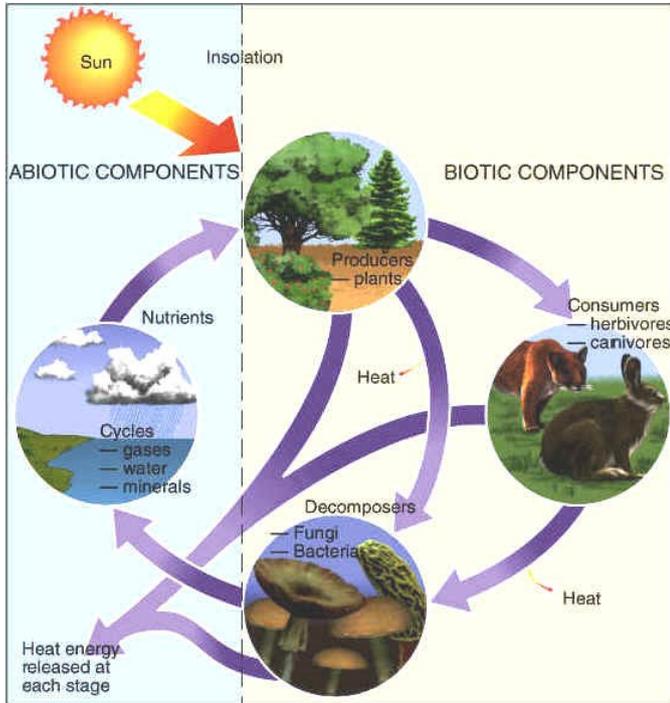


Our Environment

1. **Environment** is defined as the surroundings or conditions in which a person, animal, or plant lives or operates.
2. The environment may be the physical environment, the chemical environment or the biological environment. Thus, the environment has two components - **abiotic** and **biotic**.
- 3.



4. The **abiotic environment** includes the air (atmosphere), water (hydrosphere) and land (lithosphere). The **biotic environment** includes the plants, animals and the microbes.
5. A healthy environment is an absolute necessity for the well-being of all organisms, including man. Accumulation of wastes due to its improper disposal is a major problem in our country.

ENVIRONMENTAL WASTE

1. We generate a lot of material that are thrown away called waste materials.
 - (i) Substances that are broken down by biological processes are said to be **biodegradable**.
 - (ii) Substances that are not broken down by biological processes are said to be **non-biodegradable**.

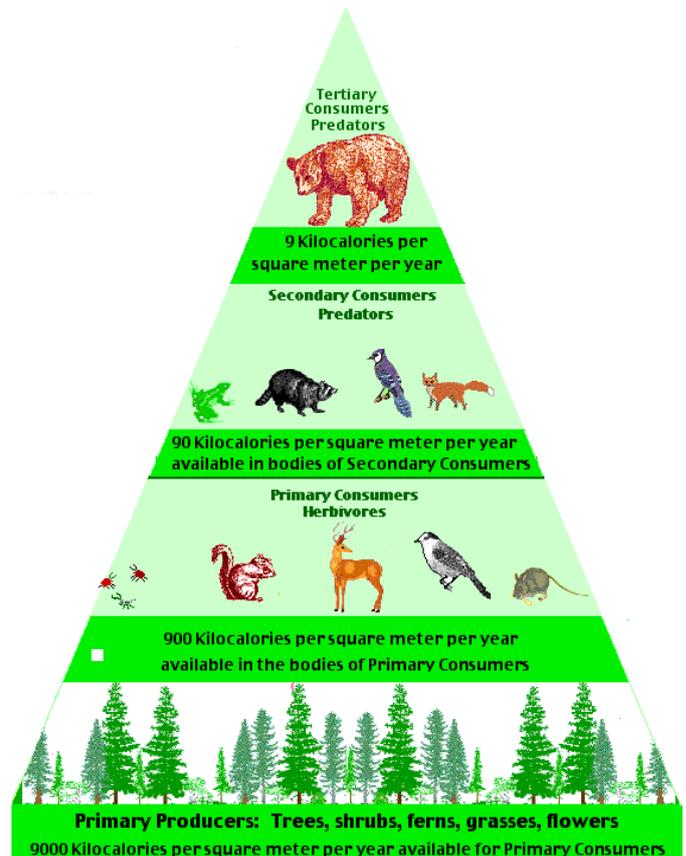
ECO-SYSTEM AND ITS COMPONENTS

1. All organisms such as plants, animals, microorganisms and human beings as well as the physical surroundings interact with each other and maintain a balance in nature. All the interacting organisms in an area together with the non-living constituents of the environment form an **ecosystem**.
2. An ecosystem consists of **biotic components** comprising living organisms and **abiotic components** comprising physical factors like temperature, rainfall, wind, soil and minerals.
3. For example, if you visit a garden you will find different plants, such as grasses, trees; flower bearing plants like rose, jasmine, sunflower; and animals like frogs, insects and birds. All these living organisms interact with each other and their growth, reproduction and other activities are affected by the abiotic components of ecosystem. So, a **garden is an ecosystem**.

4. Other types of ecosystems are **forests, ponds and lakes**. These are natural ecosystems **while** gardens and crop-fields are **human made (artificial) ecosystems**.
5. Organisms can be grouped as **producers, consumers and decomposers** according to which they obtain their food from the environment.
6. All **green plants** and certain **blue-green algae** which can produce food by photosynthesis come under this category and are called the **producers**.
7. These organisms which consume the food produced, either directly from producers or indirectly by feeding on other consumers are the **consumers**. Consumers can be classed variously as **herbivores, carnivores, omnivores** and **parasites**.
8. The microorganisms, comprising bacteria and fungi, break-down the dead remains and waste products of organisms. These microorganisms are the **decomposers** as they break-down the complex organic substances into simple inorganic substances.
9. The organisms, in addition to being dependent on the environment for their needs, are also dependent on each other. This dependency is especially for food. This results in the presence of **food chains** and **food webs**.

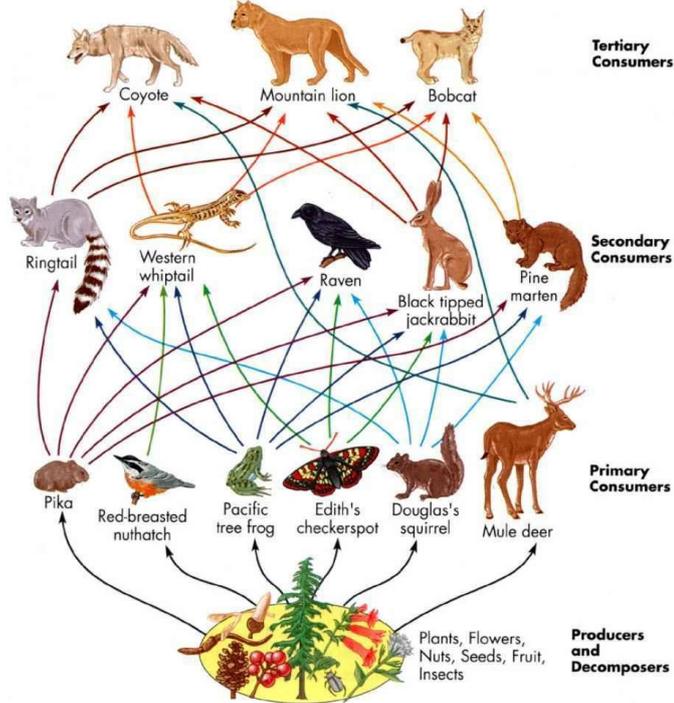
FOOD CHAINS AND FOOD WEBS

1. **Food chain** - A succession of organisms in an ecological community that are linked to each other through the transfer of energy and nutrients, beginning with an autotrophic organism such as a plant and continuing with each organism being consumed by one higher in the chain.



Our Environment

- Each step or level of the food chain forms a **trophic level**.
 - The **autotrophs** or the **producers** are at the **first trophic level**. They fix up the solar energy and make it available for **heterotrophs** or the consumers.
 - The **herbivores** or the **primary consumers** come at the second trophic level.
 - Small carnivores** or the **secondary consumers** are the third level.
 - Larger carnivores** or the **tertiary consumers** form the fourth trophic level.
- The study of food chains helps in understanding of the important aspects of the ecosystem in particular and environment in general:-
 - The food relationship among the different organisms in an ecosystem
 - The food chains are the living components of the biosphere
 - These are the vehicles of transfer of energy from one level to another
 - Through the food chains, transfer of materials and nutrients also takes place
- Autotrophs** capture the energy present in sunlight and convert it into chemical energy.



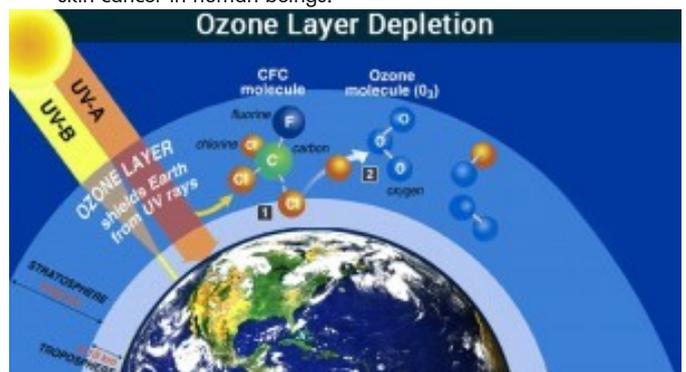
- From **autotrophs**, the **energy** goes to the **heterotrophs** and **decomposers**. When one form of energy is changed to another, some energy is lost to the environment in forms which cannot be used again. It is noted that:-
 - Green plants in a **terrestrial ecosystem capture about 1%** of the energy of sunlight that falls on their leaves and convert it into food energy.
 - An **average of 10%** of the food eaten is available for the next level of consumers. A great deal of energy is lost as heat to the environment, some amount goes into digestion and in doing work and the rest goes towards growth and reproduction.

(iii) Since so little energy is available for the next level of consumers, food chains generally **consist of only three or four steps**. The loss of energy at each step is so great that very little usable energy remains after four trophic levels.

- There are generally a **greater number of individuals at the lower trophic levels** of an ecosystem, the greatest number is of the producers.
- Food web** is a system of interlocking and interdependent food chains. Each organism is generally eaten by two or more other kinds of organisms which in turn are eaten by several other organisms. So instead of a straightline food chain, the relationship can be shown as a series of branching lines called a **food web**.
 - The **interactions** among various components of the environment involves **flow of energy** from **one component of the system to another**.
 - Significance of Eco-System:
 - Firstly**, the flow of energy is unidirectional. The energy that is captured by the autotrophs, passes to the herbivores does not come back to autotrophs. As it moves progressively through the various trophic levels it is no longer available to the previous level.
 - Secondly**, the shorter the food chain, the greater is the available energy.
 - Thirdly**, the nutrient movement goes on side by side along with unidirectional flow of energy. The nutrient movement is a cyclic movement where the nutrients revolve round with an ecosystem, hence cyclic. This cyclic movement of nutrients is also called as **biogeochemical cycle**.
 - The phenomenon of passing the toxic substances through different levels is termed as **biological magnification**. The movement of some toxic substances (like DDT) in the ecosystem, sprayed to kill the pests and insects passes through the various trophic levels and it accumulates at the highest trophic level. Man being an omnivore, man eats food of very type and in the process receives these poisons at every trophic level leading to accumulation of toxic substance.

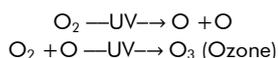
OUR ACTIVITIES AFFECT THE ENVIRONMENT

- We look at two of the environmental problems in detail, **depletion of the ozone layer** and **waste disposal**.
- Ozone (O_3) is a molecule formed by three atoms of oxygen. While O_2 , which we normally refer to as oxygen, is essential for all aerobic forms of life. Ozone, is a deadly poison. However, at the higher levels of the atmosphere, ozone performs an essential function. **It shields the surface of the earth from ultraviolet (UV) radiation from the Sun**. This radiation is highly damaging to organisms, for example, it is known to cause skin cancer in human beings.



Our Environment

3. Ozone at the higher levels of the atmosphere is a product of UV radiation acting on oxygen (O₂) molecule. The higher energy UV radiations split apart some molecular oxygen (O₂) into free oxygen (O) atoms.



4. The amount of ozone in the atmosphere began to drop sharply in the 1980s. This **decrease has been linked to synthetic chemicals like chlorofluorocarbons (CFCs)** which are used as refrigerants and in fire extinguishers. In 1987, the United Nations Environment Programme (UNEP) succeeded in forging an agreement to freeze CFC production at 1986 levels.

Managing the Garbage, we Produce

5. In our daily activities, we generate a lot of materials that are thrown away. These accumulated wastes can be classified as biodegradable and non-biodegradable.
- (i) Substances that are broken down by biological processes are said to be **biodegradable**.
 - (ii) Substances that are not broken down by biological processes are said to be **non-biodegradable**.



6. It is necessary to have **awareness** regarding methods of disposing different types of waste.
7. Waste management involves **collection, storage, transportation, recycling and disposal**.
8. **E-waste**- Discarded electronic devices like televisions, personal computers, floppies, audio-video CDs, batteries, etc. contribute to the growing pile of e-waste in the city. At least, 30,000 personal computers are sent for dismantling every year in the city. These products contain components that contain toxic substances like lead, cadmium, mercury, hexavalent chromium, plastic, PVC, BFRs, barium, beryllium, and carcinogens like carbon black and heavy metals. The deadly mix can cause severe health problems for those handling the waste. It could even prove fatal.
9. **Sewage Treatment** - The ultimate return of used water to the environment is done by treating sewage.

