**B10 - ENERGY FLOW IN ECOSYSTEMS**

1. **State that the Sun is the principal source of energy input to biological systems.**
* The Earth receives two main types of energy from the sun: light (solar) and heat;
* Photosynthetic plants and some bacteria can trap light energy and convert it into chemical energy;
* Heterotrophic organisms obtain their energy by eating plants or animals that have eaten plants;
* So all organisms, directly or indirectly, get their energy from the sun;
* This energy is passed from one organism to another in a food chain;
* This energy does not return in a cycle but is lost to the environment.
1. **Define the terms:**
2. **Food Chain** - a chart showing the flow of energy (food) from one organism to the next beginning with a producer.

E.g. Mahogany tree caterpillar songbird hawk

1. **Food Web** - a network of interconnected food chains showing the energy flow through part of an ecosystem.



1. **Producer** - an organism that makes its own organic nutrients, usually using energy from sunlight, through photosynthesis.
2. **Consumer** - an organism that gets its energy by feeding on other organisms.
3. **Herbivore** - an animal that gets its energy by eating plants.
4. **Carnivore** - an animal that gets its energy by eating other animals.
5. **Describe energy losses between trophic levels.**



* Energy is lost at each level in the food chain;
* Energy is lost through the process of respiration (as heat);
* Energy used up for movement;
* Warm-blooded animals lose heat energy in faeces and urine;
* Some of the material in the organism being eaten is not used by the consumer e.g. a locust (insect) does not eat the roots of the maize, and some of the parts eaten are not digestible.
1. **Define the terms:**
2. **Decomposer** - an organism that gets its energy from dead or waste organic matter.
3. **Ecosystem** - a unit containing all of the organisms and their environment, interacting together, in a given area e.g. decomposing log or a lake.
4. **Trophic level** - the position of an organism in a food chain or food web.
5. **Explain why food chains usually have fewer than five trophic levels.**
* As energy is passed along the chain, each organism uses some of it in;
* On an average, about 90% of the energy is lost at each level in a food chain;
* So the further along the chain you go, the less energy there is;
* There is plenty of energy available for producers, so there are usually a lot of them;
* There is less energy for primary consumers, and least in secondary consumers;
* Thus towards the end of food chain the organisms get fewer in number.
* The loss of energy along the food chain thus limits the length of it.

 **6. Describe the carbon cycle.**



* Carbon moves into and out of the atmosphere mainly in the form of carbon dioxide;
* Plants take carbon dioxide out of the air by photosynthesis;
* Plants convert carbon dioxide into organic materials (carbohydrates, fats and proteins);
* Herbivores obtain carbon compounds by eating plants**;**
* Carnivores gain carbon compounds by eating other animals;
* Animals and plants release carbon dioxide back into the air through respiration;
* When organisms die they usually rot (decompose);
* Decomposers breakdown the organic molecules through the process of respiration to release energy. Thus decomposers also release carbon dioxide;
* If a dead organism does not decompose, the carbon compounds are trapped in its body. Over a long period this can form fossil fuels;
* Combustion of fossil fuels releases carbon dioxide back into the air.

 **7. Discuss the effects of the combustion of fossil fuels and the cutting down of forests on the oxygen and carbon dioxide concentrations in the atmosphere.**

* Photosynthesis takes carbon dioxide out of the atmosphere and replaces it with oxygen;
* Respiration and combustion use up oxygen from the atmosphere and replace it with carbon dioxide;
* When fossil fuels are burnt, the carbon in them combines with oxygen from the air, and forms carbon dioxide. This process is called combustion;
* Combustion of fossil fuels is thought to be having an effect on the balance of carbon dioxide;
* The extra carbon dioxide may be causing the percentage of carbon dioxide in the air to increase;
* The loss of the trees may reduce the amount of photosynthesis taking place;
* As a result the concentration of carbon dioxide increases and oxygen decreases in the atmosphere;
* The rise in the levels of carbon dioxide levels in the atmosphere could be dangerous as it may cause global warming.