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PEOPLE AND THE TROPICAL RAINFOREST ECOSYSTEM

THIS UNIT concentrates on equatorial rainforests, the people who live there, and the people who take an interest in this ecosystem. Equatorial rainforests are found in the tropics 20° North and South of the Equator. Look at Figure 1 to see their world distribution.

As conditions are humid, the environment is perfect for plant growth. There is no need for trees to shed their leaves, as there are no seasons here, so in the rainforest they are broad-leaved evergreen. The trees and other plants are arranged in five layers. Each layer is made up of plants that are

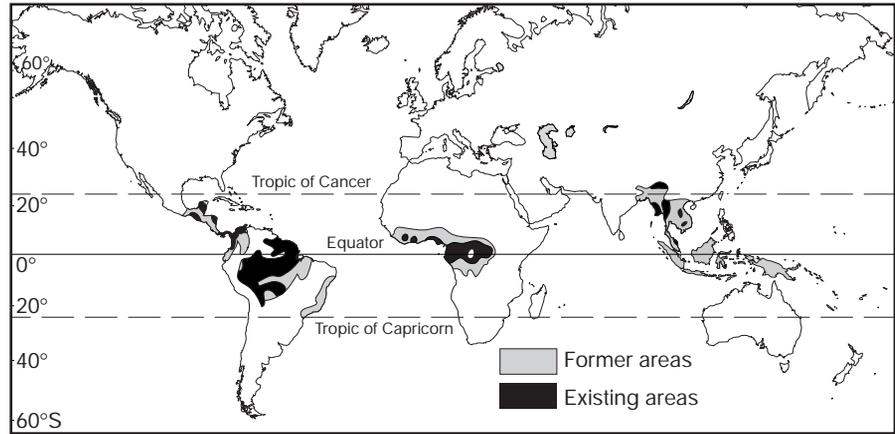


Figure 1: Equatorial rainforest areas

adapted to the specific environment, and each layer is also associated with different animals. Figure 2 shows the main layers of

plants and associated animals.

Rainforest soils, known as **latosols**, are poor in nutrients as the heavy

Layers	Microclimate	Plants	Adaptation	Animals/insects	Adaptation
Emergent Tall trees, 40+ m	Sunshine, high temperatures, strong winds, low humidity, heavy rain	Kapok tree	<ul style="list-style-type: none"> • Small waxy leaves to protect against heavy rain and strong sunshine and to reduce moisture loss. • Winged seeds for easy dispersal. 	Eagles, monkeys, butterflies	<ul style="list-style-type: none"> • Able to glide and move easily.
Main canopy Continuous cover, dense large trees, 20-40 m	Sunshine, high temperatures, increasing humidity	Vines, epiphytes, eg orchids and bromeliads	<ul style="list-style-type: none"> • Vines root in the ground and use trees for support as they grow towards the light source. • Bromeliads collect water and insects; frogs etc live in this pool of water in the plant. • The plants grow in the branches of trees near light 	Monkeys, squirrels, birds, sloths 90% of forest animals live in this layer.	<ul style="list-style-type: none"> • Monkeys and squirrels able to glide from tree to tree, making it easier to get around in the forest. • Sloths move slowly and hang on their fur disguises them from predators.
Under-canopy Young trees 10-30 m					
Shrub Mature woody plants and saplings	Only 2-15% of the sunlight reaches this layer; hot, calm, humid	Ferns, dwarf palms	<ul style="list-style-type: none"> • Drip-tip leaves to allow water to run off. • Dark green leaves as they contain a lot of chlorophyll to allow photosynthesis. • Large leaves to trap any sunlight. • Insects help with pollination. 	Leaf-cutter ants, Azteca ants, snakes, frogs, jaguars, gorillas	<ul style="list-style-type: none"> • Leaf-cutter ants provide the tree with nutrients by collecting and burying leaves which then decompose. • Azteca ants protect a tree from predators in return for shelter.
Ground/herb Scattered plants and seedlings and bare ground with thin layer of fallen leaves and decomposing matter	2% sunlight only; hot, calm, very humid	Fungi	<ul style="list-style-type: none"> • Tolerate low light levels. • Quick-growing plants when light is available. 	Ants, etc	<ul style="list-style-type: none"> • Insects use organic litter as food.

Figure 2: Rainforest plants and animals

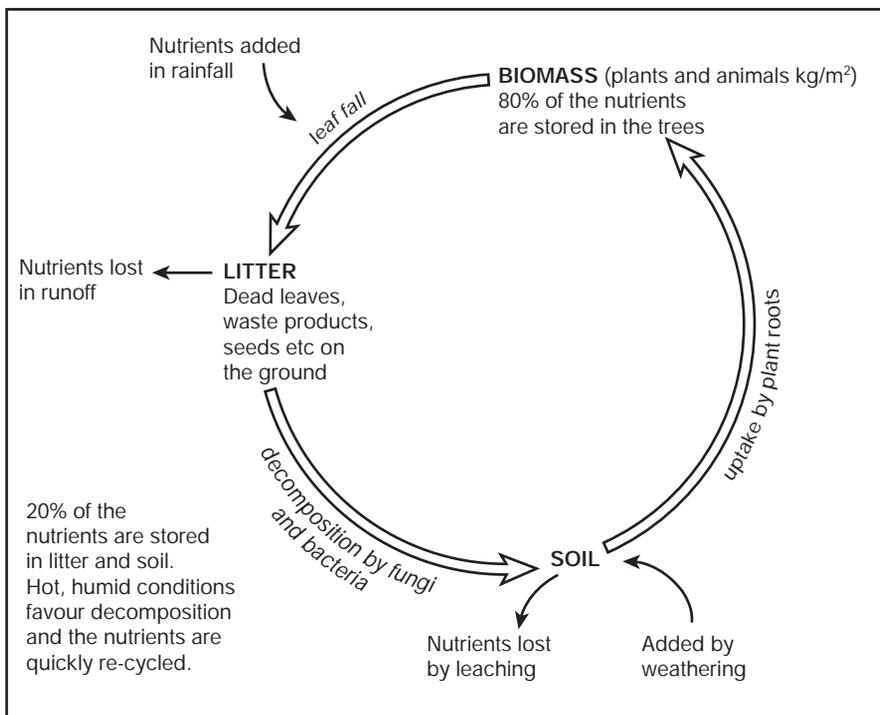


Figure 3: Nutrient cycling in the rainforest

rainfall encourages **leaching** (dissolving and removing of the nutrients). Latosols are a mixture of clays, quartz, aluminium and iron (which gives the soil its characteristic red colour). Most of the nutrients are found near the surface, and the trees quickly absorb these through their roots. Plants also obtain nutrients directly from rainwater and with the help of nutrient-absorbing fungi living in the root zone. This means that the largest store of nutrients in the rainforest is in the trees. Figure 3 presents information on nutrient cycling.

Who are the original people of the tropical rainforest?

Indigenous (native) people, such as the Waorani and Kayapo in South America, have lived in rainforests for thousands of years. They hunted, fished, and grew a variety of crops in small gardens. Everything that they needed to survive, including food, clothes and medicines, came from the forest. To plant a garden they cleared a small area of land by slashing the trees and bushes, and then burnt them to release nutrients into the soil. They planted crops in the fertile soil. However, each year the yield from

the garden would be less as the nutrients were used up or leached. The garden would be abandoned after 4–5 years and a new area would be cleared. The abandoned land would slowly recover as trees grew back, and 10–50 years later the tribe might return to clear the area once again. Figure 4 shows the close relationship the people had with the forest.

Who are the other forest people?

Other groups of people have also lived in the rainforest for a long time, especially near rivers.

Rubber-tappers moved into the rainforests from the beginning of the twentieth century. Rubber-tapping does not damage the forest, as it is not necessary to cut down a rubber tree to extract the latex. For example, in Ecuador the Quichua community of Rio Blanco moved to the forest in 1971. They originally lived in the foothills of the Andes, but the supply of land there was running short due to population growth and demand for food. At first the Quichua practised shifting cultivation but then they started to grow cash crops such as coffee, cocoa, rice and maize. Although this was only on a small scale, they were concerned that too much of their primary forest had been cleared. So, in 1995, they developed an **ecotourism** project as an alternative economic activity that might protect the forest rather than clear it.

These communities of indigenous and other forest people live in harmony with their environment. They are few in number, and their way of life is **sustainable**. This means they use the resources of the forest to meet both today's needs and the needs of future generations.

However, since the 1970s these people have been under threat from developers and settlers who did not recognise their rights to the

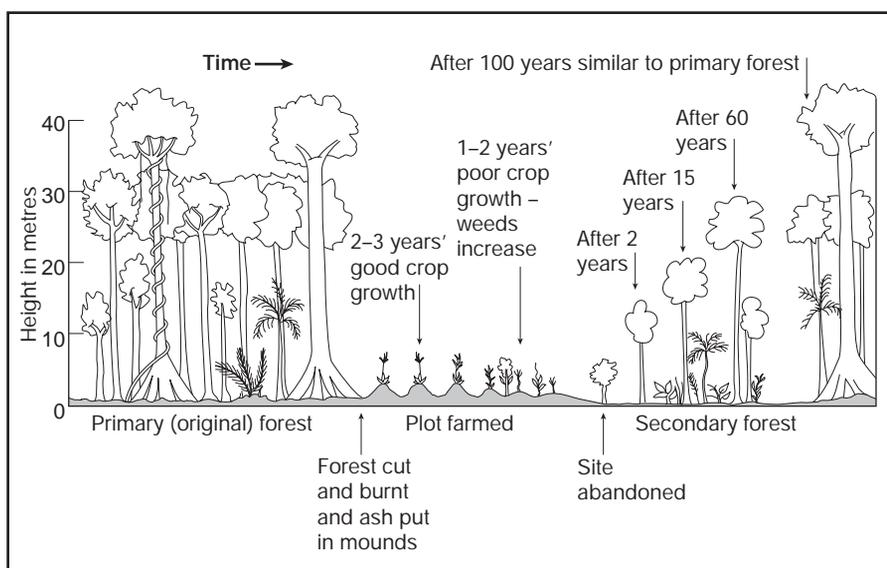


Figure 4: Shifting cultivation and the rainforest

land, and many forest communities have been forced into smaller areas. Vast areas were cleared by burning, and there was severe conflict between the forest people and the newcomers. Chico Mendez, a well-known spokesman for the rubber-tappers, was eventually assassinated in 1988 for his campaign against the developers. Diseases brought by developers also created problems, as the forest people were not immune to common 'Western' diseases like measles and flu. It is now estimated that in the Amazon rainforest there are fewer than 200,000 indigenous people left out of an original population of over 1 million.

Who are the people who want to exploit the forest?

Forests provide a wide range of benefits for governments, so since the 1960s less economically developed countries (LEDCs) have allowed their exploitation for the following:

- 1 Logging for timber.** As trees of the same species do not usually grow close together, many other trees are damaged or destroyed whilst the selected trees, eg mahogany, are felled and removed.
- 2 Mining.** Gold, nickel, tin and iron ore are among several valuable minerals found in Amazonia. The world's largest single source of iron ore is located at Serra dos Carajas in Brazil. Production started there in 1985 but large sums of money had to be spent on clearing land to create a settlement to house the workers and for a railway to carry the iron ore to the docks at São Luis. Part of the forest was drowned by the building of the Tucuruí Dam to produce HEP for the mine, railway and factories. Much of the steel produced here is exported, but some goes to industries in Brazil, for example the car industry. Figure 5 shows the location of the mining operation.
- 3 Road building.** From 1970, in order to open up the Amazon and improve communications, the Trans-Amazonian highway was built.
- 4 Pasture for cattle ranching.** Vast areas of trees have been burnt to grow grass for grazing. Burning

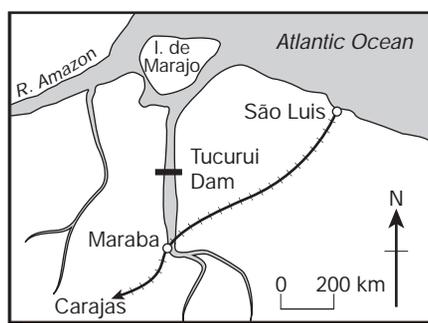


Figure 5: Serra dos Carajas area

returns nutrients to the soil, but after 2–3 years the fertility declines and fertilisers have to be used. Often the land is abandoned, as this is cheaper than buying fertilisers for such large areas, and the next ranch is developed on a new plot of land. The abandoned area suffers from soil erosion. These areas do not recover well.

- 5 Crops.** Plantations have been developed to grow large quantities of cash crops such as oil palm.
- 6 Settlement.** In the 1980s the Brazilian government was keen to relocate people from the favelas of big cities such as Rio de Janeiro and from the dry region of Northeast Brazil. The people were promised a house and land to farm if they moved to the Amazon.

Why do people want to protect the rainforest?

People are concerned about the increasing rate of deforestation. Estimates vary, but 14% of the Amazon (an area the size of France) has been cleared to date, and the rate of clearance is an area the size of Belgium each year. Rainforests are important for a number of reasons:

- They provide homes for people. It is estimated that 20 million people live in the Amazon region.
- They provide habitats for unique plants and animals. Over 50% of the Earth's species live in tropical forests. Many of these are as yet undiscovered.
- They contain gene banks that may provide new drugs and medicines in the future. For example, curare (used as a poison on Waorani hunting arrows) is used as a relaxant in modern surgery.
- They stabilise the climate by absorbing carbon dioxide and so help

to reduce the rate of global warming.

- They reduce soil erosion where there are trees to intercept the rainfall. Watercourses also remain clear and free of sediment.

What can people do to protect the rainforest?

To stop the exploitation of the rainforest, people in several countries have to work together. Given the vast size of the rainforests it is not always possible to control what is happening, but some important steps have already been taken locally and worldwide:

- 1 Parks and reserves** have been set up to protect parts of the rainforest, for example the Jau National Park was set up in the Amazon in 1986 with funding from WWF (the World Wide Fund for Nature) and the European Union.
- 2 Communities** are being educated about sustainable use of the forests.
- 3 Ecotourism** provides an alternative sustainable economic activity.
- 4 In Brazil, IBAMA** – the Institute of Environmental and Renewable Natural Resources – was set up to oversee developments in fragile areas. By 1995 all companies using wood as a raw material or energy source had to get their supplies from managed forests.

Overall it is very difficult to get both MEDCs and LEDCs to agree, as every country has its own priorities. Although some LEDCs, like Brazil, Indonesia and Malaysia, have sustainable management and conservation plans, they are less keen to take further action when MEDCs continue to destroy their own forests and still want free trade. Worldwide, governments still make decisions to allow developments (oil exploration, factories, dams) that will damage areas of the forest. The solution to the rainforest problems is, therefore, the responsibility of people worldwide, and this will be a challenge for the new Millennium.

Activities

1 On a copy of Figure 6, add to labels A–G to show how plants are adapted to the climate of the rainforest. Use the information in Figure 2 to help you.

2 Look at Figure 3.

- How are nutrients added to the cycle naturally?
- How does slash and burn affect the nutrient cycle?
- Why do the forest people have to abandon the land after a few years?
- Describe what would happen to the cycle if trees were totally removed.

3 (a) Use Figure 4 to describe the differences between primary and secondary forest (after 15 years' growth).

(b) Why has population increase and pressure from developers created problems for people who practise shifting cultivation?

4 (a) Use the labels beside Figure 7 to fill in the blank boxes on the flow chart.

- Explain how the removal of trees causes flooding.
- Explain how the removal of trees creates a drier climate. What other cause of climate change could be added to this diagram?
- How are the forest people affected by deforestation?
- How is the wildlife affected by deforestation?

5 (a) Many different groups of people are interested in the rainforest. Make a copy of Figure 8. Working with a partner, fill in the boxes using the appropriate symbols.

(b) Choose **two** groups that live in harmony. Explain your answers.

(c) Choose **two** groups that you have shown to be in conflict. Explain the reasons for this conflict.

(d) How would you suggest that the conflicts you identified in (c) could be reduced?

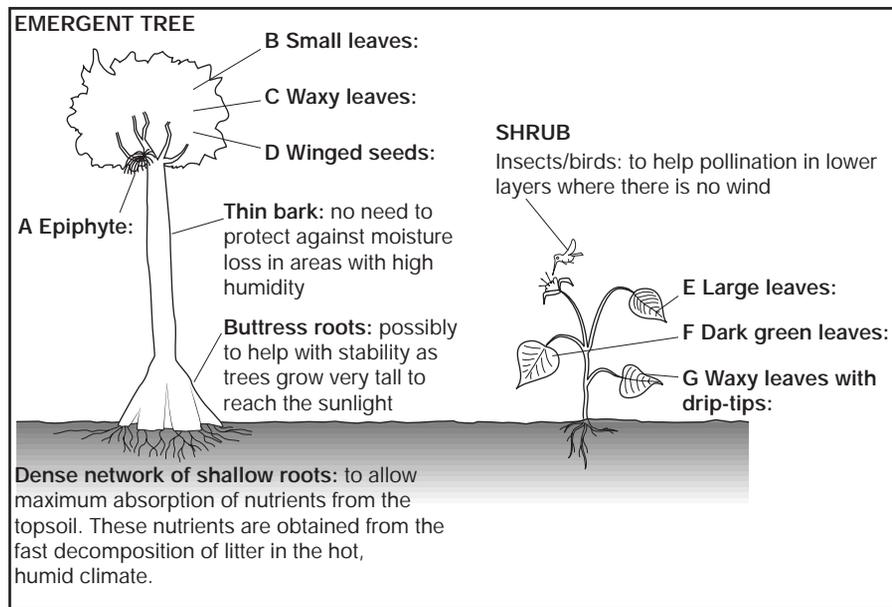


Figure 6: How plants adapt to the rainforest climate

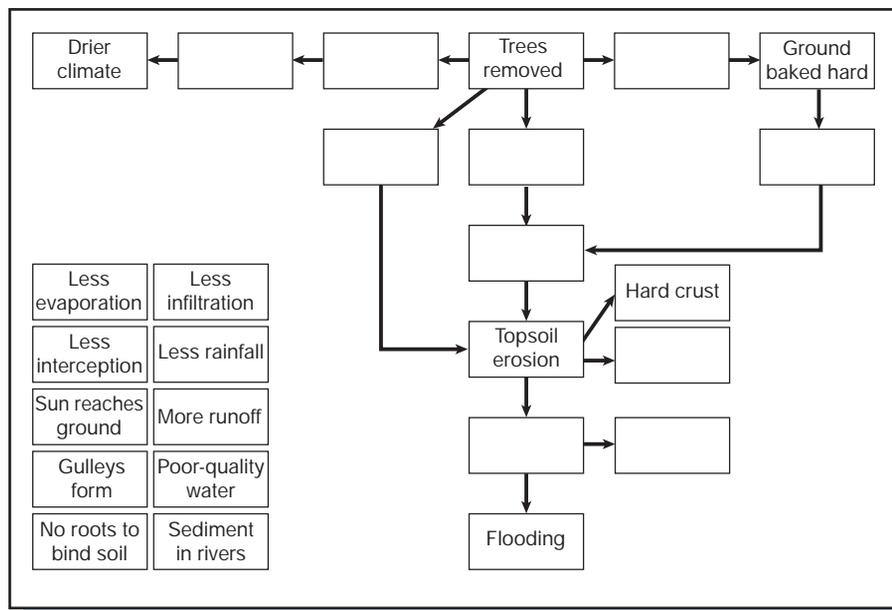


Figure 7: Effects of removing trees from the rainforest

6 Why do LEDCs want to develop their rainforests?

7 Individuals can help to save the rainforests. For example:

- Use less paper/recycled paper.
- Use less petrol and plastic, and re-use the plastic containers and bottles that you already have.
- Eat less beef.
- Don't buy wood products that are not from a sustainable source.

(a) For each of these suggestions explain how it will help save the rainforests.

(b) Add some more ideas to the list.

(c) Design a poster to make people more aware of what they could do to save the rainforests.

	Wildlife	Miners	Loggers	Ranchers	Indigenous people	Small-scale cash croppers
Miners	✓					
Loggers						
Ranchers						
Indigenous people						
Small-scale cash croppers						
Conservationists						

✗ No conflict
 ✓ Conflict
 ? Possible conflict

Figure 8: Conflict of interest matrix