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Our Environment

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- ✓ EACH LINE, FLOWCHART & DIAGRAM IS MOTIVATED FROM PYQs
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SCAN
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Ecosystem

All organisms such as plants, animals, microorganism and human being and physical surroundings interact each other and maintain balance in nature and all these interacting organisms together with non-living constituents of the environment form an ecosystem.

Two types of ecosystem

- Natural ecosystem
- Man-made ecosystem (artificial)

Natural ecosystem:- forest, pond, lake etc.

Artificial:- Garden, crop field, aquarium.

Classes of organism

Producers: Producers are the organisms which can prepare their own food from simple inorganic substances like CO_2 and water by using sunlight energy in the presence of chlorophyll.

Ex:- green plants, certain blue-green algae.

Consumers: Those organisms which consume food (eat food) prepared by producers are called consumers.

Ex - Carnivores, Herbivores, omnivores.

Decomposers: The micro-organisms which break down the complex organic compounds present in dead organisms like dead plants and animals and their products like, faeces, urine, etc, into simpler substances are called decomposers.

Ex - certain bacteria and fungi.

Food chain: The transfer of food (or energy) from one organism to another is called a food chain.

Example: Grass \rightarrow deer \rightarrow lion

Grass \rightarrow insect \rightarrow frog \rightarrow bird

Plants \rightarrow worms \rightarrow birds \rightarrow cat

Terrestrial Algae \rightarrow protozoa \rightarrow Small fish \rightarrow Big fish

activity 15.1

Answer: We cannot leave the aquarium as such after we set it up. Decomposed food particles, dead plant parts, excreta of the fishes etc. accumulate in the water. Thus concentration of nitrogenous waste and microorganisms increase. So, aquarium needs to be cleaned regularly.

A pond or lakes need not to be cleaned in this manner because they are large-sized ecosystems. They contain much water. Also they get new water by the phenomenon such as rain.

activity 15.2

Answer: If we add predator fishes or animals to the aquarium, they will eat the other small fishes. Eventually, there will be only predator fishes. So, we should not mix predatory fishes with prey fishes.

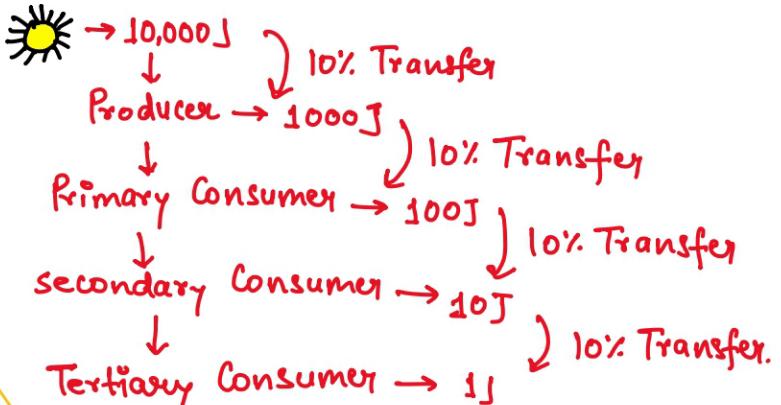
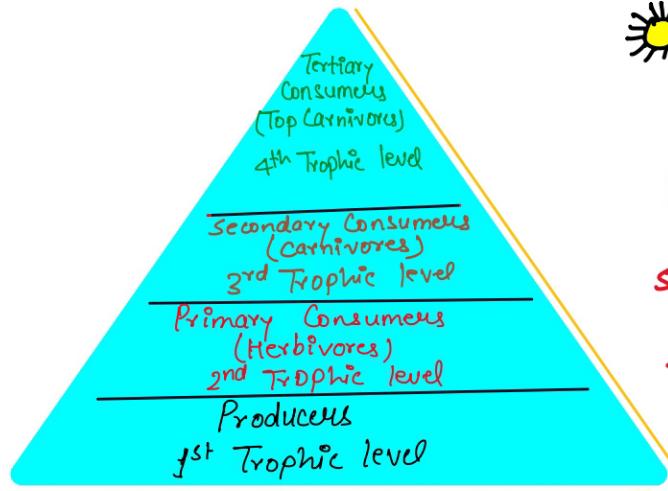
Answer: Small fishes eat phytoplankton and aquatic plants and check the overgrowth of the planktons and plants. Small fishes are eaten by predatory fishes. Large fishes eat small fishes.

Answer: Aquatic plants \rightarrow small fishes \rightarrow large fishes \rightarrow larger fishes

Answer: In an aquatic ecosystem, all trophic levels are important for successive level. But producers are most important because they provide food to other trophic levels

Trophic level

The various steps in a food chain at which the transfer of food (or energy) takes place.



10% Law

According to 10% law only 10% of the energy entering a particular trophic level of organism is available for transfer to the next higher trophic level.

Flow of energy

About 1% of the sun's energy falling on the leaves is used by the plant in the process of photosynthesis and stored as chemical energy of food.

The plants (or producers) are eaten up by herbivores. The chemical energy stored in plant food is transferred with food to herbivores.

Some energy utilised for the metabolic activity and some energy unutilised which is released as heat in the environment.

An average of 10% of the food eaten is turned into its own body and made available for the next level of consumers.

This process of energy transformation repeated with carnivorous, larger carnivorous or top carnivorous and so on.

Biological magnification

The increase in concentration of harmful chemical substance like pesticides in the body of living organism at each trophic level of a food chain is called biological magnification.

P.Y.Qs

Question: "Energy flow in a food chain is unidirectional." Justify this statement. Explain how the pesticides enter a food chain and subsequently get into our body.

Answer: Because the energy moves progressively through the various trophic levels and is no longer available to the previous trophic level. The energy captured by autotrophs does not revert back to the solar input.

Pesticides, used for crop rotation when washed down into soil/water body, are absorbed by the plant/producers along with water and mineral.

Being non-biodegradable these chemicals get accumulated previously in the food chain and enter our body.

P.Y.Q8

Question: What will happen if we kill all the organisms in one Tropic level?

Answer: Each and every Tropic level depends for its energy needs on its previous trophic level if all organisms of any of the trophic levels in a food chain are damaged, the organisms of other trophic level will also be destroyed because energy flows stop from one trophic level to the other trophic level.

P.Y.Q8

Question: In the food chain

Grass Deer Lion

operating in a forest, what will happen if all the

- (a) lions are removed?
- (b) deers are removed?

Answer: (a) Number of deer increases which will result in less amount of grass, leading to soil erosion.

(b) Feed available for lawyers would be less. Amount of grassland will increase.

activity 15.3

Answer: Some harmful chemicals may enter the bodies through the food chain. E.g. Pesticides and other chemicals are washed down into the soil or water. From the soil, plants absorb them. From the water bodies, aquatic plants & animals take up them. Thus they enter the food chain.

The non-degradable chemicals get accumulated at each trophic level. This is called biological magnification. Thus cereals, vegetables, fruits & meat contain pesticide residues. Their concentration is maximum in human body because humans occupy the top level in any food chain.

Methods to reduce intake of pesticides:

- o Minimise the use of chemical pesticides.
- o Wash fruits & vegetables thoroughly before use.
- o Use organic fruits and vegetables.

Ozone

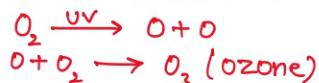
Ozone (O_3) is a molecule formed by three atoms of oxygen.

- Ozone is a deadly poisonous.
- It shields the surface of the earth from ultraviolet (UV) radiation from the sun.

UV radiation is highly damaging to organism. → it causes skin cancer

Formation

The higher energy UV radiation split apart some molecular oxygen (O_2) into free oxygen (O) atoms. These atoms then combine with the molecular oxygen to form ozone.



activity 15.4

Answer: In 1980s, the amount of ozone began to drop sharply. It was due to chemicals like chlorofluorocarbons (CFCs) which are used as refrigerants and in fire extinguishers.

In 1987, the United Nations Environment Programme (UNEP) made an agreement to freeze CFC production at 1986 level. It is now mandatory to make CFC-free refrigerators.

Other ozone depleting substances: Hydrofluorocarbons (HFCs), halons etc.

The size of the ozone hole has reduced in recent years.

P.Y.Q8

Question: Why is damage to the ozone layer a cause for concern? What steps are being taken to limit this damage?

Answer: Enlargement of ozone hole will cause more ultraviolet rays to reach on the earth surface. This is very harmful for us, animals and microorganism in the following ways
(i) Ultraviolet radiation may cause skin diseases, specially skin cancer.
(ii) Plant life will be disturbed due to retarded growth and destruction of pigments.
(iii) UV-rays may kill microorganisms, decomposers and other useful microbes. It may lead to ecological imbalance.

Steps to prevent damage of ozone layer

- (i) Judicious use of aerosol spray propellants such as fluorocarbon and chlorofluorocarbon (CFCs) which cause depletion or hole in ozone layer.
- (ii) Limited use of supersonic plains.
- (iii) Control over larger scale nuclear explosions.

Manage waste

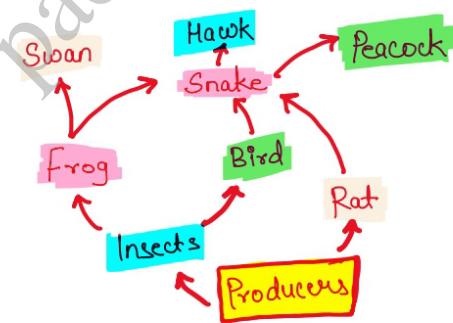
Biodegradable waste:- Substance that are broken down by biodegradable process are said to be biodegradable waste.

Non-biodegradable waste:- Substance that are not broken down by biological process are said to be non-biodegradable waste.

Method reducing waste disposal

1. Recycling
2. Preparation of compost
3. Incineration
4. Land fill

Food Web: The Network of many food chain



P.Y.Q8

Question: Give any two ways in which biodegradable substances would affect the environment.

Answer: Biodegradable substances affect the environment in the following ways

- (i) These substances are decomposed by the action of microorganisms. This causes foul smell.
- (ii) During the process of decaying of biodegradable substances, various types of gases are released which cause air pollution.

P.Y.Q8

Question: Give any two ways in which non-biodegradable substances would affect the environment.

Answer: The non-biodegradable substances affect the environment in the following ways

- (i) They persist in the environment for a long time and thus damage the environment.
- (ii) Such substances cause land pollution and water pollution.

activity 15.5

Answer: Milk packets, medicine bottles, strips, plastic covers etc.

Substances that are not broken down by biological processes are called non- biodegradable. They are inert and persist for a long time or may harm the ecosystem. E.g Plastics, glass, nylon etc.

Answer:

Spoilt food, vegetable peels, used tea leaves, empty cartons, waste paper, old and torn clothes etc. are changed over time.

Substances that are broken down by biological processes are called biodegradable. E.g. Fruits, vegetables, leaves, meat, paper, rubber etc.

Spoilt food, vegetable peels etc. undergo fastest changes.

activity 15.6

Answer:

Some Biodegradable materials:

- Human and animal excreta.
- Plant products, wood, paper, food waste, leaves, grass clippings, natural products.
- Remains from the dead bodies.

Some non-biodegradable wastes:

- Plastic products like grocery bags, plastic bags, water bottles, etc.
- Metals, metal cans, tins, metal scraps, etc.
- Construction waste, rubber tires, man-made fibers like nylon etc.
- Computer hardware like glass, CD's, DVD's, cellphone, processed woods, cable wires Styrofoam etc.

Answer:

Average time to break down Non-biodegradable substances

Glass bottle	500 years
Plastic bags	10-20 years
Plastic container	50-80 years
Plastic soda bottle	450 years
Nylon fabric	30-40 years

Answer: There are biodegradable plastics such as Polylactic acid, Polyhydroxyalkanoates, Polybutylene succinate, starch blends, Cellulose-based plastics, Polyglycolic acid (PGA), Polycaprolactone (PCL) etc.

P.Y.Qs

Question: If all the waste we generate is biodegradable, will this have no impact on the environment?

Answer: The biodegradable wastes do not persist for a long time in the environment. However, they also cause harmful effects but these effects are only for sometime. These wastes can be converted into useful substances and broken into simple substances by the action of microorganisms. So, there will be impact of biodegradable waste but for a short time.

P.Y.Qs

Question: How can we help in reducing the problem of waste disposal? Suggest any three methods.

Answer: The problem of waste disposal can be reduced by the following ways:

(a) **Recycling:** Different kind of solid wastes like paper, plastics, etc., can be recycled. For example, waste paper is sent to the paper mills where it is reprocessed to produce new paper.

(b) **Composting:** Biodegradable domestic wastes such as left-over food, fruit and vegetable peels, leaves of potted plants, etc., can be converted into compost by burying them in a pit dug into ground.

(c) **Biogas and manure:** Organic wastes can also be decomposed anaerobically to yield biogas and manure.

(d) **Burning:** The solid combustible waste is burnt. It however, causes air pollution.

(e) **Sewage treatment plants (STPs):** The dirty drain water containing urine and faeces, which is carried from our homes by underground pipes (called sewers) is called sewage. Sewage should always be disposed off by treating it in sewage treatment plants(STPs). The treatment results in the production of clean water, which is then discharged into river.

Exemplar

Question: Which one of the following is an artificial ecosystem?

- (a) Pond
- (b) Crop field
- (c) Lake
- (d) Forest

Answer: (b) Crop field

Question: In a food chain, the third trophic level is always occupied by

- (a) carnivores
- (b) herbivores
- (c) decomposers
- (d) producers

Answer: (a) carnivores

Question: In the given food chain, suppose the amount of energy at fourth trophic level is 5 kJ, what will be the energy available at the producer level?

Grass → Grasshopper → Frog → Snake → Hawk

- (a) 5 kJ
- (b) 50 kJ
- (c) 500 kJ
- (d) 5000 kJ

Answer: (d) 5000 kJ

Question: In an ecosystem, the 10% of energy available for transfer from one trophic level to the next is in the form of

- (a) heat energy
- (b) light energy
- (c) chemical energy
- (d) mechanical energy

Answer: (c) chemical energy

Question: What are the advantages of cloth bags over plastic bags during shopping?

Answer: Advantages of cloth bags over plastic bags during shopping are as follows

- They can carry more weight than plastic bags
- They are bio-degradable
- They can be reused.
- They do not cause environment pollution.

Question: Why are crop fields known as artificial ecosystems?

Answer: Crops field are known as artificial ecosystems because they are manmade where certain biotic and abiotic components are manipulated.

Question: Suggest any four activities in daily life which are eco-friendly

Answer: Activities in daily life which are eco-friendly are as follows

- Using of bicycles and electrical bikes instead of vehicles run by fossil fuels.
- Avoid using plastic bags, instead we can use bags made of clothes and papers.
- Plant trees in our surroundings
- Stop usage of old items and recycle them.

Question: Give two differences between food chain and food web.

Answer: Food Chain

- The food chain is the straight and single pathway for the flow of energy in an ecosystem, through different species of organisms.
- Food chain is hypothetical situation
- Members of higher trophic level feed on single type of organism of lower trophic level

Food web

- Food web is defined as the convoluted or complicated pathway of an ecosystem consist of numerous food chains of the different trophic level, through which the energy flow.
- Food web is a real life situation.
- Members of higher trophic level can feed upon organisms of the lower trophic levels of other food chain.

Question: Explain some harmful effects of agricultural practices on the environment.

Answer: Following are the harmful effects of agricultural practices on the environment

Soil degradation Extensive cropping causes loss of soil fertility. Also, over the time it can lead to soil erosion and finally to desertification.

Pollution Use of synthetic fertilisers and pesticides leads to soil, water and air pollution.

Water shortage Excess use of ground water for agriculture lowers the water level. This results in acute water shortage at many places.

Bio-magnification The chemical pesticides, being non-biodegradable accumulate in organisms in increasing amounts at each trophic level.

Deforestation

Indiscriminate cutting of trees for agriculture has resulted in loss of habitat for wildlife. Thus, it also causes damage to natural ecosystem.