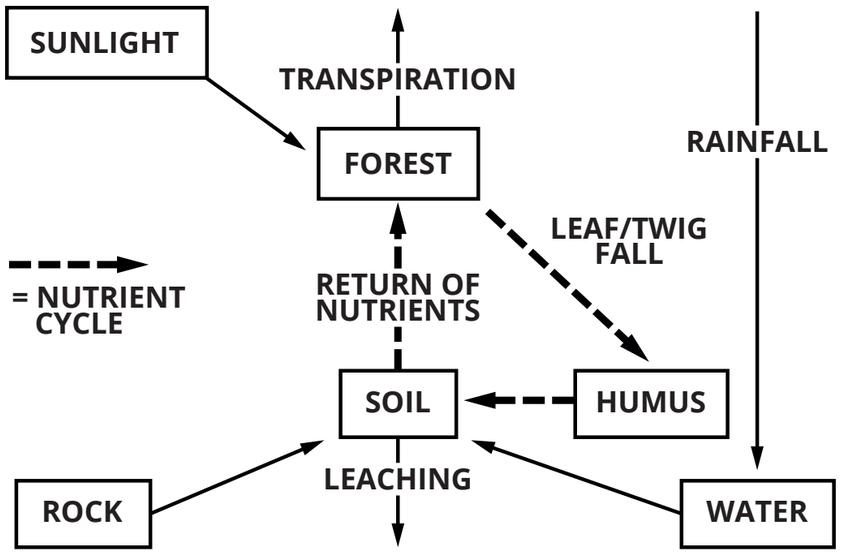
5.3.2 What are the key processes of ecosystems at different scales?

How ecosystems function

An **ecosystem** is a community of plants and animals and the environment in which they live. Plants in an ecosystem get their energy from the sun through a process called **photosynthesis**. They use this energy to produce food in the form of leaves, seeds or fruits – so plants are **producers** in the ecosystems. In a UK woodland, the leaves, seeds and fruit are eaten by caterpillars, insects, birds or mice. These are **consumers**. Energy is recycled in an ecosystem through nutrient cycling.

The Nutrient Cycle

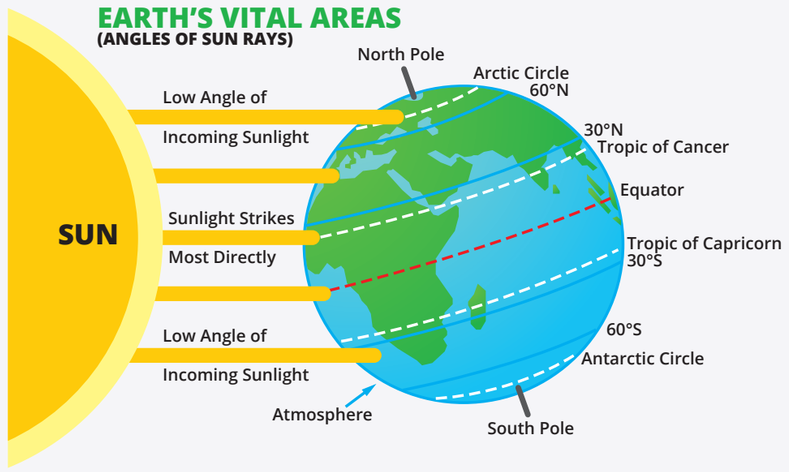


How the nutrient cycle works

Dead leaves and branches fall from a tree. Beetles and earthworms break down the leaves. Bacteria and fungi (decomposers) release nutrients into the soil. Water dissolves the nutrients. The tree takes in the water and nutrients through its roots. Weathering breaks down and releases nutrients into the soil.
Nutrient cycles in **hot** climates are rapid because there are high temperatures and abundant water. This encourages rapid rotting and is ideal for bacteria activity and humus creation. Conversely, in cold climates there is little heat and water, which discourages rotting, bacteria activity and humus creation.

Global patterns of ecosystems

Climate is such an important factor in influencing the natural vegetation and wildlife of a region, and large-scale ecosystems broadly match the world's climate zones. At the global scale, large ecosystems are known as **biomes**. Latitude affects the amount of heat energy on the ground. At the Arctic Circle, solar energy strikes the ground at a low angle and is spread over a large area. At 0º latitude the solar energy strikes the ground at almost a right angle. Energy is concentrated into a small area. Tropical rainforests, savanna, and tundra are examples of **biomes.** The tropical rainforest is an example of a large ecosystem.



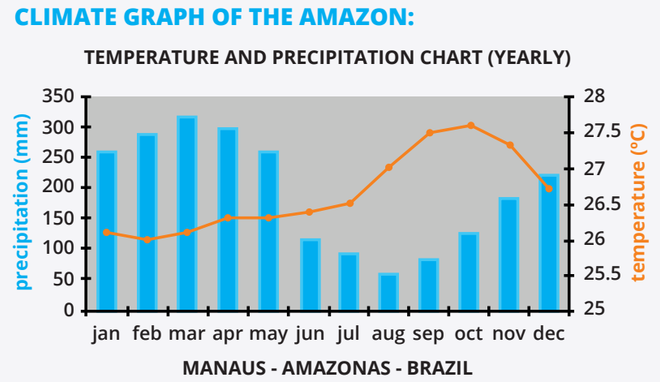
Where are tropical rainforests biome located?

Tropical rainforests are found between 5 degrees north and 5 degrees south of the equator.
E.g. Amazon Basin (Brazil), West Africa (Southern Nigeria, Congo, Ghana), South East Asia (Indonesia, Thailand, North Eastern Australia).

Why?

It is very hot because around the equator the sun is always directly overhead, and the sun's rays are more concentrated and so the area heats up quickly.

A climate graph of the tropical rainforest



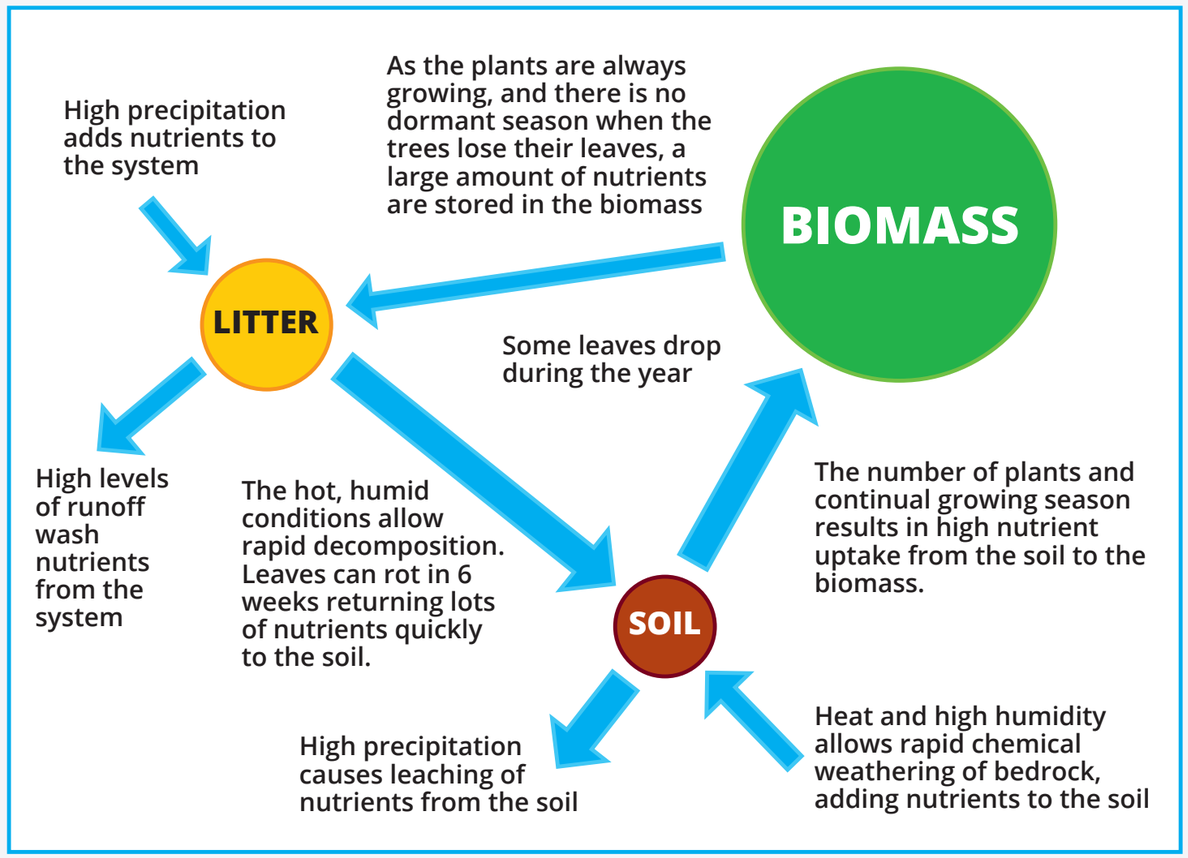
This graph shows the average amount of precipitation per year in the Amazon!

5.3.2 What are the key processes of ecosystems at different scales?

What is the climate of the tropical rainforest?

The tropical rainforest biome has a climate that is hot throughout the year and has high annual rainfall totals. Average temperatures are about 27ºC. The heat and abundant rainfall allow rapid plant growth, and trees can reach a height of 40m or more. The rate of plant growth in this biome is rapid and is controlled by factors such as a high amount of sunlight, warmth and water.

The nutrient cycle in the rainforest



The rainforest water cycle

The roots of plants take up water from the ground and the rain is intercepted as it falls, mainly at canopy level. As the rainforest heats up the water evaporated into the atmosphere forms clouds to make the next day's rain. This is convectional rainfall.

The rainforests nutrient cycle.

The rainforest's nutrient cycle is rapid. The hot, damp conditions on the forest floor allow for rapid decomposition of dead plant material. This provides plentiful nutrients that are easily absorbed by plant roots. However, as these nutrients are high in demand from the rainforest's many fast-growing plants, they do not remain in the soil for long and stay close to the surface of the soil.

Students: You would have been asked to study another contrasting biome. Make comparisons between the one you have studied and the tropical rainforest.

Ecosystems on a small scale system

You will have studied an example of small-scale ecosystem such as a woodland, hedgerow or sand dune. Complete the table to summarise key facts and figures of your example.

Type of ecosystem	
Example of a food chain	
Nutrient cycle in this ecosystem	
How human activity has affected biodiversity	