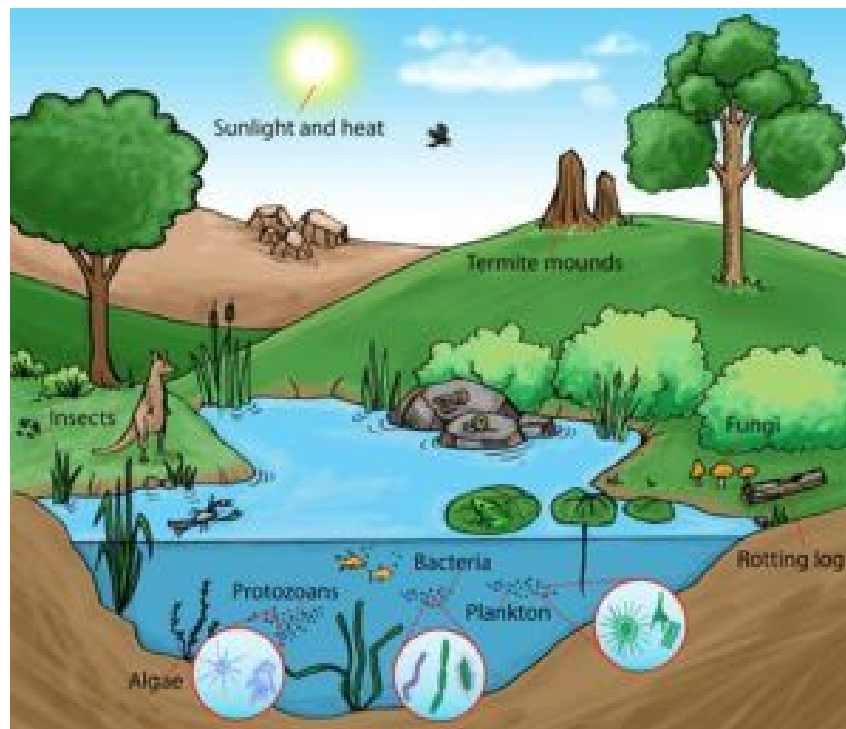


Ecosystem

Why is earth the only planet with life on it? We have aquatic life forms, terrestrial life forms, and aerial life forms too. How is earth the only planet to have ‘An Ecosystem’ on it? But, what is ecosystem and why is it important to learn about it? What would happen if one of the ecosystems disappears? Let us study more about it below.

What is Ecosystem?



A complex relationship between all the living and nonliving things (plants, animals, organisms, sun, water, climate etc)interact with

each other is known as 'An Ecosystem'. Ecosystems are the foundation of 'Biosphere' and maintain the natural balance of the earth.

For example, let's take the relationship between sheep and lion in the ecosystem; for its survival, the lion eats the sheep. And each relationship like this has an effect on other creatures and plants living in the same area.

Hence, if the lion eats more sheep, it has an effect on the plants too; they begin to flourish; since there aren't many sheep to eat the plants.

Each organism in the ecosystem plays an important role, so anytime a 'foreign' factor is put in the ecosystem, it poses a major threat to the ecosystem. This happens because the foreign factor can deform the natural balance of the ecosystem and harm it potentially.

This foreign factor could be anything ranging from rising temperature to the tsunami. Not just the foreign factor but man-made can also destroy the ecosystem.

Components of the Ecosystem

The components of an ecosystem are divided into abiotic components, that include all nonliving components such as minerals, **climate**, soil, water, sunlight and biotic components, that include all the living components. These components together make up for the flow of energy in the ecosystem and the nutrient cycle in the ecosystem.

The gleaming energy from the sun is the basic source of energy in all the ecosystems. The autotrophs (self-sustaining organisms) absorb this energy and produce photosynthesis where they can use this energy to convert CO_2 and H_2O into simple carbohydrates. The autotrophs store energy in these carbohydrates, which they then use to produce more complex and organic products like lipids, proteins, and starches that help the organism to survive.

These autotrophs are the producers of the ecosystem.

Organic compounds produced by autotrophs help in the survival of the heterotrophic organisms. And heterotrophs are the **consumers** of the ecosystem since they're incapable of making

their own food. All organisms like bacteria, fungi or animals are heterotrophs.

Types of Ecosystems

An ecosystem consists of three types of ecosystems, another term for which is 'Biomes'. The three major types are:

a. Aquatic biomes

b. Terrestrial biomes

c. Lentic biomes

a. Aquatic Biomes:

Aquatic biomes are the ones, one finds in water bodies, such as oceans, rivers, seas, lakes, springs, etc. This biome is further divided into smaller ecosystems:

Pond Ecosystems :

Pond ecosystems are comparatively small and mostly include many kinds of amphibians and insects. At times one can also find fishes here but they aren't capable of moving as easily as the amphibians.

River Ecosystems:

This ecosystem consists of fishes along with plants, amphibians, and insects. One may also find birds that hunt in and around the water for its food (small fishes).

Shallow water Ecosystem:

Here one can only find tiny fishes and corals that live in shallow waters close to land.

Deepwater Ecosystem:

These are kind of ecosystem where one can find gigantic sea creatures that live at the deep bottom of the sea. Creatures that wouldn't be visible to the normal human eye.

Want to know What is [Waste](#)?

b. Terrestrial Biomes:

Terrestrial ecosystems are ecosystems that are found on land that include forests, deserts, grasslands, tundras, and coastal regions. There can be more than one terrestrial biome depending on its climate. This ecosystem further divides into:

Rainforests:

Rainforests are the kind of ecosystems that are extremely dense because of a variety of organisms living in a tiny area.

Tundra:

Tundra is the kind of ecosystem that is a relatively simple ecosystem since only a few life forms can survive this ecosystem; especially because of its harsh conditions.

Deserts:

They are opposite of tundras, yet they have extreme conditions. Animals prefer to live in extreme heat than extreme cold.

Forests:

One can find more forests than any other ecosystem in the world such as deciduous and coniferous forests. Forests can support many life forms and complex ecosystems.

c. Lentic Biomes:

These are the kinds of ecosystems that support both aquatic and terrestrial life forms such as swamps. The only requirement is that this kind of ecosystem is the exposure for the photosynthesis process to

happen; since organisms here survive on the carbohydrates made by photosynthesis.

What are the **Effects of Human Activities on Environment?**

Trophic Levels, Food Chain and Food Web

The nutritive levels in a food chain are known as Trophic Levels. The organisms in the trophic levels of the food chain are categorized based on their feeding patterns.



- **Producers (green plants) make for the lowest level of the chain.**

- **Consumption of the by-products of these producers by the herbivores or the primary consumers makes for the second-level.**
- **Next, the consumption of these herbivores by carnivore or the tertiary consumers makes for the third-level. Additionally, omnivores (organisms that consume plants and animals both) as well come at the third level.**
- **Quaternary consumers consist of organisms that eat these carnivores.**
- **Lastly, decomposers make up for a completely different level of the food chain alongside the given levels. These decomposers help in breaking waste materials and convert them into nutrients which is useful for the producers.**

Organisms that lie at the very top of the food chain are known as ‘Apex Consumers’.

All of the above points together make up for what is known as ‘Food Chain’.

Food Web

The interlinking of feeding relationships of various communities of organisms is known as the ‘Food web’.

Solved Example for You

Q. Which of the following organisms eat organic matter and return the nutrients to the soil?

- a. Producer
- b. Decomposer
- c. Scavenger
- d. None of the above

Sol: b. Decomposer

Some animals eat dead animals. They are called scavengers. They help break down or reduce organic material into smaller pieces.

Decomposers then eat these smaller pieces. Decomposers eat dead materials and break them down into chemical parts. Animals and plants, then use nitrogen, carbon and other nutrients. Decomposers help the world in cleaning up the dead plants and animals.

Effects of Human Activities on Environment

‘The world is going to end tomorrow’. Suprised? What if this is true? Maybe not today, but someday and unfortunately, this isn’t something one can simply joke about. Since the rate at which global warming is increasing, there’s no surprise this could actually happen in the near future. And we, humans, are responsible for all of these environmental effects. But is this the only cause we’re responsible for or are there others?

Let us find out more about the environmental effects in the section below.

Human Interference in nature

As the rate of the population keeps increasing day by day, we move nearer towards global extinction. Since more population means more land and more land means more destruction. Humans are known for their greedy and careless nature. To fulfil their needs they'd go to any extent causing very harmful environmental effects. Humans have till date caused following destruction in nature:

Air Pollution and its effects

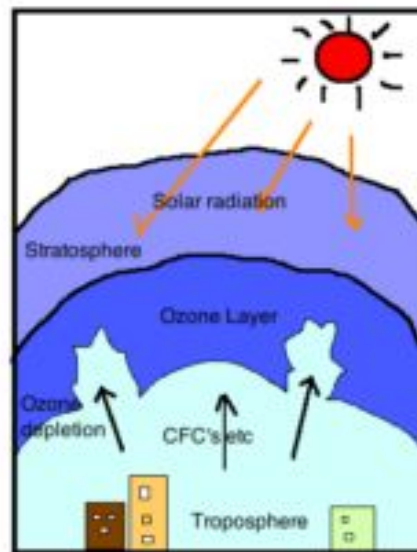
The rate of air pollution is increasing by each passing day due to human interference and it's no surprise that it will now soon hit the peak or already has hit. Air pollution caused by air pollutants have a negative effect on plants as they tend to change the pH levels of the soil, solubilizing toxic salts of metals like Aluminium. Oxides of sulphur and nitrogen are emitted into the atmosphere by combustion of fossil fuels. Later these gases convert into acidic precipitation or rain drop which form acidic rain and infect plants and other forms of vegetation thereby making the food we eat harmful and toxic.

Air pollution is the major cause of the depletion of ozone layer and for many other harmful environmental effects.

Ozone-layer Depletion

One of the major problems caused by air pollution is the depletion of the Ozone layer which has given rise to global warming. Ozone is found in the stratosphere of the atmosphere. The ozone layer protects the earth from the harmful radiations given out by the sun. It absorbs the radiations from the sun thereby preventing it from entering the earth's atmosphere. Emission of CFCs alongside low temperatures is the major cause of ozone layer depletion.

Other factors responsible for this depletion are hydro-chloro-fluro-carbons (HCFCs) and volatile organic compounds. These compounds maintain themselves as long as they're in the lower atmosphere but react and breakdown on exposure to UV rays in the stratosphere. All these factors combined lead to ozone layer depletion.



Effects of Ozone Layer Depletion

Ozone layer depletion has numerous effects on human health and the environment at the large, such as:

- Exposure to UV rays can lead to skin cancer and it's several types, like Melanoma, cell carcinoma and basal.
- Direct exposure to UV rays can also lead to many eye-related issues such as Cataract problems, snow blindness or even Photokeratitis.
- One's immune system can be deteriorated because of exposure to UV rays; since increased temperatures weaken the immune system response.

- Exposure to UV rays can also lead to ageing of the skin, making one look much older than he/she actually is.
- Exposure to UV rays can also cause respiratory diseases such as chest pain, difficulty in breathing or even throat irritation.
- Ozone layer depletion also affects other living beings such as animals. Because of increasing temperature, other organisms are starting to become extinct.
- Ozone layer depletion also affects the marine life as exposure to UV rays warms the water leading to drying up of water bodies.

Solved Example for You

Q. A fish-eating bird species were found to have a specific, heavy metal concentration of 700,000 ppt (parts per trillion). The conclusion based on the data is :

a. Air pollution may have caused this bird species to inhale dangerous amounts of heavy metals while migrating.

- b. The entire population of the bird species, from which this sample was taken, died.
- c. The population of this bird species exploded, causing an ecosystem imbalance.
- d. Pollutants tend to collect in areas of land where this bird species nests.
- e. This bird species is at a high trophic level on the food chain.

Sol: e. This bird species is at a high trophic level on the food chain.

Organisms at higher trophic levels in a food chain can experience biomagnification, which is the accumulation of environmental toxins (such as heavy metals) in living tissue. Organisms at lower trophic levels accumulate small amounts of toxins through their food. Because organisms at the next highest trophic level eat many of the lower-level organisms, they take in higher amounts of the toxins. At the highest trophic levels, increased concentrations of toxins in organisms' tissues can be dangerous. This bird tissue has a high concentration of a

specific heavy metal, so the species must be at a high trophic level.

Therefore, the correct answer is option E.

Waste

‘This is such a waste of time’ or ‘This food is now a waste’. We use these phrases in our daily life, without giving any thought. Why do we call anything that’s not useful waste? What is Waste? How do you dispose of ‘any’ kind of waste? Let us study about waste below.

What is Waste?

Trash, garbage, rubbish, junk, worthless-there are so many synonyms for waste; but what makes anything waste? And how does it become so?

‘Waste’ is any unwanted or unuseful material. These are objects that have been discarded since these materials aren’t functioning anymore. Waste can be in any form (liquid, solid or gas), although generally, waste is solid. There are various types of wastes like unwanted food, torn clothes, kitchen waste, etc.

Types of Waste

There are various types but primarily there are three kinds of wastes:

a. Municipal Wastes:

Municipal Waste commonly consists of items we use on an everyday basis then dump it. Cloths, paints, wires, glasses, unwanted food, etc come under municipal waste. These waste come from schools, factories, but primarily come from our homes.

The composition of municipal waste differs in each municipality and keeps changing with time. Municipal waste divides further into:

a. Household waste:

Materials like unused food, clothes, unwanted paper, damaged batteries, etc come under household wastes. Agricultural wastes also come under household waste.

b. Commercial waste:

Wastes coming from any kinds of businesses, trading factories, schools, etc come under commercial waste.

c. Demolition waste:



As clear from the word ‘demolition’, these wastes come from the destruction of any structure made of concrete, wood, bricks, etc. Although sometimes demolition wastes can also be recycled.

b. Hazardous Wastes:

Hazardous waste refers to solid, liquid, or gaseous wastes from industries that have either of the properties:

- Corrosiveness
- Ignitability
- Reactivity
- Toxicity

Treatment of these wastes is necessary before the industries dump it. Hazardous wastes are unsafe for human health and the environment at large. Hazardous waste further divides into:

I. Industrial Waste:

Waste produced by industries includes any material that isn't useful for the industrial manufacturing process. Wastes such as chemicals, pigments, ashes, metals, etc come under industrial waste.

c. Biomedical Waste:

Any waste coming from medical facilities such as hospitals, medical colleges, research centers, etc come under biomedical waste.

Category of Wastes

We just saw types of wastes. Now, these wastes are further divided into various categories i.e. Solid Waste or Liquid Waste.

Solid Waste:

Any kind of garbage coming households, factories or hospitals come under waste. Except solid wastes are only solids or semi-solids. These solids/semi-solids can be dry or wet.

Wet Waste:

Any dissolved liquid based waste or sludge coming from wastewater plants, households, etc come under wet waste.

Examples such as leftover curries, juices, rotten vegetables will come under wet waste

Dry Waste:

Waste which isn't dissolved in any form or in liquid form come under dry wastes. Examples such as plastics, bottles, etc will come under dry waste.

Biodegradable Waste:

Any organic material that can be synthesized into carbon dioxide, water, methane or organic molecules by organisms in the soil come under biodegradable waste.

Nonbiodegradable Waste:

Any material that cannot be synthesized into CO_2 , water or CH_4 come under non-biodegradable waste.

Methods to Dispose Waste

Dustbins aren't the only method to throw waste away. Here are few alternatives:

a. Burial Pits/Landfills :

Throwing daily wastes in burial pits or what are also known as landfills is an alternative for dustbins and is the popular waste disposal method. It looks after burying waste in the ground and eliminating foul smell coming from the wastes.

b. Incineration:

Burning of waste at high temperatures and converting them into residue or gaseous products is known as 'Incineration'. It's a better alternative to dustbins since the volume of waste here decreases by 20-30%.

c. Recycling:

The process of reusing the discarded materials and converting them into something new is known as 'Recycling'. It's the third main element in the process of 'Reduce, Reuse and Recycle'. Recycling reduces the harmful effect of greenhouse gases and helps in conservation of resources for future.

d. Composting:

When organic wastes are kept in a pit for a long period of time the microbes start decomposing the waste. If the compost is nutrient rich then it becomes a better manure for plants.

Can you think of any more methods?

Solved Example for You

Q. Most harmful environmental pollutants are:

- a. Biodegradable items
- b. Non-biodegradable items
- c. Corrosive Agents
- d. Toxic Chemicals

Sol: b. Non-biodegradable items

Waste that cannot be broken down by other living organisms come under non-biodegradable waste. Non-biodegradable substances affect the environment. They may enter the food chain and harm the organisms in the higher trophic levels (by biomagnification), e.g.,

pesticides, like DDT, non-biodegradable substances like radioactive wastes, lead, mercury etc., affect the health of all living organisms.