

The Living World Student Notes



Key Words:

Biotic - The living parts of an ecosystem like trees or animals.

Abiotic - The non living parts of an ecosystem like rocks or the climate.

Ecosystem - A community of plants, animals and their physical environment where everything is interconnected.

Evaporate - When liquid water becomes vapour (gas) in the atmosphere.

Biomes - A large community of plants and animals that occupies a large area eg TRF or desert.

Habitat - The natural home of a plant or animal.

Organism - An individual animal or plant.

Producer - Plants which use sunlight and water to photosynthesise and create their own food.

Consumer - An animal which eats another plant or animal.

Food Chain - A series of organisms which rely on the next one for their source of food.

Food Web - Animals and plants which are interconnected through lots of food chains.

Biomass - The total number or weight of organisms in an area.

Trophic Levels - They show organisms in different hierarchies and which organisms depend on which other organisms.

Decomposers - Organisms which break down matter from dead plants and animals.

Nutrients - They provide nourishment for further plant and animal growth.

Nutrient Cycle - A cycle which shows how nutrients move around an ecosystem, through the soil, biomass and litter.

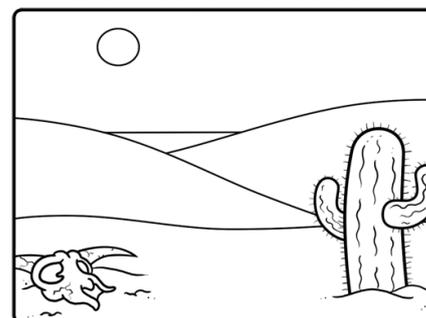
Biodiversity - A large range of different plants and animals.

Deciduous - Trees which lose their leaves in winter.

Coniferous - Trees which are ever green all year round like pine.

Precipitation - Liquid that falls from the sky like rain, snow, hail.

Deforestation - Cutting down trees.



Distribution - How something is spread out.

Altitude - Height of somewhere above sea level.

Relief - The height and shape of the land.

Interdependent - How things are linked together and dependent on each other eg. Organisms in an ecosystem.

Adaptation - How an organism changes to survive in different surroundings.

Transpiration - Evaporation from a plant.

Intercept - Is when precipitation does not reach the soil but is caught by the vegetation.

Forest Degradation - When a forest struggles to provide wood and fertility and biodiversity reduces.

Commercial Farming - Farming to sell.

Logging - Cutting down trees to use for timber or paper etc.

Selective Logging - When only certain valuable trees are cut in a forest. It reduces the impact to the rest of the forest because not all trees are cleared.

Extraction - To remove something from somewhere like trees from the rainforest.

Soil Erosion - The wearing away of soil. Fertility will reduce and it may be blown away by wind or rain.

Indigenous Tribes - People who are native to an area.

Carbon Sink - The way the rainforest absorbs carbon dioxide from the atmosphere.

Sustainable - Everlasting. To keep something good or productive for a long time.

Debt Reduction - Is when a richer country gives a poorer country money in exchange for conserving the rainforest of that country.

Non Governmental Organisations - Non profit groups like charities.

Conservation - Is when there is a balance between the development of a place and the protection of a natural resource - like the rainforest.

Agroforestry - When you use the protection of trees to grow crops.

Desert - A biome with little rainfall and vegetation. Very high temperatures.

Sand Dunes - A hill of sand.

Semi Arid - A desert which receives more rain than arid areas.

Diurnal Temperature Change - The extreme temperature difference between day and night time temperatures in the desert.

Organic Matter - A small portion of soil is made up of this. It is dead and living plants and animals that are rich in nutrients and have been decomposed.

Irrigation - The artificial watering of plants.

Xerophytes - A plant that is adapted to the desert.

Pioneer Species - The first plant to colonise a place.

Desertification - When fertile land becomes desert, it's usually on the edge of a desert. It is caused by drought or bad farming techniques.

Development - When a place grows, becomes more advanced and people have better lives.

Population Density - How closely packed the people in an area are.

Water Security - Being able to access clean water to maintain food, health and goods production.

Ecological - The strand of geography to do with organisms and how they're linked together.

Fragile Environments - An environment easily disturbed and hard to restore if disturbed.

Natural Climate Change - Climate change with natural causes like volcanic eruptions.

Man Made Climate Change - Climate change caused by humans eg. Releasing carbon dioxide through factory production.

Over cultivation - The excessive use of the land to the point where the soil isn't as fertile and production declines.

Overgrazing - When too many animals graze in an area and the natural vegetation can't grow back.

Appropriate Technology - Technology suitable for the social and economic conditions of the people who use it, is environmentally sound, and promotes self-sufficiency on the part of those using it.

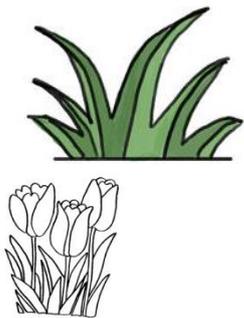
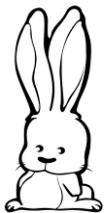
Subsistence Farming - Farmers who eat the food they grow.



Ecosystems

An ecosystem is made up of plants, animals and their surrounding physical environment, including soil, rainwater and sunlight. Important relationships link together the biotic (living) and the abiotic (non living) parts of the ecosystem.

| <u>Biotic</u> | <u>Abiotic</u> |
|---|---|
| Living | Non Living |
| Animals: Insects, birds, rabbits, squirrels | Rocks: Weathering of rocks releases nutrients for the plants. |
| Plants: Trees, wild flowers, grasses | Sunshine and rain needed for photosynthesis of plants. |
| The plants provide food and shelter for the animals. | Soils store water and nutrients which the plants absorb. |
| Micro Organisms such as fungi and bacteria which are decomposers. They break down dead matter and release nutrients into the ecosystem. | |



Biotic and Abiotic components are linked in 2 ways:

1. Physical linkages, for example animals eating the plants
2. Chemical linkages, like mild acids in the rainwater speeding up the decay of leaves.

Ecosystems depend on the constant input of light from the sun, as well as rain from the atmosphere. In turn, rainwater leaves the ecosystem when it evaporates and returns to the atmosphere or runs into a river.

Ecosystems can be any size:

- Local (small scale, called a habitat)
- Regional (England's Lake District)
- Global Biomes (Rainforest)
- Earth (where all organisms are in some way linked)

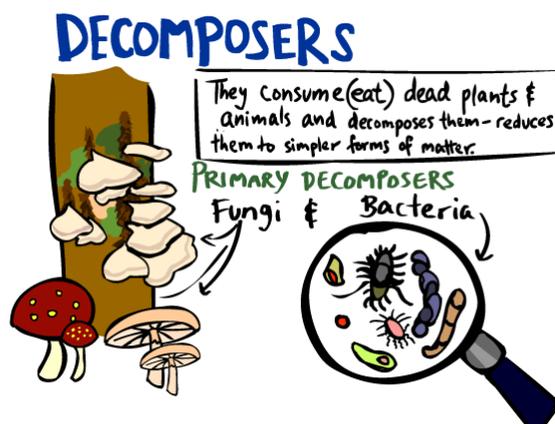
Food Chains and Food Webs:

All organisms in an ecosystem fall into one of the below categories:

1. **Producers** - These are always plants and use photosynthesis to produce their own food. They take nutrients from the soil using their roots. They use the sun and rainwater for energy and have the most energy of all the organisms. There are more producers than any other organism in an ecosystem.
2. **Herbivores or Primary Consumers** - These are plant eating animals like cows who eat grass. They receive energy from the plants. There are fewer cows than grass and also cows receive less energy from the producers than the producers do from the sun.
3. **Carnivores or Secondary Consumers** - These are animals that feed on herbivores. So for example, a rabbit is a primary consumer and a fox will eat the rabbit. Again, energy is lost as the carnivores receive energy from the herbivores which have already lost some energy. Some Secondary Consumers may also be primary consumers since they will eat more than one organism.
4. **Top Carnivores or Tertiary Consumers** - These animals hunt and eat other carnivores and herbivores. They include the largest and fastest hunters like lions and wolves.

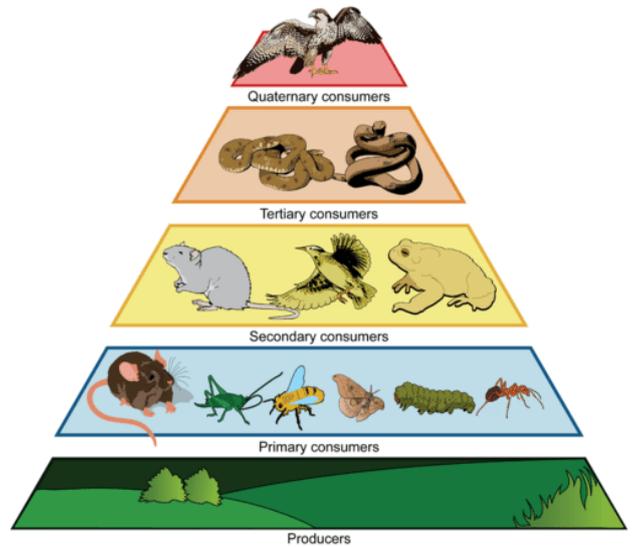
Decomposers:

These are organisms that over time break down dead organic matter. They include Scavengers (such as insects that eat dead wood) and Detritivores (such as bacteria). Decomposers help to return nutrients to the soil in the form of an organic substance called humus.



Tropic Levels:

The diagram above shows how one organism receives energy and nutrition from the organism before. I.e. the mouse eats the grasshopper and uses its energy to live. The diagram to the left shows how biomass and energy is lost through the food chain. The producers who are the bases for the food chain have the most biomass and energy (since it's directly from the sun). As you go further up the food chain there is less of each organism (in weight) and also each organism receives less energy by feeding.

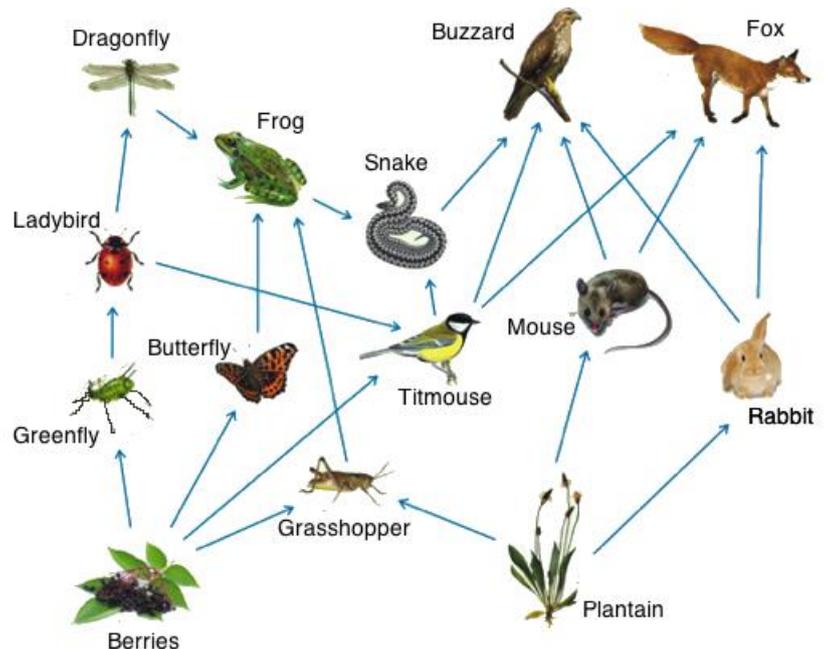


There are 2 main reasons why energy and biomass is lost through the trophic levels.

1. Many parts of plants are simply not eaten by animals, and carnivores do not eat all of their prey (such as bones). Also, much of what the animals do eat is excreted.
2. Energy is lost at each level. Hunters use a lot of kinetic energy: chasing prey can be time consuming and exhausting. Some herbivores such as around a lot for plants to eat. Energy is also constantly being used up for respiration (breathing). Much of an animal's daily calorie intake is used simply to stay alive, rather than to build new biomass (weight).

Food Webs:

Ecosystems are not simple like food chains. One animal does simply not just eat one type of plant or animal. Humans eat a whole host of plants and animals. One type of animal can be a secondary consumer but be a quaternary or even high consumer. For example the snake eats a Titmouse which eats Berries or it can eat a Frog, which eats a Dragonfly, which eats a Ladybird, which eats a Greenfly, which eats Berries. You can tell who eats who by the direction of the arrows. The arrows represent the flow of energy so when a fox eats a rabbit, the energy flows from the rabbit to the fox.



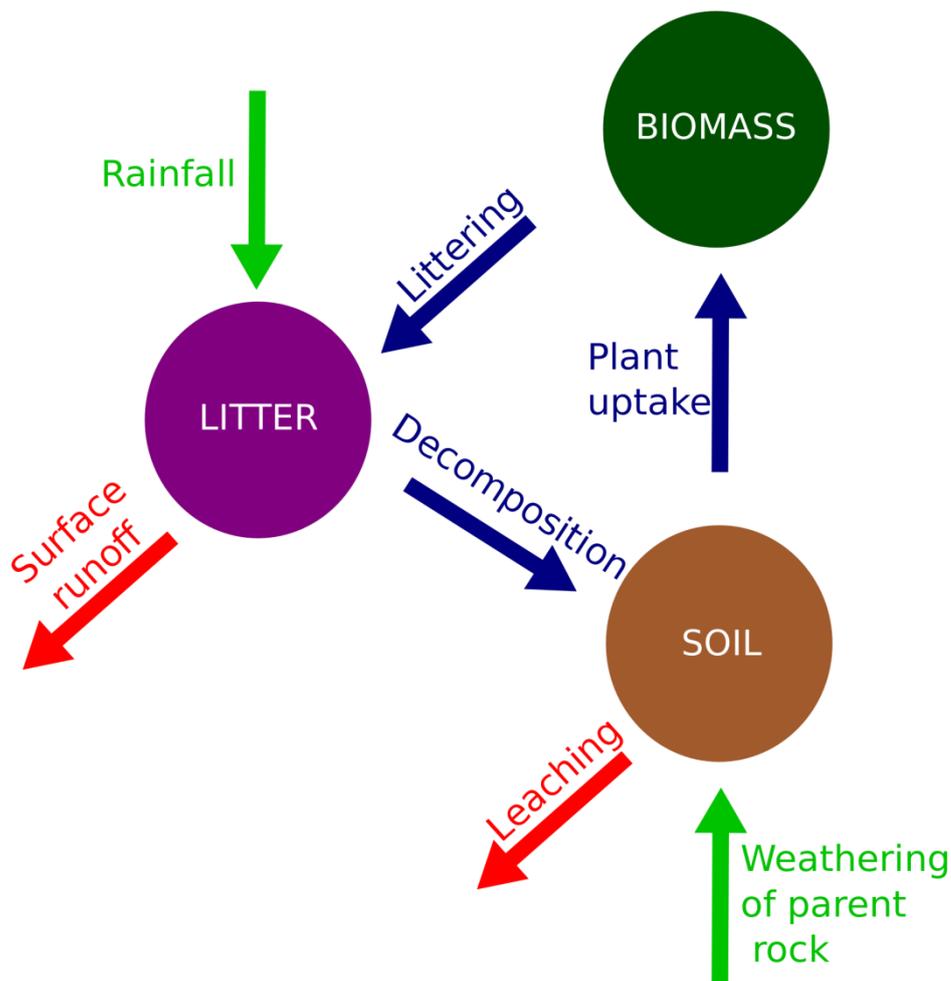
Nutrient Cycling:

All plants and animals depend on nutrients in food for their health. Nutrients occur naturally in the environment and are constantly recycled in every ecosystem.

Nutrients are added to the soil via the weathering of rock underneath into the soil. Nutrients are lost when precipitation washes all the nutrients out of it and into the rock below.

Nutrients are added to the biomass (the plants and animals in that ecosystem) by the roots of plants taking up nutrients through the soil. The animals can therefore live from the plants. Nutrients are lost from the biomass when trees lose their leaves and when plants and animals die.

Litter is the nutrients that have made it to the floor of this ecosystem. More nutrients is added in through rainfall since rain is needed to break down the litter to receive the nutrients. Some of the nutrients run out of the ecosystem if the rain washes them away. Nutrients leave the litter when they are decomposed and returned to the soil.



Case Study of a small scale UK ecosystem: Epping Forest

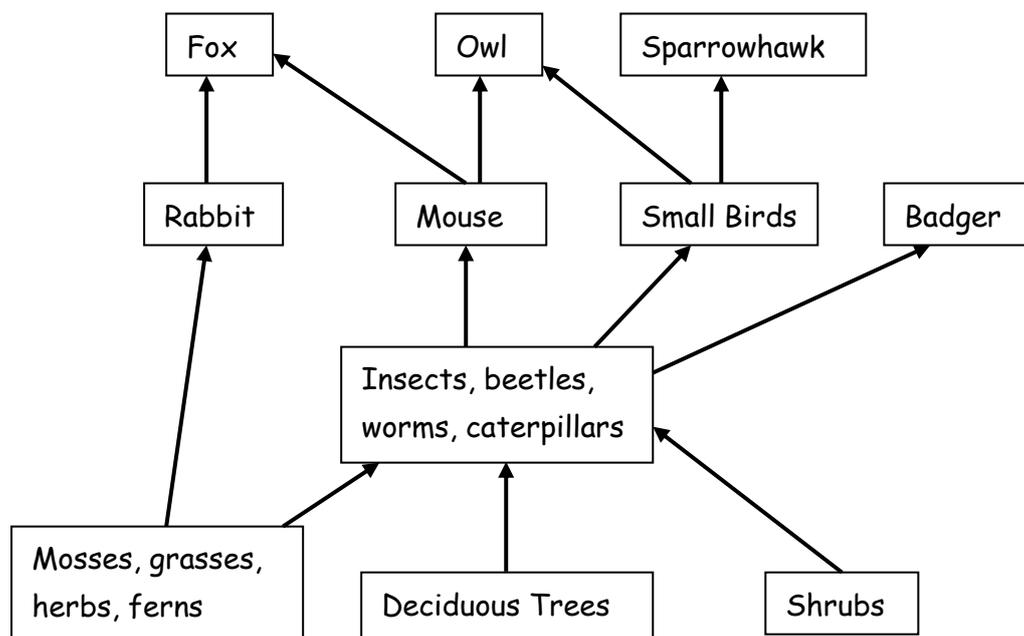
Location: North East London on the border with Essex.

Some Facts: It covers 2,476 hectares and contains areas of woodland, grassland, heath, rivers, bogs and ponds, and most of it is a Site of Special Scientific Interest and a Special Area of Conservation. It's particularly famous for pollarded trees - a technique to encourage tree growth.

It has long standing criminal associations since the tree cover and the forest's location close to London have made it notorious as a burial area for murder victims.



Characteristics:



Biodiversity in the forest has remained high and there is a complex food web composed of thousands of species. The above diagram shows Epping Forest Food Web simplified.

Within *deciduous trees* there are oak, elm, ash and beech.

Shrubs include holly and hazel, along with grasses, brambles, bracken, fern and flowering plants. Mosses and lichen grow here.

There are 38 *bird* species and 700 species of fungi which *decompose* litter into nutrients.

Interdependence: Interdependence is when one part of an ecosystem relies on another. This includes both the biotic and abiotic components of it.

Tree life in Epping Forest is reliant upon the sun and precipitation. Most of the trees are deciduous, meaning they lose their leaves in winter. This is an adaptation to the UK's seasonal climate. Winters are darker and cooler than the summers. As a result, the trees grow broad green leaves in spring. This allows them to maximise photosynthesis during the summer. They shed their leaves in the autumn, and so conserve their energy during the winter.



By mid autumn, the forest floor is covered with a thick layer of leaves. Remarkably, by spring, the leaf litter has all but disappeared and the decomposers and detritivores' work is now complete. Nutrients stored in the leaves are converted to humus in the soil, ready to support the new season's plant growth. This will ultimately include the fruits and berries that, in turn, support many of the primary consumers.

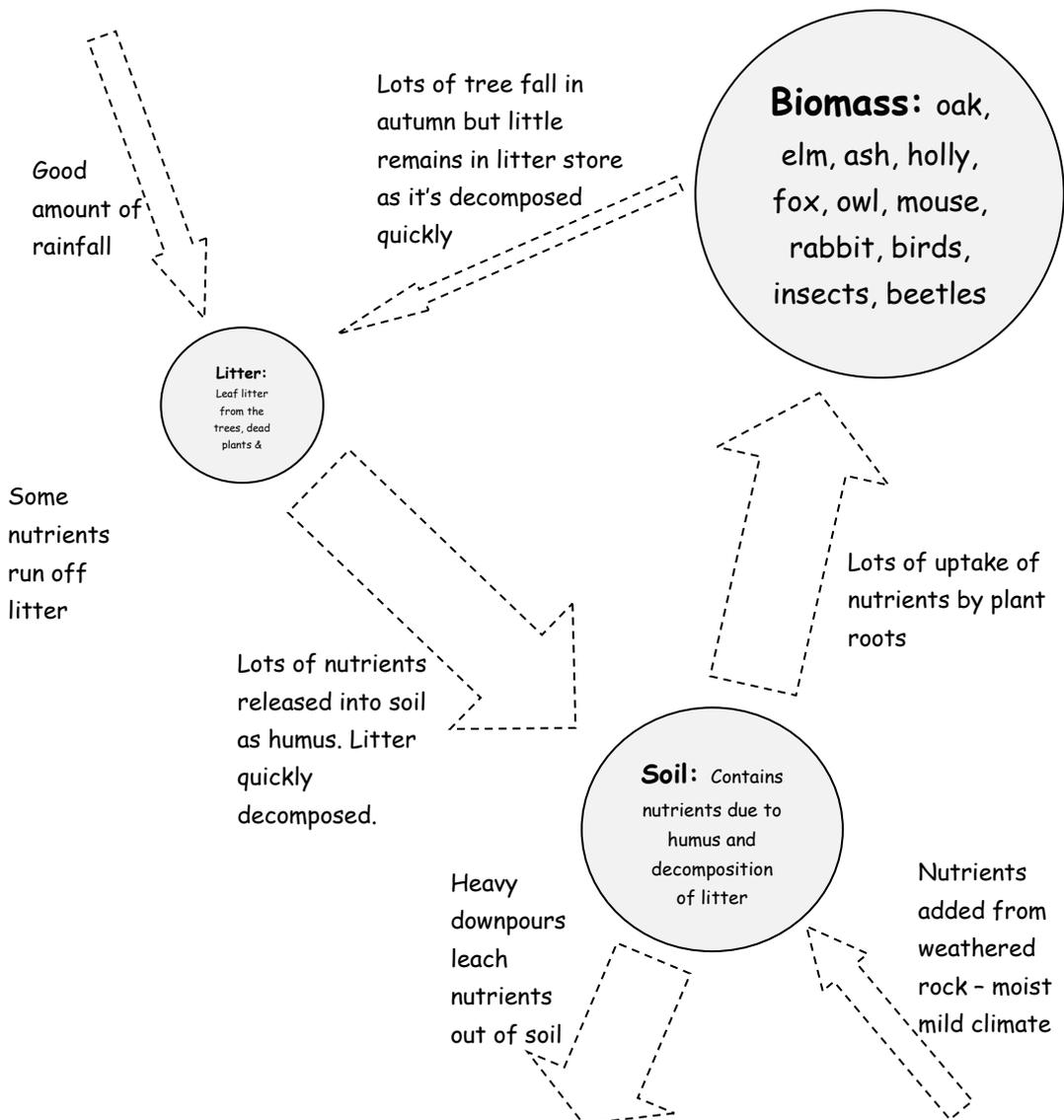


The primary consumers health is key to the survival of the secondary consumers who feed on them. In this way the ecosystem is linked because without the impact of the seasons, leaves wouldn't fall, decompose and restart life in spring for the whole biomass.



The nutrient cycle shows how the whole ecosystem is interdependent.

In Epping Forest, the Biomass store is large because of the huge height of the trees and the plentiful shrubs etc under them. The soil store is large too because there is plenty of humus from the annual life drop and quick work of the decomposers. Nutrients and energy flows quickly between each of the stores because of the seasonal changes in temperature and light.



Ecosystem Balance

Ecosystems can become unbalanced in 2 ways:

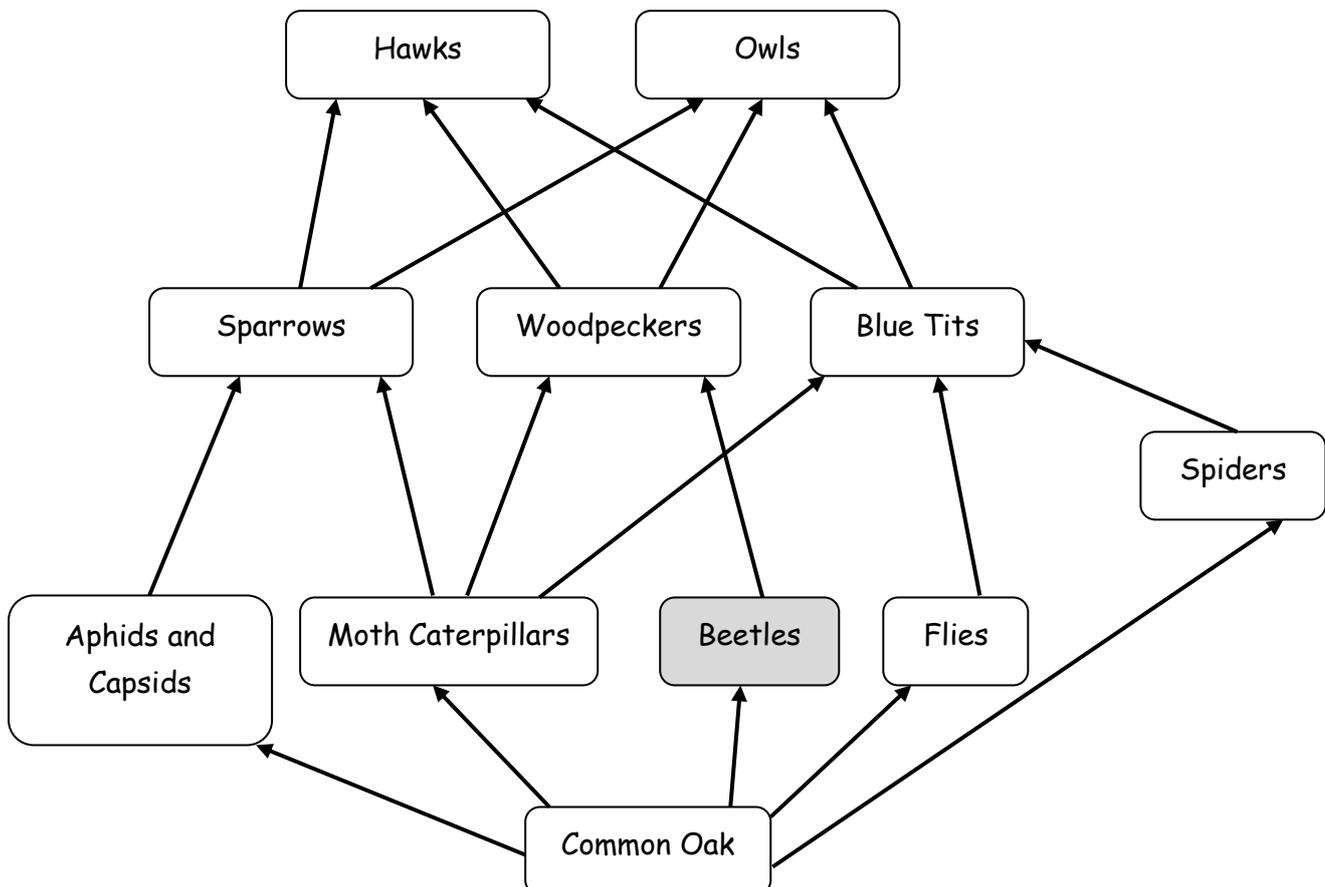
Physical forces: Extreme weather and climate change can disturb the balance of an ecosystem. In 1977 England faced a drought which lasted a year and a half which killed many trees. A further 15 million trees were felled by a storm in 1987. Because of this many consumers in the food web died because they hadn't enough producers to feed on. Since then secondary forest growth has occurred and consumers have moved back.



Human forces: Deforestation or the removal of trees causes the soil beneath it to be exposed to rainfall, which can wash it away making it impossible for the ecosystem to recover since every organism depends on the producers. This happens most commonly in the rainforest since rainfall is so heavy and the soil doesn't hold lots of nutrients.

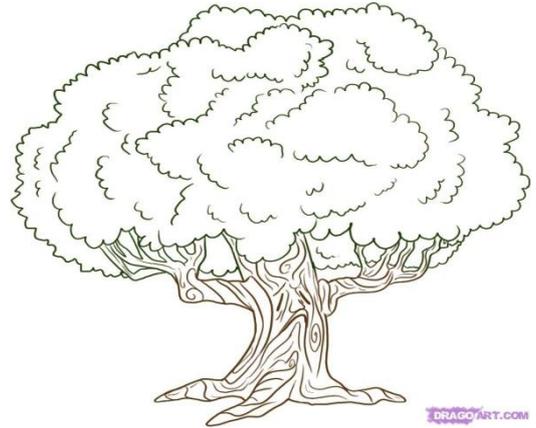
Human induced climate change can unbalance an ecosystem. Higher temperatures in southern England may make it hard for trees to survive and many woodlands may turn into grassy areas.

How does the loss or gain of one species affect a food web?



This food web is supported by a Common Oak tree. Say the BEETLES were reduced by a disease, what would the impact be on the rest of the food web?

- The Woodpeckers may reduce in numbers because there are less Beetles to eat. (Direct Effect)
- Or they may eat more Moth Caterpillars and so their numbers may decrease. (Indirect Effect)
- The Common Oaks may grow more because there are less Beetles feeding on it. (Direct Effect)
- If there are fewer Moth Caterpillars then there may be fewer Blue Tits. (Indirect Effect)
- Or the Blue Tits may eat more Spiders and reduce their population. (Indirect Effect)
- If there are fewer Woodpeckers and Blue Tits then the Owls and Hawks may also decrease. (Indirect Effect)
- Or they may eat more Sparrows and reduce their population. (Indirect Effect)
- If there are fewer Sparrows then there may be more Aphids and Capsids. Indirect Effect)



Restoring ecosystem balance through good management

Many species have been hunted to extinction and ruined ecosystem balance. Rewilding or ecosystem restoration is the best way to restore ecosystem balance. Grey Wolves were recently (1995) reintroduced into Yellowstone National Park in the USA which has restored balance to the ecosystem and landscape. The diagram on the next page shows the chain of impacts.





Reintroduction of the grey wolf. 16 packs of around 10 animals. Each pack kills one Elk per day.

Elk population falls from 20,000 to 10,000 in 8 years.



Competition from the wolves results in a decrease in coyote populations. Male Coyotes are smaller.

More kills made by wolves provides more food for Scavengers.

Reduction in grazing pressure on vegetation. Aspen and cottonwood start to regenerate, there is more tree cover.

Reduction in predation from coyotes leads to an increase in voles, mice and other rodents.

Increase in populations of grizzly bears, cougars, ravens, magpies and eagles.



Increase in bank side trees which stabilises river banks. More woody debris in the rivers creates pools and provides trout habitats.

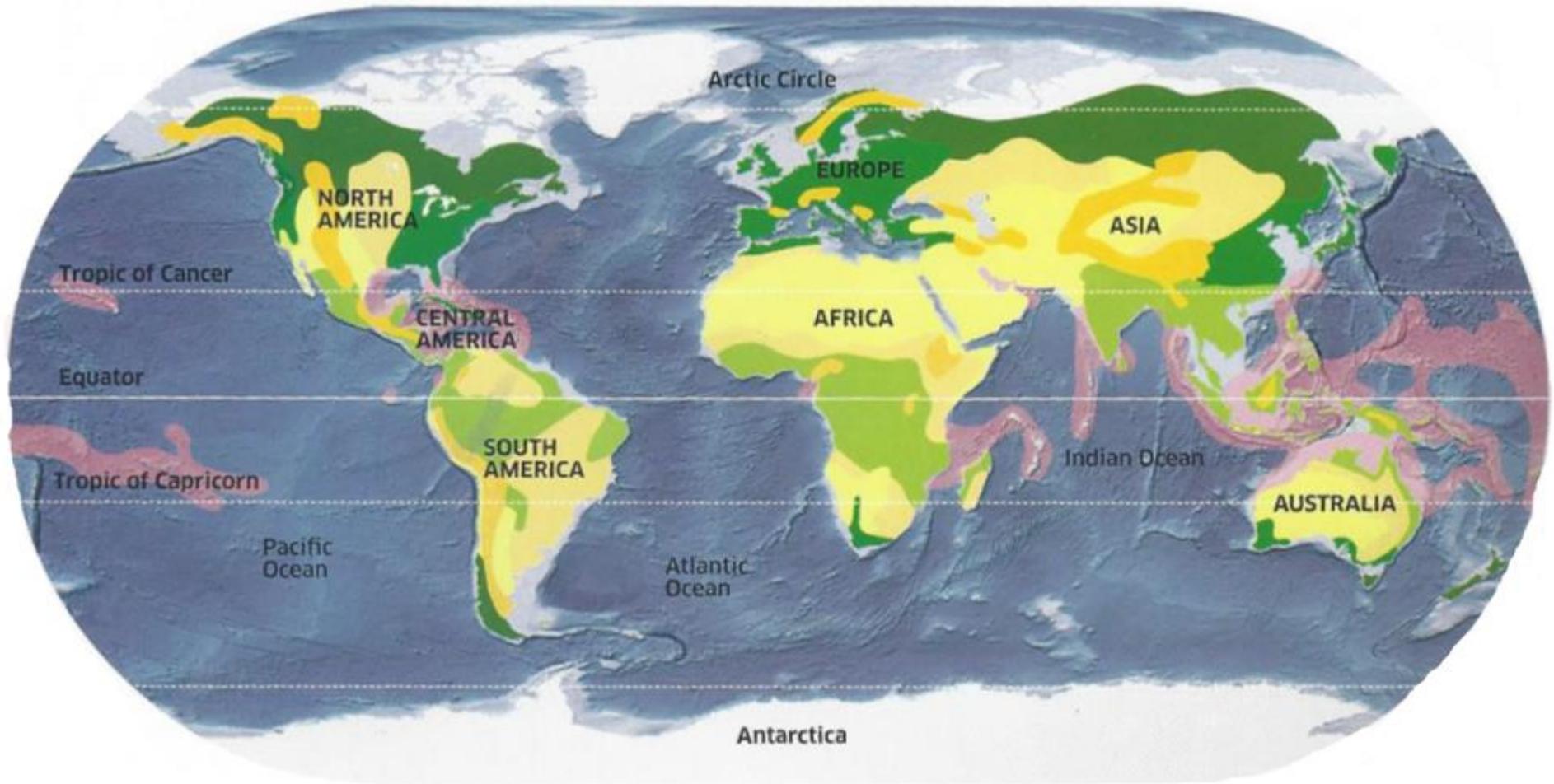
Beavers create ponds and flooded areas, which promote the growth of aspen.

Regeneration of aspen attracts Beavers, which begin to recolonise Yellowstone.

Increased tree cover provides a habitat for songbirds.

Populations of predators of small rodents eg. Red Foxes and birds of prey increase.

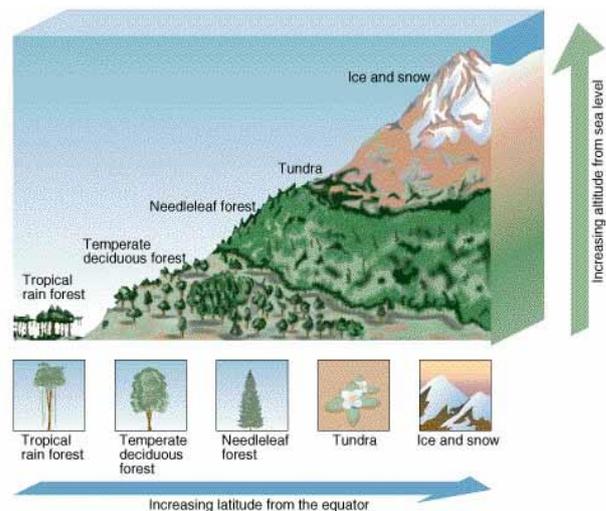
The Distribution and Characteristics of Global Ecosystems



- | | |
|---|--|
|  Mountains |  Temperate forests |
|  Desert |  Tropical rainforests |
|  Grassland |  Polar |
|  Taiga |  Coral reefs |

Factors which influence the location of ecosystems

- The Climate
- Distance from the sea
- Latitude (How far north or south the ecosystem is from the equator)
- Altitude (Height above sea level)
- Relief (The height and shape of the land)
- Ocean Currents



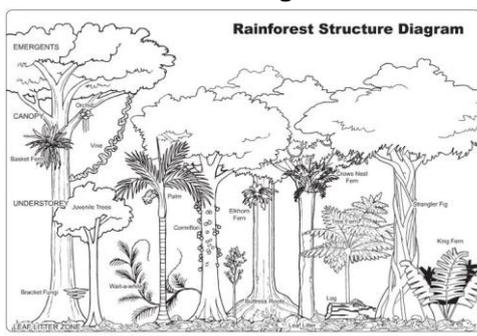
Where are each of the global ecosystems and how does climate explain their location?

Tropical Rainforests:

Location: Lie along the equator. Central America in the Amazon river basin. Africa - Zaire basin, with a small area in West Africa; also eastern Madagascar. Indo-Malaysia - west coast of India, Assam, Southeast Asia, New Guinea and Queensland, Australia.

Characteristics: A tropical rain forest has more kinds of trees than any other area in the world. Scientists have counted about 100 to 300 species in one 2 1/2-acre (1-hectare) area in South America. Seventy percent of the plants in the rainforest are trees.

Link to Climate: The sun's rays are concentrated at the equator heating moist air which rises and leads to heavy rainfall, with little seasonal variation. This creates the perfect conditions for evergreen rainforest.



Mediterranean:

Location: Between 30 and 40 degrees north and south of the equator but only on the west coasts of continents. Around the Mediterranean Sea, on the west coast of the USA and central Chile, in the Western Cape of South Africa and parts of southern Australia.

Characteristics: This dry aromatic biome is a feast for your senses: sights of vivid pink and purple colours; scents of citrus and lavender; and sounds of crickets and cicadas chirruping and trilling in the heat. A coyote yowling might wake you at night.

Link to Climate: Hot dry summers and mild wet winters are key to this warm temperate climate. This region has four to six months in summer with hardly any rain. Conifers like pine and cedar grow to no more than three or four metres in height in this hot dry place.

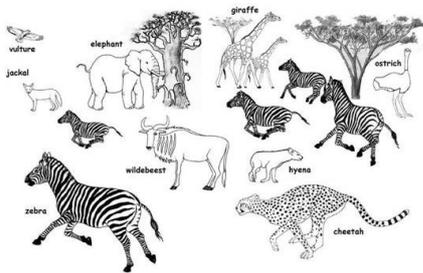


Tropical Grasslands:

Location: Between tropical rainforest and desert. The largest expanses of savannah are in Africa, in Kenya and Tanzania but they can also be found in Brazil in South America.

Characteristics: Savannah vegetation includes scrub, grasses and occasional trees, which grow near water holes, seasonal rivers or aquifers.

Link to Climate: Conditions are dry for half of the year due to the seasonal movement of the Hadley cell. The Hadley cell brings rain with it when it moves northerly and dry conditions when it moves back towards the equator. It moves northerly in our summer.



Coniferous Forests:

Location: 60 degrees north. They cover vast areas of North America and range across northern Europe, Scandinavia and Russia.

Characteristics: Larches are found in some of the coldest regions. Cypresses, cedars and redwoods are found in warmer regions. Mosses, liverworts and lichens are found on the forest floor and grow on tree trunks and branches.

Link to Climate: Winter temperatures are very cold due to lack of insolation (the sun's heat is spread over a larger distance at the poles). Due to the Earth's tilt, there is no sunlight for some of the months of the year. Coniferous trees have evolved needle leaves that reduce moisture and eat loss during the cold, dark winter months.



Temperate Grasslands:

Location: Between 40 and 60 degrees north and south of the equator. Only found in the centre of continents away from the sea. The two major areas are the prairies in North America and the steppe which straddles Europe and Asia.

Characteristics: Some grasses grow up to two metres in height in patchy tufts, whereas other feather-like plants carpet a vast area but only grow to a maximum of 50cm. The deep roots of these grasses seek out underground stores of water up to two metres below the ground.

Link to Climate: There is a large temperature range between this region's cold winters and hot summers, as this region is far from the moderating effect of sea breezes (warming in winter, cooling in summer) because they are found inland.



Tundra (Cold Desert):

Location: Found at the Arctic Circle. In the north, this biome stretches across northern Canada and Alaska, Siberia and northern Scandinavia.

Characteristics: The word tundra literally means 'barren, treeless land'. And with its extreme seasons of dark, freezing winters and fleeting summers that aren't much warmer, it's easy to see why few species of plants and animals can survive here.

Link to Climate: The sun's rays have little strength here and temperatures are below freezing for most of the year. Only tough, short grasses can survive, often in waterlogged conditions (due to the surface ice thawing in summer).



Deserts:

Location: Close to the Tropics of Cancer and Capricorn. Found between 15-30° north and south of the equator. The Sahara Desert is the largest desert in the world and covers 300 million square miles.

Characteristics: The vegetation doesn't grow very tall. There are only small animals such as rodents and reptiles shading away in the small scrubs or burrows, as daytime temperatures are intolerable. Because there is little water here, animals either store water in their bodies or get water from the foods they eat.

Link to Climate: The air that rises over the Equator goes north and south after shedding all the moisture as rain. The Sun's rays are still highly concentrated at 30 degrees latitude. Combined with dry air, this brings arid conditions to places like the Sahara and Australia.

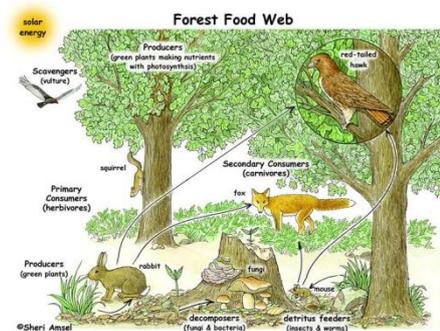


Deciduous Forests:

Location: Western Europe and the east coasts of Asia, North America and New Zealand.

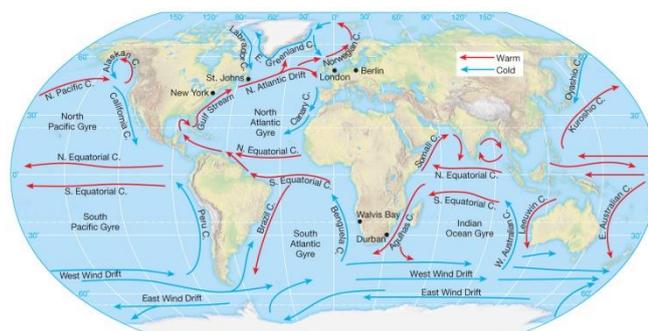
Characteristics: The deciduous forest has four distinct seasons, spring, summer, autumn, and winter. In the autumn the leaves change colour. During the winter months the trees lose their leaves. Animals adapt to the climate by hibernating in the winter and living off the land in the other three seasons. The plants have adapted to the forests by leaning toward the sun.

Link to Climate: Rain bearing storms arrive regularly from the jet stream. The sun's rays are weaker at this latitude.



Other Factors which influence the distribution of ecosystems

1. Altitude- Temperatures fall by about half a degree for every 100 metre increase in altitude, and tough grasses replace trees on steep mountainsides.
2. Mountain Ranges - In the USA and Asia, inland areas isolated from the sea have low rainfall. This is because winds blowing off the oceans quickly lose their moisture when air is forced to rise upwards over a high mountain range. The drier lands found east of the USA's Rocky Mountains are said to be in a rain shadow.
3. Ocean Currents - A cold ocean current flowing along South America's coast helps to create arid conditions in Chile's Atacama Desert because little evaporation takes place over the cold water. In contrast, the warm Gulf Stream ocean current affects the climate in western Europe.



Location and characteristics of the Tropical Rainforest

Location:

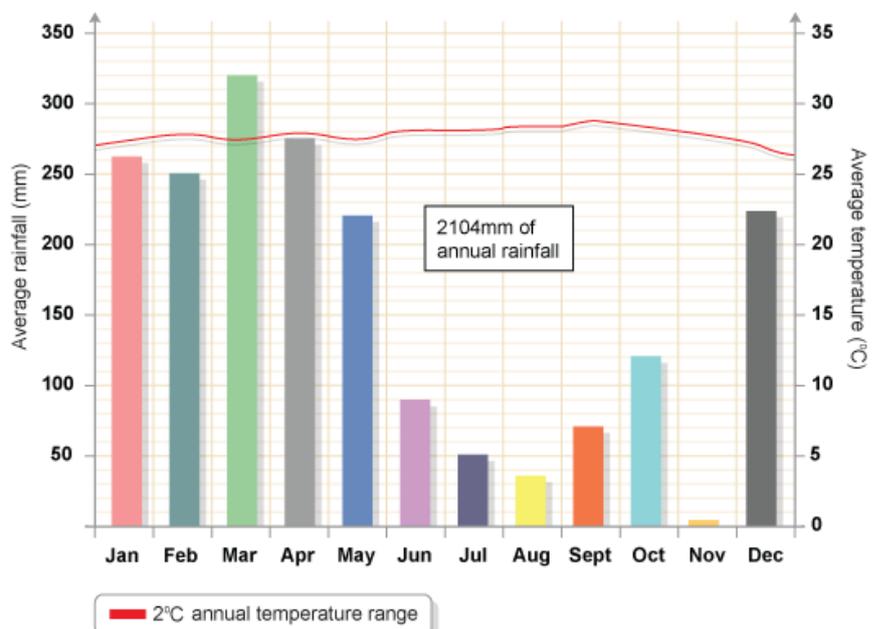


The tropical rainforest occupies only 7% of the World's land. It is valuable in the fight against global warming. The main areas of tropical rainforest are in the Amazon basin in Brazil, Central Africa and South East Asia.

Climate:

A tropical rainforest biome is found in hot, humid environments in equatorial climates, where it rains virtually every day. They contain the most diverse range and highest volume of plant and animal life found anywhere on earth. The level of rainfall depends on the time of year. Temperatures vary through the year - but much less than the rainfall.

The graph shows average rainfall and temperature in Manaus, Brazil, in the Amazon rainforest. The rainy season is from December to May. Notice how much the rainfall varies over the year - the highest monthly rainfall is in March with over 300mm,



while the lowest is in August with less than 50mm. Over the year, the temperature only varies by 2°C.

Vegetation:

The main plants in this biome are trees. This is important because in the rain forest, some rain never gets past the trees and to the smaller plants and ground below. Trees in this climate reach a height of more than 164 feet. They form a canopy. The forest floor is called understory. The canopy also keeps sunlight from reaching the plants in the understory. Between the canopy and understory is a lower canopy made up of smaller trees. These plants do receive some filtered sunlight. The plants that make up the understory of a rain forest have adapted to the small amount of sunlight that they receive. Ferns and mosses do well, along with epiphytes. These are plants that grow on other plants. They can be found growing on branches of tall trees. There are many different plant species found in the rain forest.

Soils:

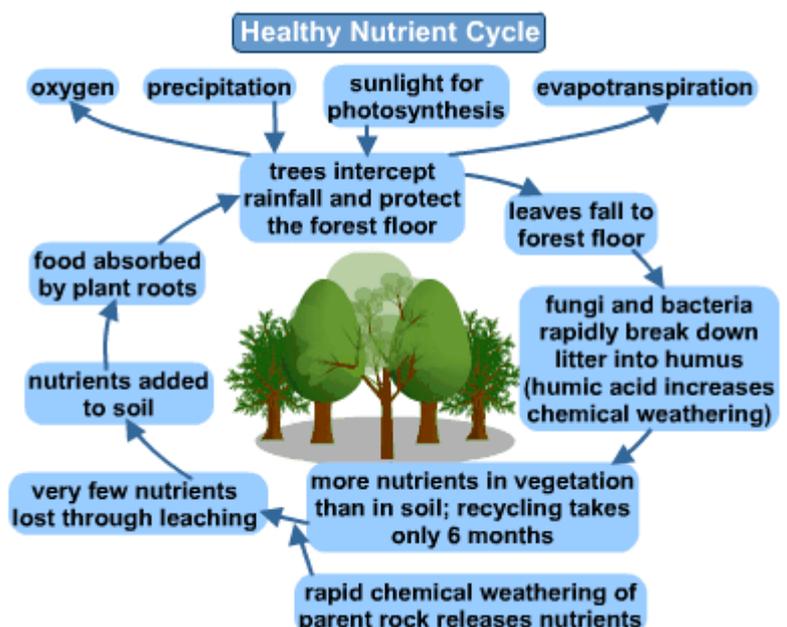
Tropical Rainforest Soils are called Latosols. They are shallow and infertile. Heavy rainfall quickly washes away any nutrients that are not taken up by the trees. Despite the infertile soil the rainforest survives because plant and animal remains soon decay in the warm, humid climate and shallow rooted trees quickly absorb the nutrients released by decomposition.

Animals:

Rainforests are tremendously rich in animal life. Rainforests are populated with insects (like butterflies and beetles), arachnids (like spiders and ticks), worms, reptiles (like snakes and lizards), amphibians (like frogs and toads), birds (like parrots and toucans) and mammals (like sloths and jaguars). Different animals live in different strata of the rainforest. For example, birds live in the canopy (upper leaves of the trees) and in the emergents (the tops of the tallest trees). Large animals (like jaguars) generally live on the forest floor, but others (like howler monkeys and sloths) are arboreal (living in trees). Insects are found almost everywhere.

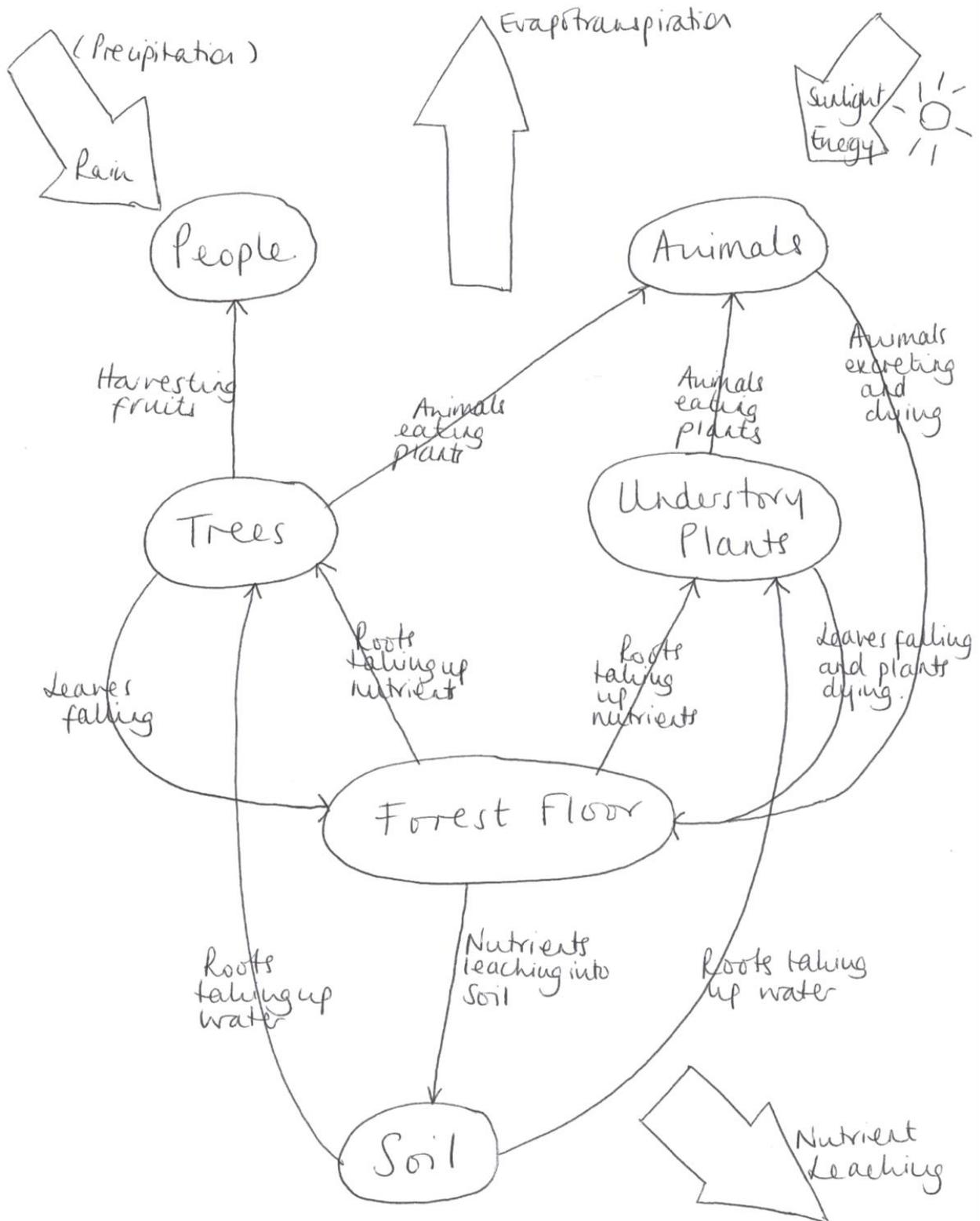
The Rainforest Nutrient Cycle:

Most of the forests' vital nutrients are locked up in the biomass (living vegetation and animals) and the litter (dead wood and leaves and animal remains on the ground). The warm, humid conditions cause the litter to decompose very quickly. The little rain that reaches the forest floor often washes away litter nutrients before they become part of the soil. Rainforest soils are therefore infertile but plants can pick up enough nutrients to survive. These are stored in the large thick trees.



The Rainforest Ecosystem and Interdependence:

Each part of the ecosystem is linked and dependent upon the other. The trees rely on the soil and the nutrients coming from dead plants and animals, and the decomposers which turn the dead matter into nutrients. The whole ecosystem relies on the heat from the sun and the large quantity of rain to help these nutrients decompose and allow the plants to take up these nutrients quickly. People also rely on the rainforest, from the local tribes who use the trees to build their home and sustain life, to us, the people in the west, who use the rainforest for medicines, timber, cattle ranching etc.



Why is there so much biodiversity in tropical rainforests?

1. Biodiversity means there is a large range of species in an ecosystem. Tropical rainforests are thought to be the oldest biome on Earth, so it is not surprising that they contain the most species.

2. They have had the most time for their inhabitants to diversify. Increasing size provides more opportunity for species to diversify, especially considering the rainforest stretches across many areas of the world but they all have a fairly constant temperature and humidity.
3. Because of the reliable climate, tropical forests provide relatively constant food supplies, so that organisms can specialise on one or a few food sources in the expectation that they will be widely available during the year. For instance, insects are always available in the tropical forest, so that army ants have a constant supply of food. There are no such ants in temperate forests, since in cold weather they would starve for lack of prey.
4. Within the tropical rainforest there is also a great variety of habitats such as along river banks or on mountains and therefore animals have adapted to each of these environments giving a great variety of species.
5. Tropical rainforests have a number of layers, or strata, which provide habitats. There are the tall emergent canopy, several mid-layers, an understory, and ground-level herbs and shrubs. With plant diversity comes animal diversity, since all of these plants provide food and shelter for animals.
6. Where there are many food resources - seeds, fruits, small rodents, reptiles and amphibians, myriads of insects - a highly varied set of animal, plant, bacterial, and fungal species will be there to feed on them. Some species depend upon highly specific types of food sources. Certain birds have bills suited to cracking large seeds or nuts; others, with smaller beaks, make use of small seeds. Species divide up the resources and habitats in such a way as to lessen competition and improve survival.

What are the issues with Biodiversity in the tropical rainforest?

Human exploitation of the rainforests resources is reducing this rich biodiversity. Many species are becoming endangered, and many others have become extinct. A loss of biodiversity means a decline in ecosystem productivity. The challenge is can the tropical rainfores