

CASE STUDY

The loss of tropical rainforest in Borneo

Apart from its highest mountains, Borneo was once covered in tropical rainforest – until humans embarked on a programme of rapid forest destruction. A hundred years ago, this huge island was inaccessible and unexplored. But, recently, the clearance of vast areas of forest by burning has sometimes covered countries as far away as China in a brown smoke and ash cloud.

Nowhere else in the world has experienced forest clearance as rapid as in Borneo since 1980.

- 9**
- a** Construct a line graph to show the loss of Borneo's rainforest over time. The years and percentages of land covered by forest are: 1950 (94%), 1985 (74%), 2000 (57.5%), 2005 (50.5%), 2010 (44.5%).
 - b** Describe the trends the graph shows.
 - c** If the present rate of destruction continues, estimate the likely year when all of Borneo's forest will have been cut down.



Fig. 8.30 Cutting trees in the Borneo rainforest

LEARNING TIP Although the years are not in regular intervals, it is possible to plot them at the correct point along the X axis, so that the variation in rates over time can be seen.



Why has so much forest been cleared?

The forest is a source of wealth, which multinational companies want to exploit to provide raw materials for their industries. Population pressure and poverty are also factors, as well as the vastness of the areas involved, which are too large for protection agencies to patrol effectively.

Logging

Borneo is divided between three countries – Brunei and Malaysia have land in the north west, but most of the island is Indonesian. The Indonesian part is called Kalimantan.

From the 1970s onwards, rainforest in the Indonesian and Malaysian parts of Borneo began to be cut down. Those two countries wanted to boost their economies by exporting timber for uses such as furniture making and pulp and paper manufacture. In the 1980s, the logging industry expanded rapidly as new roads provided access to previously untouched areas of forest. Between 1980 and 2000, more timber was exported from Borneo than from Africa and Latin America combined. The forests removed by logging were usually **clear cut** and not replanted. The use of heavy machinery on wet soils compacts them, so rain cannot sink in and runs off instead, causing soil erosion.



Fig. 8.31 Logging in Borneo

Population pressure

Between 1970 and 2000, Indonesia's **transmigration** programme (see page 36) moved thousands of Indonesians from overcrowded islands like Java to less crowded areas like Kalimantan. This resulted in the clearance of millions of hectares of forest. The new settlers' attempts to live by subsistence farming failed, because the heavy rainfall quickly leached the plant nutrients from the soil once the protective forest cover was removed. This is known as **soil degradation**. Instead, the migrants provided labour for logging companies and the roads made for them opened up the forest to the logging companies.

Plantations

In the 1980s, the **deforestation** was speeded up as vast oil palm plantations were planted. By 2004, these plantations covered one million hectares of Kalimantan. The oil palm is a very productive tree (one hectare yields about 6000 litres of oil), so planting it was very profitable for the landowners. Palm oil is used widely in the manufacture of soap, cosmetics and processed foods.



Fig. 8.32 A young oil palm plantation in Borneo

The replacement of tropical rainforest with oil palm plantations is likely to continue, because palm oil has now become an economical way of making biodiesel. It is cheaper than conventional oil and the demand for biofuels is soaring in developed countries, where they are subsidised. To meet the growing demand, Malaysia and Indonesia plan to expand the amount of land being used for oil palm cultivation.

Plantations have also been established for rubber, for industrial hardwoods, and for fuelwood and charcoal. Native trees are being replaced by those species more suitable for pulping.

Hydroelectric power

In Sarawak (in Malaysian Borneo) a large area of forest has been cleared to provide a reservoir for the Bakun HEP scheme. Local people are expressing strong protests about this, because the Malaysian government plans to build seven HEP plants in Sarawak's forests to make industrial developments possible.

Mining

Some forest inland of Balikpapan has now been turned into an oil field. Recently, large-scale coal mining (especially in the east and south of Kalimantan) has become a big threat to the forests there. The Indonesian government is promoting economic development by building a railway to link the mines to the ports. Forest conservation is generally less important to an LEDC than increasing the country's wealth, if they face a choice between the two.



Road building

Roads built to access mines, HEP sites and logging areas open up the forest alongside them for further deforestation and industrial and other developments, including settlement.

Why did the forest clearance result in atmospheric pollution?

Using burning as a method of forest clearance has become widespread. Every year it endangers wildlife and causes an enormous cloud of ash and smoke to drift across neighbouring countries. Attempts have been made to blame the fires on shifting cultivators, but satellite images prove that clearance for plantations is the main cause. The 1997–8 fires burned nearly 7 million hectares in Kalimantan and were the largest.

Consequences of deforestation

Global warming and health

The burning of forests emits a lot of carbon dioxide into the atmosphere. This greenhouse gas absorbs radiation and contributes to enhanced global warming. Forests are also seen as the 'lungs of the world'. When they are removed, less carbon dioxide is taken in and less oxygen is given out. The forests are needed to combat the effects of the extra carbon dioxide in the atmosphere due to the burning of fossil fuels like coal and oil.

Smoke from burning forests is also a health hazard, which – at its worst – was thought to be responsible for one in five of all the deaths in the entire south-east Asian island region.

Loss of biodiversity

Deforestation could result in the loss of plant species which might have unknown uses as medicines, industrial raw materials and foods.

Death of ways of life and unique cultures

Forest clearance in Sarawak for HEP developments, oil palm plantations and logging may threaten the **hunter-gatherer** way of life of the Penan people. They feed on fruit, nuts, plants and animals from the forest.

In Kalimantan, the Dayak people are also under threat. They are shifting cultivators who need to be able to move to different areas of the forest once their current plot has had its soil leached and exhausted of minerals. When there is plenty of forest, their way of life is **sustainable** – because they only clear small plots and they allow the forest to regenerate and the soil to recover its nutrients before they return to the same plot. It does not harm the environment. However, now deforestation is forcing them to return to each plot before sufficient years of fallow have passed. As a result, crop yields and soil quality quickly deteriorate. This leads to soil erosion and the growth of poorer vegetation than the original forest.

There is also tension between the Dayak people and the migrants who were moved to Kalimantan as part of the transmigration programme, because their cultures are totally different.

The hunter-gatherers and shifting cultivators use the forests in sustainable ways.



Fig. 8.33 Forest clearance by burning



Loss of habitats

The numbers of orang-utan in Borneo have fallen in the last 50 years – partly due to the reduced forest cover. Poaching has become easier. Local people can boost their low incomes greatly by selling young orang-utan as pets, after first killing their protective adults (who they consider to be pests, because they include palm fruit in their food). Many other animals and birds are thought to be near extinction in Borneo.

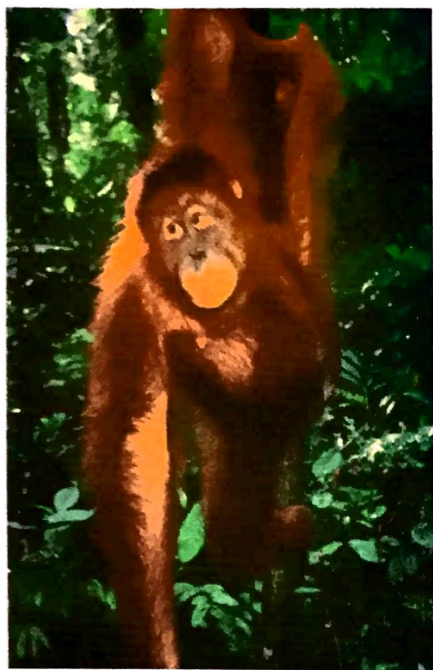


Fig. 8.34 Orang-utan in Borneo

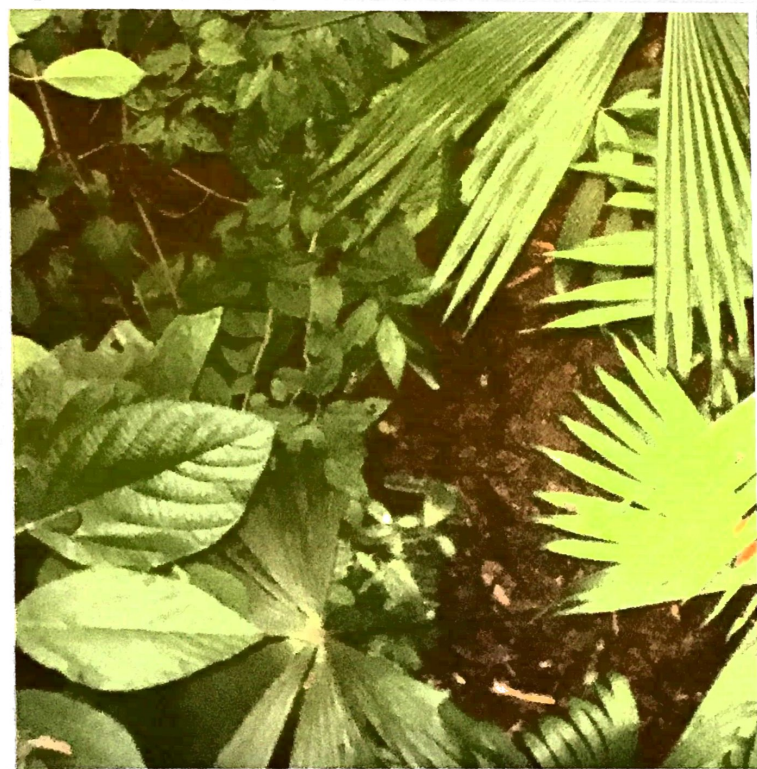


Fig. 8.35 Ground vegetation by a path

Loss of soil fertility

When soils are degraded as a result of deforestation, any forest that is allowed to regenerate (secondary growth) is always poorer than the original primary forest.

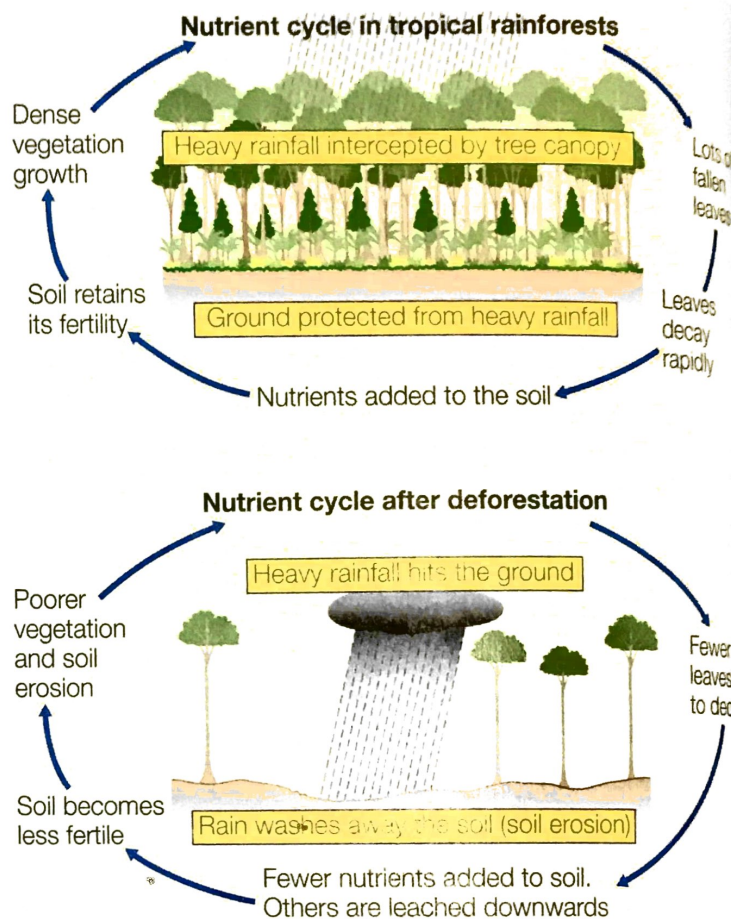


Fig. 8.36 The impact of deforestation on the nutrient cycle

- With no rainforest vegetation to protect the soil, heavy rainfall washes it away. The farmers then need to clear more land.
- When rainforest is cleared and the land is intensively farmed, it loses its fertility within 20 years.
- Deforestation breaks the nutrient cycle, which the soil depends on for its fertility.

10 Look at Fig. 8.35.

- Describe the ground layer vegetation and explain why it is not typical of ground layer vegetation deeper in the forest.
 - Explain why the soil does not have a cover of leaves, even though a great deal of the plants every day.
- b Another consequence of deforestation is soil erosion, leading to the choking of rivers and reservoirs with silt and the consequent loss of aquatic life and flooding. Explain how this occurs.



Attempts to manage Borneo's rainforests

Some areas of Borneo have been designated as **national parks**, which are supposed to have their wildlife and habitat protected. In reality, that is not always the case. For example, when Kutai National Park was formed in Kalimantan, over 300 000 hectares of forest should have been made safe from development. However, timber and oil exploration rights were then granted in the area, and the official size of the Park was reduced by a third. Illegal logging has even degraded that, because it is difficult for park rangers to monitor such a large area.

There is no doubt that the remaining forest should be preserved, but that will be difficult to achieve because a growing population needs a growing economy to sustain it. One third of Indonesians live on less than one US dollar a day.

Large-scale deforestation is bad news. But there are ways of managing rainforests in order to halt or reduce the destruction, and in some cases repair the damage.

Selective logging

This is a technique where individual trees are felled only when they are mature. The idea is that the rainforest canopy is then preserved, which protects the ground below and also helps slower-growing hardwoods, like mahogany. However, the roads left behind by selective loggers allow other people to follow them in and open up the forest further. Also, for every tree that's selectively logged, up to 30 other trees can be damaged or destroyed getting the logged tree out of the forest.

Reducing debt

Conservation swaps, or **debt-for-nature swaps**, are a way of reducing a country's debt and benefiting nature and conservation at the same time. The most common type of debt-for-nature swaps work like this. A country (e.g. the USA) that is owed money by another country (e.g. Peru), cancels part of the debt in exchange for an agreement by the debtor country to pay for conservation activities there.

Promoting responsible management and use

The Forest Stewardship Council is an NGO that promotes the responsible management of the world's forests. Approved companies can use its logo to show that their wood products have been produced responsibly. Consumers can then make a choice between buying approved products, with the logo, or products produced in a less responsible way (hopefully reducing demand for them).

The Forest and Land Restoration Initiative in Kalimantan has a stated aim to restore 900 000 hectares of forest each year by **afforestation** and **reforestation**. It involves local government and villagers. Teak is usually planted because it is valuable and fast growing, so it can be logged at a sustainable rate. However, it is not planted as fast as felling is occurring. Incentives are given to local farmers to replant trees but they are often not big enough to achieve that aim. One disadvantage is that by selecting to plant teak, biodiversity is reduced and the true tropical rainforest is not restored, because teak is not a tropical rainforest species (it is a monsoon forest species).

Ecotourism

Ecotourism helps the local economy. It is often based in resorts within wildlife reserves, such as Tabin Wildlife Resort in the north of Borneo. Walkways, both at ground and canopy level, are often provided for the visitors – together with information boards and visitor centres.

Organisations like the World Bank are also promoting the development and use of more efficient farming methods or more sustainable ways for farmers to earn a living, such as ecotourism.

Improving the standard of education generally and educating the people about why forest conservation is needed should also help. The use of some forest areas as tribal reserves would benefit both the rainforest and the tribes, because they would use the forest in sustainable ways.



11 a Write a speech in which you use two reasons to try to persuade people in a village to save the remaining rainforest in their area. Do not use reasons covered in question 10b.

b Copy and complete Table 8.7 overleaf. You can write 'As for mining' where appropriate.

Fig. 8.37 Ecotourists walking just below the canopy of a tropical rainforest