenhouse gases, and reduce potable water consumption, or an infinite number of other appropriate metrics, that when measured can show improvement in environmental sustainability. The environmental policy decrees to the entire organization what is of utmost importance to an organization, beyond financial and budgetary concerns.

Some of the important legislations for environment protection are as follows

- The National Green Tribunal Act, 2010
- The Air (Prevention and Control of Pollution) Act, 1981
- The Water (Prevention and Control of Pollution) Act, 1974
- The Environment Protection Act, 1986
- The Hazardous Waste Management Regulations, etc.

These important environment legislations have been briefly explained

1. The National Green Tribunal Act, 2010 The National Green Tribunal Act, 2010 (No. 19 of 2010) (NGT Act) has been enacted with the objectives to provide for establishment of a National Green Tribunal (NGT) for the effective and expeditious disposal of cases relating to environment protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto.

2. The Air (Prevention and Control of Pollution) Act, 1981 The Air (Prevention and Control of Pollution) Act, 1981 (the "Air Act") is an act to provide for the prevention, control and abatement of air pollution and for the establishment of Boards at the Central and State levels with a view to carrying out the aforesaid purposes. To counter the problems associated with air pollution, ambient air quality standards were established under the Air Act. The Air Act seeks to combat air pollution by prohibiting the use of polluting fuels and substances, as well as by regulating appliances that give rise to air pollution.

3. The Water (Prevention and Control of Pollution) Act, 1974 The Water Prevention and Control of Pollution Act, 1974 (the "Water Act") has been enacted to provide for the prevention and control of water pollution and to maintain or restore wholesomeness of water in the country. It further provides for the establishment of Boards Environmental Policies & Practices The Water Act prohibits the discharge of pollutants into water bodies beyond a given standard, and lays down penalties for non-compliance. At the Centre, the Water Act has set up the CPCB which lays down standards for the prevention and control of water pollution. At the State level, SPCBs function under the direction of the CPCB and the State Government.

4. The Environment Protection Act, 1986 The Environment Protection Act, 1986 (the "Environment Act") provides for the protection and improvement of environment. The Environment Protection Act establishes the framework for studying, planning and implementing long-term requirements of environmental safety and laying down a system of speedy and adequate response to situations threatening the environment. It is an umbrella legislation designed to provide a framework for the coordination of central and state authorities established under the Water Act, 1974 and the Air Act. The term "environment" is understood in a very wide term under s 2(a) of the Environment Act. It includes water, air and land as well as the interrelationship which exists between water, air and land, and human beings, other living creatures, plants, micro-organisms and property.

5. Hazardous Wastes Management Regulations Hazardous waste means any waste which, by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics, causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances.

Environmental Protection Act:

The Environment (Protection) Act was enacted in 1986 with the objective of providing for the protection and improvement of the environment. It empowers the Central Government to establish authorities [under section 3(3)] charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country. The Act was last amended in 1991.

Indian Environmental law: Since the sixties concern over the state of environment has grown the world over. There has been substantive decline in

environment quality due to increasing pollution, loss of vegetal cover and biological diversity, excessive concentration of harmful chemicals in the ambient atmosphere and in food chains, growing risks of environment accidents and threats to life support systems. The Decision which were taken at united nation conference on the human conference on the Human Environment held in Stockholm in june 1972 were based on the world community's resolve to protect and enhance the environmental concerns. Although several measures had been taken for environmental Protection both before and after the Conference it was found necessary to enact a comprehensive law on the subject to implement the decision of the conference. Accordingly the Environment (Protection) Bill passed was introduced in the Parliament Various different areas of environmental protection have been covered by different laws, drawn up at different times.

Some of the areas covered include :- Environmental Policies & Practices

- Air pollution
- Water pollution
- Forest and wildlife protection
- Waste management
- Wild Life

Environmental practices: The environmental management criteria of the Foundation for the Social Promotion of Culture (Social Promotion) are reflected in this Guide of Good Environmental Practices. Social Promotion meets all requirements of control and transparency in the exercise of its mission and has signed the Code of Conduct of NGDOs of the Spanish NGDOs Coordinator, pledging to promote “a type of development respectful of the environment.

Environmental Policies & Practices

Environmental practices work on home:

10 Sustainability Practices You Can Follow At Home

- Avoid Disposable Items: Use cloth shopping bags instead of getting plastic or paper bags at the store. ...

- Make Your Household Chemicals: ...
- Eat Low on the Food Change: ...
- Transition to Renewable Energy: ...
- Go Car-Free: ...
- Eat Locally: ...
- Live Smaller: ..
- . • Make Your Own Cosmetics:

A good way would be to start with conserving water, driving less and walking more, consuming less energy, buying recycled products, eating locally grown vegetables, joining environmental groups to combat air pollution, creating less waste, planting more trees, and many more

Ten Environmental Property Management Practices:

1. Conduct an environmental audit The best way to truly understand your current state is to conduct an environmental audit. Once you know your energy consumption patterns, you'll be able to identify problems, set achievable goals, and choose the environmental practices that work best for you.
2. Use energy efficient light bulbs This is a low cost, high-impact practice that will help you save money and reduce maintenance LED light bulbs use about 25 to 85% less energy than traditional bulbs, and can last 3 to 25 times longer.
3. Run a towel and linen program 85% of European hoteliers are already on board with this practice, according to your search You'll save water, detergent, and energy when you give your guests the option to reuse their towels and linens. To let your guests know how they can get involved, place water saving information cards in your rooms.
4. Invest in eco-friendly dishwashers and laundry systems All residential properties should have fully-equipped bathrooms and kitchens. From laundry and dishwashing to room cleaning, there's no denying residential buildings consume a lot of water.
5. Promote a paperless environment Technology makes it easy for property owners to reduce their paper consumption. With a cloud-based building

management system, you can manage all aspects of your property in one central location—no printing required.

6. **Adopt a green purchasing policy** Adopting a green purchasing policy means taking environmental, social, and ethical considerations into account for every decision you make. It involves choosing products and Environmental Policies & Practices services that have a reduced impact on the environment. You'll avoid products containing toxic substances, consider whether the products can be recycled, and choose energy efficient and products.

7. **Build a waste management and recycling program** Tenants of large residential properties and hotel guests generate massive amounts of waste. Developing a strong waste management and recycling program (including composting) is thus one of the top environmental practices for property owners. To get your tenants or guests involved, provide recycling instructions in rooms and place recycling bins in convenient locations throughout your property.

8. **Provide staff training on green initiatives** The more aware and involved your employees are, the easier it will be to manage your green initiatives. Have your staff attend courses on green management and environmentally friendly practices so they can appreciate the crucial role they play.

9. **Monitor your energy consumption** Energy is the second hotel management, after payroll. Plenty of tools exist to help you boost energy efficiency, but automatic energy consumption monitoring is the foundation you need to catch problems early and track your improvements.

10. **Install a leak detection device** Even a small plumbing leak can cause irreversible damage and cost thousands of euros to fix. Most property owners rely on manual water readings, which are often inaccurate and infrequent. Plus, they don't catch leaks in time

What is the role of Indian culture in the environment?

Conservation of sacred species, groves, forests and landscapes has been an important aspect of the ethics of Indian culture. The Sacred Groves / Forests are important repositories of floral and faunal diversity that have been conserved by local communities in a sustainable manner

Indian Culture helps Conservation of wildlife because Bisnois of Rajasthan has an attitude of preserving wildlife which includes Khejri trees and Black Buck from 1451 or so. Moreover, Indian Culture Admires and worships Nature and religion preserves and nourishes nature.

ROLE OF INDIAN CULTURE IN ENVIRONMENT CONSERVATION

Conclusion

It becomes imperative that we adopt new things without losing the basic character of our long cherished traditions and values which include environmental conservation. India is a culturally rich and diverse country where people speak many languages, with many communities which live in their respective social structures completely depending on their environment to ensure their livelihood.

Culture, Environment And Technology

Whole civilizations have come into existence near sources of water like Indus Valley Civilization.

In this sense, nature and culture become intertwined. Culture reflects our history, tradition and our beliefs. Revolutions in the technological and communication fields and the advent of globalization have made an impact on our culture which have made an impact on our culture which have also evolved with time.

Contribution of Hindu

Religion

- Protection of wildlife and natural resources has been enshrined in Hindu religion and culture and it has also been stressed in the Constitution of India.
- Governments of different Indian states are promoting regeneration of forests and their protection with the help of action and rational participation of the local people.

Culture Of India

Sacred Groves

Nature In Indian Art And Scriptures

- India is the birthplace of Hinduism, Buddhism, Jainism and Sikhism, collectively known as Indian religions. Indian religions are a major form of world religions.
- India is full of cultures and these culture have their value system and ethics , which even helps the conservation of environment.
- Indian painting, sculpture, architectural ornamentation, and the decorative arts is replete with themes from nature and wildlife reflecting love and reverence, and therefore the ethics of conservation.
- In literature and scriptures too there has been considerable depiction of the appreciation and love for nature such as in "Panchtantra" which is an Indian collection of animal fables in verse and prose.

- One of the finest examples of traditional practices in India based on religious faith which has made a profound contribution to nature conservation has been the maintenance of certain patches of land or forests as "sacred groves" dedicated to a deity or a village God, protected, and worshiped.
- These are found all over India, and abundantly along the Western Ghats, the west coast, and in several parts of Kerala, Karnataka, Tamil Nadu and Maharashtra.

Indian Culture helps Conservation of wildlife

Indian Culture helps Conservation of water

- Bisnois of Rajasthan have a tradition of protecting wildlife including Black Buck and Khejri trees since 1451 or so.
- Garuda, lion, peacock, and snake—are part of our cultural ethos from time immemorial.
- Indian traditions and cultures have been protecting our ponds and other water bodies.
- We worship Ganga river and other rivers, the kund at Trayambkeshwar is considered to be the origin of the sacred Godawari river etc.

Indian Culture Worships Nature

Indian Culture Saving Trees

- Indian Culture tells people to worship trees and hence saving trees from being cut.
- Moreover trees are considered sacred in India
- We, as Indians, take pride in our strong cultural heritage. Religion protects and nurtures nature.
- If we take a look at Hinduism, we worship the sun, wind, land, trees, plants, and water which is the very base of human survival.

What is Environment Conservation?

Environmental conservation" is the broad term for anything that furthers the goal of making life more sustainable for the planet. Ultimately, people want to help the planet survive naturally and with no negative impact from the human race. Helping keep the planet safe and healthy is called "conservation."

What is the role of religion and culture in the environment?

Religion and culture can significantly address climate change, biodiversity and ecosystem loss, pollution, deforestation, desertification and unsustainable land and water use, and other

urgent issues identified in a shared vision by all nations in line with the 2030 Agenda for Sustainable Development.

GREEN POLICY-

Green politics, or ecopolitics, is a political ideology that aims to foster an ecologically sustainable society often, but not always, rooted in environmentalism, nonviolence, social justice and grassroots democracy.

Green Politics

Introduction Ecologism or green political theory is the most recent of schools of political thinking. On the one hand, it focuses on issues that are extremely old in politics and philosophical inquiry – such as the relationship between the human and nonhuman worlds, the moral status of animals, what is the ‘good life’, and the ethical and political regulation of technological innovation.

Yet on the other, it is also characterised as dealing with some specifically contemporary issues such as the economic and political implications of climate change, peak oil, overconsumption, resource competition and conflicts, and rising levels of global and national inequalities. It is also an extremely broad school of political thought covering a wide variety of concerns, contains a number of distinct sub-schools of green thought (here sharing a similarity with other political ideologies) and combines normative and empirical scientific elements in a unique manner making it distinctive from other political ideologies.

Some Origins of Green Political Thinking Some origins of green theory can be identified and summarised:

- the ‘romantic’ and negative reactions to the Industrial Revolution, from working class and peasant resistance to capitalism, mechanisation and the factory production system, the enclosure of the commons, and the despoliation of the countryside;
- the positive reaction to the unfinished project of the French (democratic) Revolution;

- a negative reaction to ‘colonialism’ and ‘imperialism’ in the nineteenth and twentieth centuries, and a related concern with global ecological injustice, the ‘ecological debt’ owed by the minority/’developed’ world to the majority/’underdeveloped’ world and minority/majority world relations of inequality and power;
- the emergence of the science of ecology and Darwin’s evolutionary theory, and later the integration of science, ethics and politics in diagnosing and providing answers to socio-ecological and related problems;
- issues around the resource, pollution and especially energy foundations for human social, economic and political organisation, lifestyles and realisable conceptualisations of the ‘good society’ and ‘good life’;
- growing public perception of an ‘ecological crisis’ in the 1960s, claims of ‘Limits to Growth’ from the 1970s onwards, and the emergence of ‘global environmental problems’ in the 1980s and 1990s, and peak oil and climate change in the early part of this century;
- transcending the politics of ‘industrialism’ (organised on a left–right continuum) by a politics of ‘post-industrialism’ (beyond left and right);
- increasing awareness of and moral sensitivity to our relations with the nonhuman world (from the promotion of ‘animal rights’ and animal welfare to ideas that the Earth is ‘sacred’ and/or has intrinsic value);
- the integration of progressive social, political and economic policies with the politics of transition to a sustainable society, principally the universal promotion of human rights, socio-economic equality, democratisation of the state and the economy. (Barry, 2007)

Green Politics and Human Flourishing

If we accept this health metaphor, this represents a distinctive green view of ethics and politics (Barry, 2012). It enables us to understand the urgency of actually existing unsustainability and its associated exploitation of people, the abuse of the planet and the continuing degradation of the non-human world. One of the features of this health/suffering/flourishing perspective, and perhaps the one that results in some being critical of its use, is its potential for abuse by whoever or whatever authority determines what is and what is not ‘human flourishing’. This is a legitimate concern since anyone or any institution that

determines your health can potentially do so without any reference to you – that is, such objective forms of determining what is good for people can fall foul of the ‘shoe pinching objection’. Namely that only the person wearing the shoe can know if and where it pinches: this cannot be determined by some external authority. It can have non-democratic results in that relations between people governed on the basis of ‘expert knowledge’ are usually (and often legitimately) non-democratic. The classic example here is a patient’s relationship to her doctor – we do not typically view this relationship as one that necessarily has to be structured by democratic norms. The application of democratic norms is usually viewed as inappropriate in this (and other similar cases). However, notwithstanding these important considerations, I do not think that making a health, or suffering, or harm, focus central to one’s political position necessarily leads to such undemocratic and unjust results. Another concern is ‘perfectionism’, which is the concern that such a quasi-objectively determined sense of human flourishing could result in nondemocratic, individual-insensitive intrusions which would ‘force’ people to ‘flourish’ along a particular pattern over which they had not control or to which they do not lend their consent or approval.

What is the meaning of Earth Hour?

Earth Hour is an initiative to encourage individuals, businesses and governments around the world to take accountability for their ecological footprint and engage in dialogue and resource exchange that provides real solutions to our environmental challenges

According to Earth Hour Organization, “The purpose of Earth Hour is to serve as a universal call to action to safeguard the environment and raise awareness of how little time we have left to do so. We need our increasingly divided society to come together now more than ever to take immediate action for our single home

Earth Hour is a worldwide movement organized by the [World Wildlife Fund](#) (WWF). The event is held annually, encouraging the individuals, communities, and businesses to give an hour for Earth, and additionally marked by landmarks and businesses switching off non-essential electric lights, for one hour from 8:30 to 9:30 p.m., usually on the last Saturday of March, as a symbol of commitment to the planet.^[1] It was started as a lights-off event in [Sydney](#), Australia, in 2007.

Conception and start: 2004–2007 [\[edit\]](#)

In 2004, confronted with scientific findings, WWF Australia met with advertising agency [Leo Burnett Sydney](#) to "discuss ideas for engaging Australians on the issue of climate change".^[2] The idea of a large scale switch off was coined and developed in 2006, originally under the working title "The Big Flick". WWF Australia presented their concept to [Fairfax Media](#) who, along with Sydney Lord Mayor [Clover Moore](#), agreed to back the event.^[2] The 2007 Earth Hour was held on March 31 in Sydney, Australia at 7:30 pm, local time.

In October 2007, [San Francisco](#) ran its own "Lights Out" program inspired by the Sydney Earth Hour.^[3] After their successful event in October, the organizers decided to rally behind the Earth Hour being planned for March 2008.^[4]

green technologies-

Green tech is the use of science and technology to develop eco-friendly products and services that protect our environment. It includes renewable energy, sustainable transportation, waste management and recycling, energy efficiency solutions, all helping us move towards a more sustainable future

Green tech refers to a type of technology that is considered environmentally friendly based on its production process or its [supply chain](#). Green tech—an abbreviation of "green technology"—can also refer to [clean energy production](#), the use of alternative fuels, and technologies that are less harmful to the environment than fossil fuels.

Although the market for green technology is relatively young, it has garnered a significant amount of investor interest due to increasing awareness about the impacts of climate change and the depletion of natural resources.

KEY TAKEAWAYS

- Green tech—or green technology—is an umbrella term that describes the use of technology and science to reduce human impacts on the natural environment.
- Green technology encompasses a wide area of scientific research, including energy, atmospheric science, agriculture, material science, and hydrology.
- Many green technologies aim to reduce emissions of carbon dioxide and other greenhouse gases in order to prevent climate change.
- Solar power is one of the most successful green technologies and is now cheaper to deploy than fossil fuels in many countries.
- Investors can support green technology by buying stocks, mutual funds, or bonds that support environmentally friendly technology.

Understanding Green Tech

Green technology is an umbrella term that describes the use of technology and science to create products and services that are environmentally friendly. Green tech is related to [cleantech](#), which specifically refers to products or services that improve operational performance while also reducing costs, energy consumption, [waste](#), or negative effects on the environment.

The goal of green tech is to protect the environment, repair damage done to the environment in the past, and conserve the Earth's natural resources. Green tech has also become a burgeoning industry that has attracted enormous amounts of investment capital.

The use of green tech can be a stated goal of a business segment or a company. These goals are typically outlined in a company's [environmental, sustainability, and governance \(ESG\)](#) statement, or can even be found in the [mission statement](#) of a firm. Increasingly, socially responsible investors are looking to narrow down their prospective investments to only include companies that specifically employ or produce green technologies.

History of Green Tech

While green tech has become increasingly popular in the modern age, elements of these business practices have been in use since the Industrial Revolution. Beginning in the early 19th century, scientists began to observe the ecological impacts of coal-burning industrial plants, and manufacturers have sought to reduce their negative environmental [externalities](#) by altering production processes to produce less soot or waste byproducts.

In the United States, one of the most important milestones was the Second World War. In order to reduce consumption and waste, more than 400,000 volunteers began collecting metal, paper, rubber, and other materials for the war effort.

Types of Green Tech

Green technology is a broad category that encompasses several forms of environmental remediation. While climate change and carbon emissions are now considered among the most pressing global issues, there are also many efforts to address local environmental hazards. Some seek to protect specific ecosystems or endangered species. Others seek to conserve scarce natural resources by finding more sustainable alternatives.

Alternative Energy

In order to provide a viable alternative to fossil fuels, many businesses are seeking to engineer alternative sources of energy that do not generate atmospheric carbon. Solar and wind power are now among the most [inexpensive sources of energy](#), and solar panels are affordable to U.S. homeowners at a consumer scale.⁷⁸ Other alternatives, such as geothermal and tidal energy, have yet to be deployed at scale.

Electric Vehicles

Nearly a third of U.S. greenhouse gas emissions are released by transportation activities, according to the Environmental Protection Agency.⁹ Many

manufacturers are exploring ways to reduce automotive emissions, either by designing more fuel-efficient engines or shifting to electrical power.

However, electric vehicles require a host of innovations in other spheres, such as high-capacity rechargeable batteries and charging infrastructure. In addition, the benefits of electric vehicles are limited by the fact that many power grids still rely on fossil fuels.

Sustainable Agriculture

Farming and livestock have a substantial environmental footprint, from the high costs of land and water usage to the ecological consequences of pesticides, fertilizers, and animal waste. As a result, there are many opportunities for green technology in the area of agriculture. For example, organic farming techniques can reduce the damage due to soil exhaustion, innovations in cattle feed can reduce methane emissions, and meat substitutes can reduce the consumption of livestock.

Recycling

Recycling seeks to conserve scarce resources by reusing materials or finding sustainable substitutes. While plastic, glass, paper, and metal waste are the most familiar forms of recycling, more sophisticated operations can be used to recover expensive raw materials from e-waste or automobile parts.

Carbon Capture

Carbon capture refers to a group of experimental technologies that seek to remove and sequester greenhouse gases, either at the point of combustion or from the atmosphere. This technology has been heavily promoted by the fossil fuel industry, although it has yet to deliver on those expectations.¹⁰ The largest carbon capture facility can absorb 4,000 tons of carbon dioxide per year, a minuscule amount compared to annual emissions.

Adoption of Green Tech

While green tech is a broad and hard-to-define category, some types of green technology have experienced wide adoption. Several countries have launched initiatives to eliminate single-use plastics, a goal that would require sizeable investments in alternatives, such as paper substitutes, bioplastics, or recycling technologies. Singapore, for example, has pledged to reach 70% recycling by 2030.¹³

Renewable energy is another frontier for green tech adoption, with fossil fuels recognized as a significant driver for climate change. According to the Energy Information Administration, solar and wind power together will account for 71% of the new energy capacity added in 2024.¹² Worldwide, global investment in all renewable energy sources exceeded \$1.74 trillion in 2022.¹⁴

Special Considerations

While green technologies have the shared goal of preserving biodiversity and conserving the earth's resources, there are few ways to do so without affecting the environment in other ways. In some cases, reducing environmental costs in one area means causing adverse impacts in another.

For example, the batteries in electric vehicles rely on lithium, an element that is often strip-mined from South American rain forests.¹⁵ Hydroelectric dams have low carbon emissions, but high impacts on the salmon and other species that rely on those waterways.¹⁶ [Green energy devices](#) such as solar panels and wind turbines require a host of rare minerals, that can only be extracted with the use of toxic chemicals.^{17 18}

This does not necessarily mean that green technology is a lost cause, but it does require careful accounting to ensure that the benefits outweigh the costs.

What Is the Cheapest Form of Green Energy?

The cheapest form of alternative energy is solar power, according to the International Energy Agency. In its 2020 World Outlook Report, the Agency found that photovoltaic solar energy is "consistently cheaper than new coal- or gas-fired power plants in most countries, and solar projects now offer some of the lowest-cost electricity ever seen."¹⁹

How Do You Invest in Green Technology?

The easiest way to [invest in green tech](#) is to buy stock in companies that are making major bets on environmentally-friendly technologies. Investors can attempt to identify individual stocks, or simply invest in a mutual fund, index fund, or another instrument that seeks to reflect the broader market for environmental investments. The advantage to the latter approach is that the investor will gain diversified exposure to the green tech industry, rather than the fortunes of a single company.

Is Nuclear Power Green?

Nuclear power is a deeply controversial subject, and many scientists have disputed its benefits. Although nuclear power derived from fission can provide reliable, inexpensive electricity without greenhouse gases, it also produces highly radioactive waste that must be stored for thousands of years. Some activists have argued that nuclear power can never be safely generated, and a number of high-profile accidents—notably at Chernobyl and Fukushima—have highlighted these

concerns. However, it should also be noted that the combined death toll from nuclear accidents is far lower than the annual fatalities from fossil fuel pollution.

What is the role of public awareness in environment?

1. Introduction Environment literally means surroundings and is derived from French word 'environ'. Environment constitutes all the abiotic and biotic components. Every organism is dependent on its environment for food, shelter and living. There is continuous exchange of matter and energy in the environment which is necessary for making it hospitable for various organisms. Survivability of the organism is dependent on steady supply and removal of waste from environment. Environment provides conditions for existence and development of living organisms. Rapid urbanization, increase in population and industrialization are the serious problems which have disturbed the balance of the nature. It has led to depletion of natural resources with pollution of soil, air and water. Evolving concepts of development and modernization have drastically put pressure on the ecosystems and deteriorated healthy atmosphere. Modern day human are so busy to achieve their goals that they are least bothered about what is happening in the surrounding and its impact on environment. All these factors makes it essential to spread awareness among the public.

2. Scope of public awareness Quality and integrity of environment can be preserved by public awareness. Dwindling environment is the biggest threat to the existence of human beings. Loss of valuable natural resources and pollution lead to harmful effects as well as abiotic stress on flora and fauna. Public awareness is one of the basic principles in environment management. It

involves: 1. Developing sensitivity and awareness towards environmental issues. 2. Inculcating and imbibing the stringent need for conservation of natural resources and surrounding environment. 3. Encouraging active participation of the people in environmental protection and development. 4. Developing expertise for the active identification and finding remedy to environmental problems.

3. Need of public awareness in Environment management It is very important to make public aware about the deadly consequences of the environmental degradation as it would lead to massive extinction of life if left unattended and reformative measures are not undertaken. We are facing various environmental challenges that need to be tackled stringently for sustainable growth and development. Eco-friendly approach needs to be followed in every nation to acquaint for the threats posed in the name of industrialization and development. Natural

resources are limited in the world. We are dependent on natural ecosystems for the products obtained from forests, grasslands, oceans and from agriculture and livestock as well as water, air, soil, minerals, oil etc. which are indispensable part of our life support systems. Life would be impossible without these all substances. Increase in population put pressure on these limited natural resources. The earth cannot sustain the ever growing demand for resources. Moreover misuse of resources is the other contributing factor to environmental deterioration. Wastage and pollution of water resources, generation of non-biodegradable materials like plastic, non-recyclable electronic waste, nuclear waste are the other serious threats. Manufacturing processes generate solid waste, chemicals and gases that pollute the environment. Alarming increase in waste generation cannot be managed by natural processes as most of the synthetic waste is nonbiodegradable. These keep on accumulating in our environment leading to a variety of diseases and other adverse environmental effects that seriously affects our lives. Air pollution leads to chronic respiratory diseases, water pollution to gastro-intestinal diseases, and many toxic pollutants are known to cause cancer.

3.1. Population explosion Current population in India has reached nearly 1.34 billion with population growth rate of 1.2%. Some of the reasons for rapidly growing population are illiteracy, poverty, high fertility rate, reduced mortality rates and infiltration from neighboring countries. It puts extensive pressure on natural resources to meet growing demands. Hence, population growth is the biggest challenge. Women literacy and awareness are some of the measures that need to rigorously practice to circumvent this challenge.

3.2. Poverty Environment –poverty nexus dates back from ages. Poverty was one of the main agenda for the achievement of Millennium Development Goals (MDGs) framed by United Nations and its eradication from the world is the first goal for year 2030 Agenda for sustainable development. Although number of poor as well as the proportion of poor below the poverty line (according to the Tendulkar poverty line) have been declining over two decades as per government reports, but about 270 million are still below the poverty line. Initiatives like MGNREGA have been taken to improve the poverty presiding in India. Majority of poor people are directly dependent on the natural resources for their basic needs like food, fodder fuel and shelter. Environment degradation has adversely affected the status of poor who depend upon natural resources for their immediate needs. Thus, the challenge of poverty and the challenge of environment degradation are two sides of the same coin. The population growth and poverty are interlinked as every child is the bread winner for the family.

3.3. Agricultural Growth The main aim of green revolution was making nation food sufficient but the strategies adopted in achieving this aim lead to harmful effects directly on the rural and indirectly on the urban communities. Introduction of high yielding varieties, indiscriminate use of fertilizers, insecticides have led to development of resistant varieties of flora and fauna, decreased soil fertility, disturbance of the natural ecosystems etc

3.5. Deforestation Massive deforestation is the result of industrialization. Submerging of forests due to building of dams for hydroelectric power plants has led to displacement of local people, and damage to flora and fauna. Dams on river Narmada, Bhagirathi etc. have become hot topics for debate in political and scientific spheres. Forests cover in India has been decreasing from last few decades owing to pressures of development. Vast areas have turned into wastelands. These areas can be rejuvenated by increasing vegetative cover. The tribal communities respect flora and fauna to sustain their lives. Local people should be integrated with knowledge and skills of the forest department for restoring and conserving forests. Well planned strategies by joint management of forests should be evolved. We must recognize the power of awareness and integrity of the public towards environment issues from past. 'Narmada bachaoandolan' is one such acclaimed protest for preserving environmental integrity by the local people.

3.6. Land degradation Land is a limited resource. With the increase in human population and economic development, demand for land is increasing. Total land area of India is 329 million hectares out of which only 266 million hectares have potential productivity. 143 million hectares of land is under cultivation and remaining land area (85 million hectares) has suffered from soil degradation. Nearly 30% of the land in India is degraded. From 123 million hectares, 40 million hectare land is completely unproductive. Overgrazing, water and soil erosion leads to further land degradation. This degradation can be avoided by reforestation and local public efforts to restore land usage.

3.7. Technological Advancement Present day people are more concerned about using latest technologies without knowing potential ill effects of the gadgets and electronic devices. Although these have become indispensable part of living in present time but overuse and unnecessary ignorance about potential ill effects need to be tackled. Development has to go hand in hand with vigilance, sensitivity and security toward management of natural resources. This change can be brought in education, administrative procedures, outlook and institutions.

3.8. Genetic Diversity Genetic diversity need to be conserved by taking proper measures. Interbreeding of the wild populations has greatly reduced with urbanization and deforestation leading to alarming

disappearance wild genetic stocks/extinction. Lack of genetic diversity in tigers has been stated as the cause for their extinction. Habitat loss and fragmentation has led to confined breeding. The protected areas like sanctuaries, national parks, biosphere reserves are isolates populations thereby decreasing interbreeding efficiency.

4. Importance of Public awareness in Environmental management
Depletion of the natural resources and environmental degradation necessitates the need for action plan for environment protection. Climate change, loss of biodiversity, ozone layer depletion, and illegal trade of endangered species, habitat destruction, land degradation, ground water depletion, invasive species, environmental pollution, solid waste and sewage disposal pose serious threat to forest, marine, freshwater and other land ecosystems. Ignorance and lack of concern for the environmental issues pose hurdles in environment management. Government alone cannot manage the entire issues single handedly without public support. Every individual should be the integral part of campaign for the prevention of environment degradation as we are the only ones to reap the benefits of clean environment. Prevention is always better than cure. Reducing wastage of natural resources and remaining alert about the sources that lead to pollution and degradation of our environment will enable us to prompt government action for environmental protection. This is possible only through massive public awareness. Newspapers, radio and television strongly influence public opinion. Press and media add on to the public efforts and enforce politicians to respond positively to a strong public movement. NGOs and small help groups are continuously working towards sensitizing people towards environment. Various green policies formed by the government are the fruits of public efforts. Sensitization of the society about environmental issues and challenges initiate skill and expertise development in the individuals leading to appropriate solutions to the environmental issues. Idea of 'DEVELOPMENT WITHOUT DESTRUCTION OF THE ENVIRONMENT' can be accomplished by public awareness only. Public can play important role in law making and their enforcement.

4.1 Environmental Education Goals: The objective of environmental education is that the public should become conscious, attain knowledge, change outlooks, and realize capabilities to combat real-life environmental problems. For this, the general public should be acquainted with integrated inter-disciplinary and holistic education. This is only possible with a new approach to education itself—which should be provided in schools and universities. The goals of environmental education as pointed out by the UNESCO is to create environmental

awareness in the world population—an awareness about the whole environment and problems associated with it and generate commitment in people to work individually and in union towards solving existing problems and preventing new ones from emerging.

4.2. The objectives of environmental education formulated at the UNESCO's Tbilisi Conference (1977) were as follows:

i) Awareness: To make people sensitive towards environment and associated problems that arises due to its misuse.

ii) Knowledge: To help people gain experiences and basic understanding of the environment and related problems.

iii) Skills: People must gain skills for recognizing and resolving environmental problems.

iv) Attitude: Help people acquire values and feelings of concern for the environment and encourage their participation in keeping our environment clean and safe.

v) Participation: Provide an opportunity to get involved at all levels in the task of resolving environmental problems.

What are the achievements of National Green Tribunal?

Since its inception, the NGT has protected vast acres of forest land, halted polluting construction activities in metros and smaller towns. It has protected the rights of tribal communities and ensured the enforcement of the “polluter pays” principle in letter and spirit

- It is a specialised body set up under the National Green Tribunal Act (2010) for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources.
- With the establishment of the NGT, India became the third country in the world to set up a specialised environmental tribunal, only after Australia and New Zealand, and the first developing country to do so.
- NGT is mandated to make disposal of applications or appeals finally within 6 months of filing of the same.
- The NGT has five places of sittings, New Delhi is the Principal place of sitting and Bhopal, Pune, Kolkata and Chennai are the other four.

What is the Structure of NGT?

- The Tribunal comprises of the Chairperson, the Judicial Members and Expert Members. They shall hold office for term of three years or till the age of sixty-five years, whichever is earlier and are not eligible for reappointment.

- The Chairperson is appointed by the Central Government in consultation with Chief Justice of India (CJI).
- A Selection Committee shall be formed by central government to appoint the Judicial Members and Expert Members.
- There are to be least 10 and maximum 20 full time Judicial members and Expert Members in the tribunal.

What are its Powers & Jurisdiction?

- The Tribunal has jurisdiction over all civil cases involving substantial question relating to environment (including enforcement of any legal right relating to environment).
 - In October 2021, the Supreme Court declared the National Green Tribunal's (NGT) position as a "unique" forum **endowed with suo motu (on its own motion) powers to take up environmental issues** across the country.
 - As per SC, the role of the NGT is not simply adjudicatory in nature; it has to perform equally vital roles that are preventative, ameliorative or remedial in nature.
- Being a statutory adjudicatory body like Courts, apart from original jurisdiction side on filing of an application, NGT also has appellate jurisdiction to hear appeal as a Court (Tribunal).
- The Tribunal is not bound by the procedure laid down under the Code of Civil Procedure 1908, but shall be guided by principles of 'natural justice'.
- While passing any order/decision/ award, it shall apply the principles of sustainable development, the precautionary principle and the polluter pays principle.
- NGT by an order, can provide
 - relief and compensation to the victims of pollution and other environmental damage (including accident occurring while handling any hazardous substance),
 - for restitution of property damaged, and
 - for restitution of the environment for such area or areas, as the Tribunal may think fit.
- An order/decision/award of Tribunal is executable as a decree of a civil court.

- The NGT Act also provides a procedure for a penalty for non compliance:
 - Imprisonment for a term which may extend to three years,
 - Fine which may extend to ten crore rupees, and
 - Both fine and imprisonment.
- An appeal against order/decision/ award of the NGT lies to the Supreme Court, generally within ninety days from the date of communication.
- The NGT deals with civil cases under the seven laws related to the environment, these include:
 - The Water (Prevention and Control of Pollution) Act, 1974,
 - The Water (Prevention and Control of Pollution) Cess Act, 1977,
 - The Forest (Conservation) Act, 1980,
 - The Air (Prevention and Control of Pollution) Act, 1981,
 - The Environment (Protection) Act, 1986,
 - The Public Liability Insurance Act, 1991 and
 - The Biological Diversity Act, 2002.
- Any violation pertaining to these laws or any decision taken by the Government under these laws can be challenged before the NGT.

What are the Strengths of NGT?

- Over the years NGT has emerged as a critical player in environmental regulation, passing strict orders on issues ranging from pollution to deforestation to waste management.
- NGT offers a path for the evolution of environmental jurisprudence by setting up an alternative dispute resolution mechanism.
- It helps reduce the burden of litigation in the higher courts on environmental matters.
- NGT is less formal, less expensive, and a faster way of resolving environment related disputes.
- It plays a crucial role in curbing environment-damaging activities.
- The Chairperson and members are not eligible for reappointment, hence they are likely to deliver judgements independently, without succumbing to pressure from any quarter.

- The NGT has been instrumental in ensuring that the Environment Impact Assessment process is strictly observed.

What are the Challenges Pertaining to the Functioning of NGT?

- Two important acts - Wildlife (Protection) Act, 1972 and Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 have been kept out of NGT's jurisdiction. This restricts the jurisdiction area of NGT and at times hampers its functioning as crucial forest rights issue is linked directly to environment.
- The NGT decisions are being challenged in various High Courts under Article 226 (power of High Courts to issue certain writs) with many asserting the superiority of a High Court over the NGT, claiming 'High Court is a constitutional body while NGT is a statutory body.'" This is one of the weaknesses of the Act as there is lack of clarity about what kind of decisions can be challenged; even though according to the NGT Act, its decision can be challenged before the Supreme Court.
- Decisions of NGT have also been criticised and challenged due to their repercussions on economic growth and development.
- The absence of a formula based mechanism in determining the compensation has also brought criticism to the tribunal.
- The decisions given by NGT are not fully complied by the stakeholders or the government. Sometimes its decisions are pointed out not to be feasible to implement within a given timeframe.
- The lack of human and financial resources has led to high pendency of cases - which undermines NGT's very objective of disposal of appeals within 6 months.
- The justice delivery mechanism is also hindered by limited number of regional benches.

What are the Important Landmark Judgements of NGT?

- In 2012, POSCO a South-Korean steelmaker company signed a MoU with the Odisha government to set up steel project.
 - **NGT suspended order** and this was considered a radical step in favour of the local communities and forests.
- In 2012 Almitra H. Patel vs. Union of India case, NGT gave judgment of complete prohibition on open burning of waste on lands, including

landfills – regarded as the single biggest landmark case dealing with the issue of solid waste management in India.

- In 2013 in Uttarakhand floods case, the Alaknanda Hydro Power Co. Ltd. was ordered to compensate to the petitioner – here, the NGT directly relied on the principle of ‘polluter pays’.
- In the *Save Mon Federation Vs Union of India case (2013)*, the NGT suspended a ₹6,400-crore hydro project, to save the habitat of a bird.
- In 2015, the NGT ordered that all diesel vehicles over 10 years old will not be permitted to ply in Delhi-NCR.
- A December 2016 amendment to EIA 2006 notification — the amendments basically sought to give local authorities powers to grant environmental clearance to builders — was nullified by the NGT, terming it as a “ploy” (by the government) to circumvent the 2006 rules.
 - Many Projects which were approved in violation of the law such as an Aranmula Airport, Kerala; Lower Demwe Hydro Power Project and Nyamnjangu in Arunachal Pradesh; mining projects in in Goa; and coal mining projects in Chhattisgarh were either cancelled or fresh assessments were directed.
- In 2017, the Art of Living Festival on Yamuna Food Plain was declared violating the environmental norms, the NGT panel imposed a penalty of Rs. 5 Crore.
- The NGT, in 2017, imposed an interim ban on plastic bags of less than 50-micron thickness in Delhi because “they were causing animal deaths, clogging sewers and harming the environment”.