

Tropical rainforest ecosystems

What is an ecosystem?

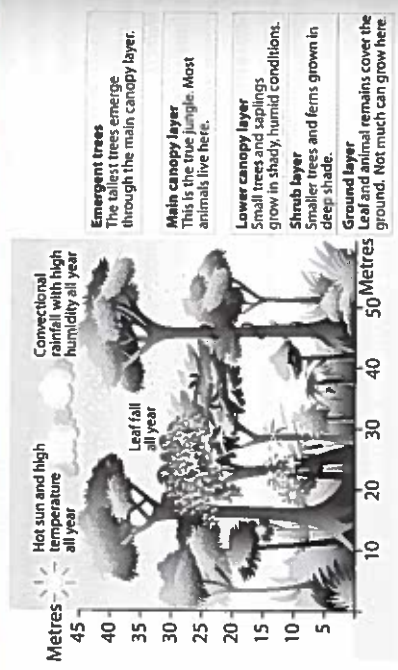
The **biosphere** is made up of all those plant and animal components in the world that are either living or have lived (organic). These components depend on each other. They

also depend upon non-living parts (inorganic) such as sunshine, rocks and air. The interaction of all these parts takes place in an ecosystem. Large ecosystems at the global scale are called **biomes**. The tropical rainforest biome has the ideal conditions for developing a complex ecosystem, with the equatorial climate of high temperatures and heavy rainfall every day giving heat and moisture. This biome contains more plants and animals than any other ecosystem – 90 per cent of known species live there.

A Tropical rainforest structure



These broad-leaved evergreen forests show dense growth and extremely diverse **fauna** and **flora**, forming unique ecosystems. There can be 40–100 species of tree per hectare. Large amounts of shade prevent much growth at low levels, so most plant and animal species are in the canopy where there is light.



All the plants compete for light to **photosynthesise** – this causes vegetation to grow in layers. Those that reach the sky – the emergents – form islands of green above the main forest. Rainforests are called the ‘lungs of the Earth’ due to the oxygen they produce.

B Plants adapt to survive in tropical rainforests

CHARACTERISTIC ELEMENTS OF LOW-LATITUDE FORESTS

1 Buttress roots
Buttress roots – tall, heavy trees develop these as a support. Trees are mostly shallow rooted.

2 Epiphytic plants with high light requirement invade a host tree
Epiphytes – plants that live on trees above ground level to get light have their roots in debris or decaying plants, e.g. orchids, bromeliads.

3 Lianas, climbers and vines
Lianas, climbers and vines intertwine around trees to get to the light at the top.

4 Drip-tip leaves
Drip-tip leaves – plants develop pointed tips and glossy leaves to remove water quickly.

Trees give the impression they are ‘evergreen’ as they lose and renew their leaves throughout the year rather than in any one season. Leaf-growth, flowering, fruit-fall and leaf-fall occur all the time so that the rainforest looks the same all year.

TASK 1: Study Source A

- Make your own labelled copy of the vertical structure of the rainforest.
- Are there any forests near where you live? If so, how does their structure compare with that of the rainforest?
- Why does so little rainfall and light reach the ground in the rainforest? How does this affect the growth of vegetation in the lower levels shown in the photo?
- Explain how competition for light leads to layers of vegetation in the rainforest.

TASK 2: Study Source B

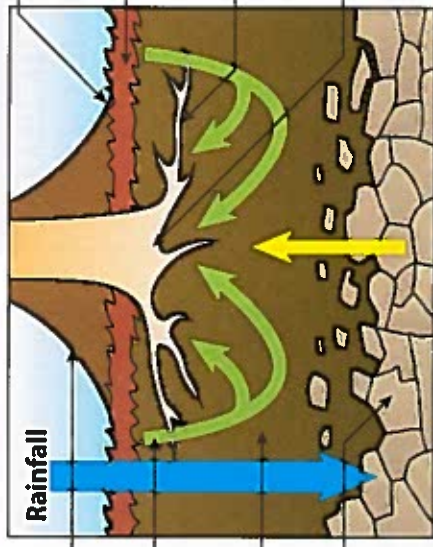
It shows four ways in which plants have adapted to survive in the rainforest. Describe two of these ways.

TASK 3: Study Source C

Describe what happens to nutrients once organic matter lands on the forest floor.

C Nutrient recycling

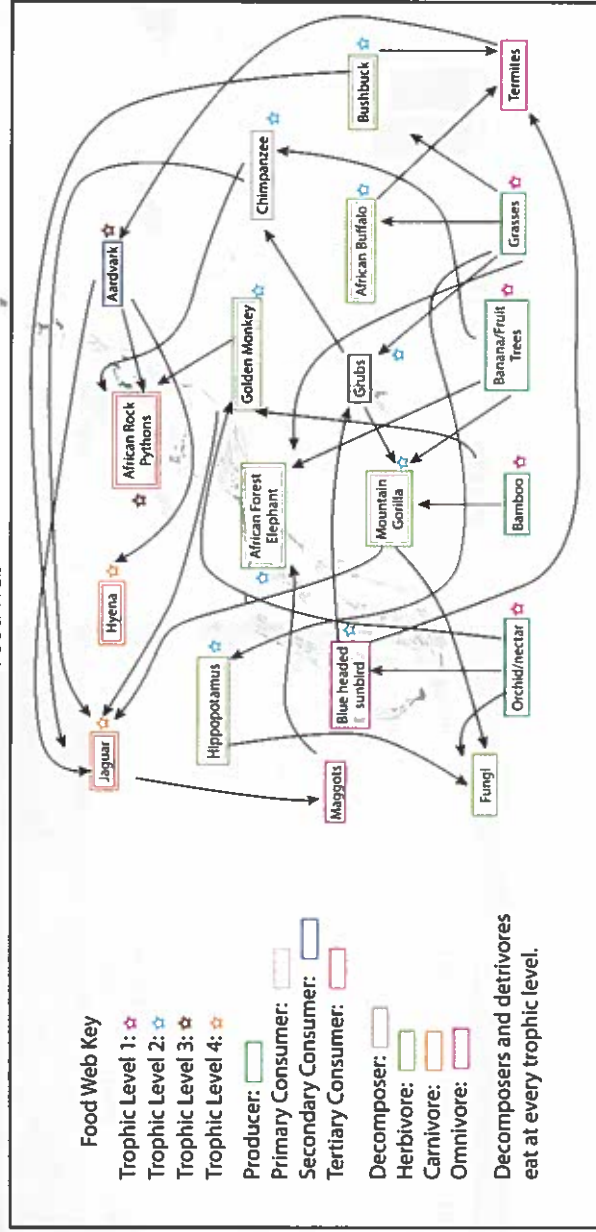
- The trees grow buttresses to hold them up because their roots are shallow and do not give support.
- Recycling of nutrients back into trees is rapid because it is so hot and wet.
- Nutrients only stay in the soil for a short time.
- Rocks provide trees with some minerals and nutrients.



- Leaves, dead branches and twigs fall from trees all year.
- Decomposers quickly break down dead plants and animals.
- Roots search for nutrients and water near the soil surface.
- Water, nutrients and gases return quickly into the trees through their roots.

D A rainforest food web from the Virunga rainforest region of the D.R. Congo, Africa

Food Web



Some definitions

Producers – plants are producers because they capture the sun’s energy by photosynthesis. All consumers depend on producers.

Consumers – primary consumers feed on the producers, then secondary and tertiary consumers feed on producers and/or other consumers.

Trophic levels – these are levels of energy. Plants form the first trophic level, then primary, secondary and tertiary consumers form the second, third and fourth trophic levels.

c Draw one example of a food chain for:

- the African rock python
- the jaguar.

TASK 4: Study Source D

- What is meant by a **producer** and a **consumer**?
- At what trophic level is:
 - a chimpanzee
 - a banana
 - a jaguar?

The mountain gorilla is close to becoming extinct. Discuss and write down any likely consequences on the food web if this takes place.