

What are the main transfers operating in the carbon cycle?

Look back to the global carbon cycle (Figure 1, 1.8) to remind yourself of the main transfers responsible for the flow of carbon between the various carbon stores.

Photosynthesis

Photosynthesis is the process whereby plants use the light energy from the sun to produce carbohydrates in the form of glucose (Figure 3).

- ♦ Green plants absorb the light energy using chlorophyll (a green substance found in chloroplasts in plant cells) in their leaves.
- ♦ The absorbed light energy converts carbon dioxide in the air and water from the soil into glucose. During this process, oxygen is released into the air.
- ♦ Some glucose is used in respiration, the rest is converted into starch, which is insoluble but can be converted back into glucose for respiration.

The process can be summarised as:

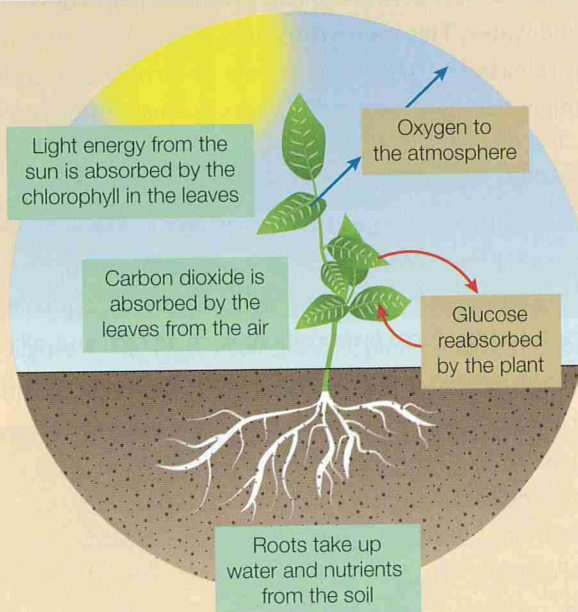
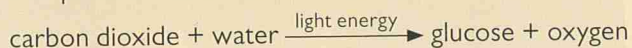


Figure 3 Photosynthesis

Respiration

Respiration is a chemical process that happens in all cells and is common to both plants and animals. Glucose is converted into energy that can be used for growth and repair, movement and control of body temperature in mammals. Carbon dioxide is then returned to the atmosphere, mostly by exhaled air.

Decomposition

When organisms die they are consumed by decomposers such as bacteria, fungi and earthworms. During this process of **decomposition**, carbon from their bodies is returned to the atmosphere as carbon dioxide (Figure 4). Some organic material passes into the soil where it may be stored for hundreds of years.

Did you know?

Researchers from Leeds University have used elevation data together with satellite data of forest cover to assess the accuracy with which maps measure the area of forests. They discovered that more than 75 per cent of tropical mountain forests are on slopes in excess of 27 degrees. This means that maps underestimate the area covered by forest. Their research suggested that the global area of tropical mountain forests is 40 per cent greater than the area reported on maps. This means that tropical mountain forests are more important stores, and therefore transfers, of carbon than previously thought.



Figure 4 Decomposing elephant, Bouba-Ndjida National Park, Cameroon

Combustion

Organic material contains carbon. When it is burned in the presence of oxygen (e.g. coal in a power station, Figure 5) it is converted into energy, carbon dioxide and water. This is **combustion**. The carbon dioxide is released into the atmosphere, returning carbon that might have been stored in rocks for millions of years.

Burial and compaction

Burial and compaction is where organic matter is buried by sediments and becomes compacted. Over millions of years, these organic sediments containing carbon may form *hydrocarbons* such as coal and oil.

Corals and shelled organisms take up carbon dioxide from the water and convert it to calcium carbonate, used to build their shells (Figure 6). When they die, the shells accumulate on the seabed. Some of the carbonates dissolve, releasing carbon dioxide. The rest become compacted to form limestone, storing carbon for millions of years.

✔ **Figure 5** Coal-burning power station, Moscow, Russia



✔ **Figure 6** Corals use carbon dioxide to build their exoskeletons

