

A low-angle, upward-looking photograph of a large tree trunk in a forest. The trunk is thick and covered in rough, reddish-brown bark with patches of green moss. The tree extends from the bottom of the frame towards the top, where it meets a dense canopy of green leaves. Sunlight filters through the leaves, creating a dappled light effect. Other tree trunks are visible in the background, also reaching upwards.

Forests: a Global Perspective

CONTENT PAGE

Page 2

- 1** Where are the world's forests?
How has their distribution changed over time?
Interdependence and Globalisation



Page 7

- 2** How do forests
contribute to
environmental health?
Sustainable Futures



Page 11

- 3** How are forests used by people?
Identity and Cultural Diversity



Page 15

- 4** What are the factors that contribute to forest decline?
Interdependence and Globalisation



Page 19

- 5** How does deforestation affect people
and the environment?
Social Justice and Human Rights



Page 25

- 6** How can forests be managed to help reduce poverty?
Social Justice and Human Rights



Page 29

- 7** What action can be taken to conserve
future forests?
Sustainable Futures



WHERE ARE THE WORLD'S FORESTS? HOW HAS THEIR DISTRIBUTION CHANGED OVER TIME? Interdependence and Globalisation

What is a forest?

A forest can be defined as a variety of living and non living components dominated by trees. The living components consist of trees, plants, animals and microscopic organisms; water, rocks, sunlight and air are the non living components. Forest types are determined by the climatic region they are located within.

Get the forest facts!

- the world's forest environments cover 31 per cent of the Earth's total land area – that's more than four billion hectares!
- only 36 per cent of the world's total forest areas are primary forest which consist of native species with no impact upon human activities
- forests provide the livelihood for over 1.6 billion people and are home to over 300 million people
- more than \$300 billion is generated annually through the trade of forest resources
- forests provide the habitat for 80 per cent of the world's terrestrial (land) biodiversity
- 13 per cent of the world's forests are legally protected as national parks, game reserves and wilderness areas.

Distribution of the world's forests

Ten countries with largest forest area 2010

COUNTRIES	Million hectares
Russian Federation	809
Brazil	520
Canada	310
United States of America	304
China	207
Democratic Republic of Congo	154
Australia	149
Indonesia	94
Sudan	70
India	68
Other	1347



Figure 1.1 The world's forests have many roles such as protecting our land and water resources, maintaining biodiversity and providing renewable raw materials and energy

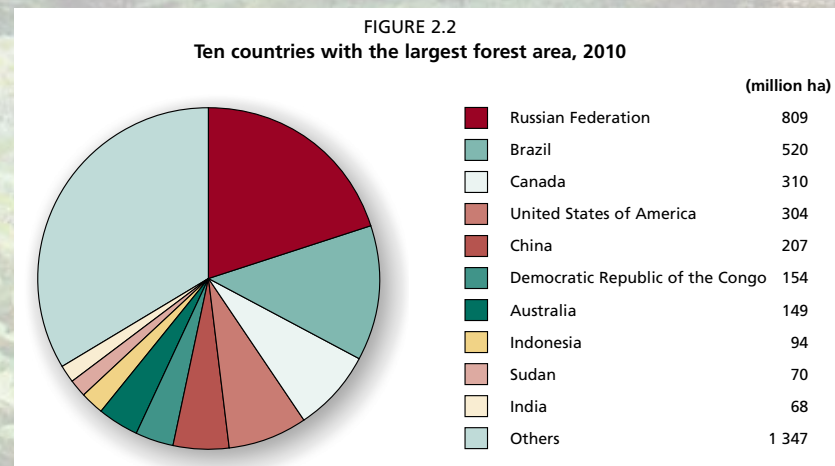


Figure 1.2 More than half of the world's forest cover is found in only five countries – Russian Federation, Brazil, Canada, United States of America and China

Did you know?

The Amazon rainforest is the largest in the world covering an amazing 5.5 million square kilometres. The Amazon accounts for 54 per cent of the world's remaining rainforest environments.



How has the distribution of forests changed over time?

Over half of the world's original forest cover has disappeared as a result of deforestation or natural disasters. Deforestation has been the most significant factor as the forests are cleared by people and the land converted for agriculture, harvesting timber, fuel and the spread of urban environments. In the ten-year period from 1990–2000 an estimated 16 million hectares of forests were lost every year as a result of deforestation and natural disasters. Since 2000, the regions of South America and Africa have experienced the largest loss of forest with four million hectares and 3.4 million hectares per year respectively. Australia's forest loss has also been significant because of severe drought and forest fires.

It's not all bad news!

An increase in forest area can occur in two ways: natural expansion of forests on abandoned agricultural land, and afforestation which is the planting of trees on land that was not previously a forest environment. Since 2000, the most significant gain in forest environments has occurred as a result of large-scale afforestation in China which has increased the country's forest environments by three million hectares per year.

How much area?

Reading about the large areas of rainforest can be confusing. To help you understand the scale of rainforest mentioned in the text, relate it to the area of the Melbourne Cricket Ground (MCG) arena in Melbourne. The MCG is 2.5 hectares in area. Now calculate how many MCGs areas of forest were lost from South America and Africa since 2000.

Figure 1.3 Global distribution of original and remaining forests

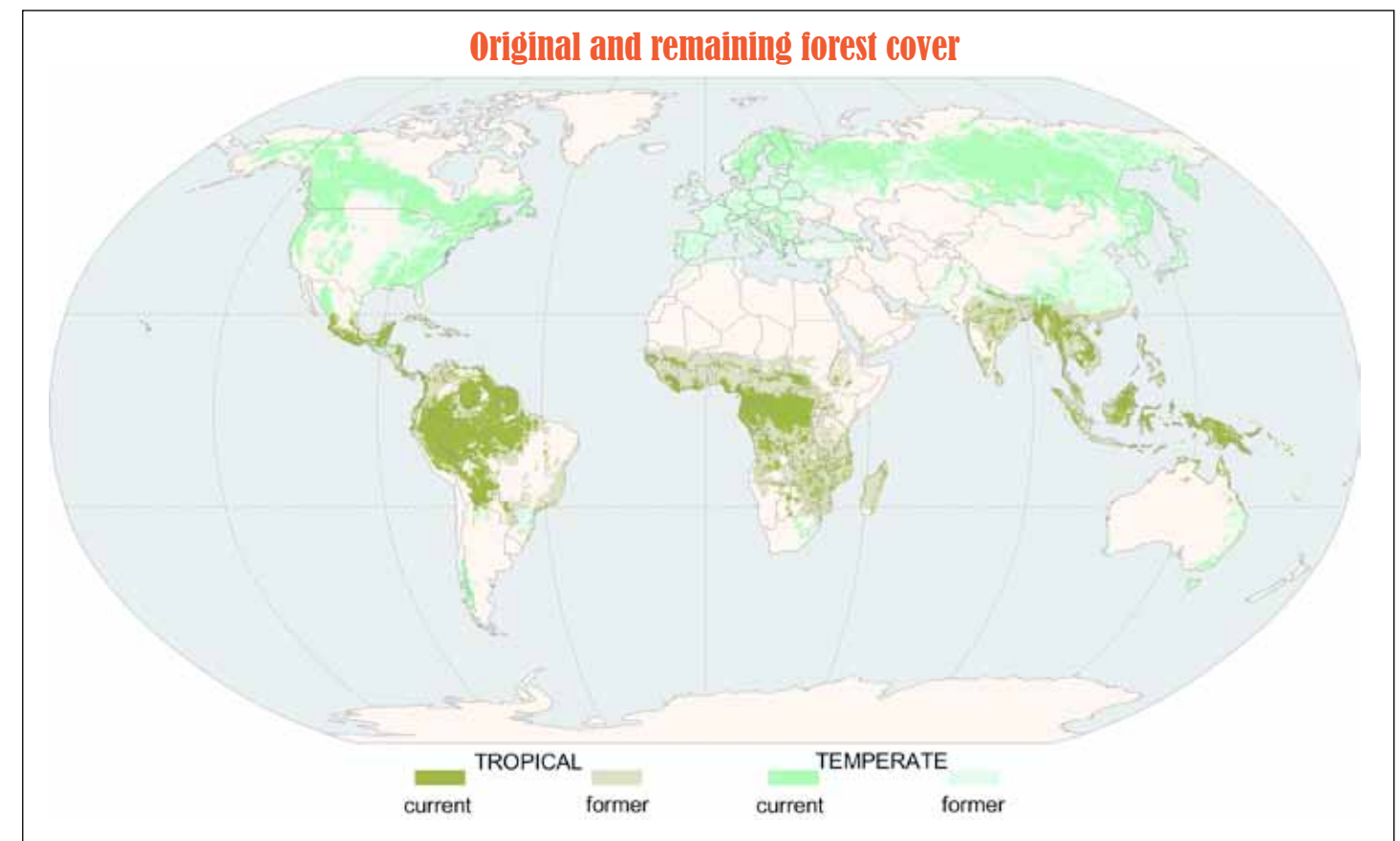




Figure 1.4a Warm temperate forest



Figure 1.4c Boreal forest

Boreal or taiga forests are located in the northern hemisphere, forming a continuous belt of coniferous trees across North America, Europe and Asia. There is a strong connection between boreal forests and variable climatic conditions. Located in subarctic cold climates the temperatures can range between 10 degrees Celsius in summer and dropping to -40 degrees Celsius in winter, and average annual rainfall can range from 200 mm to over 2000 mm.

Subtropical forests are located outside the Tropics of Capricorn and Cancer. These forests are characterised by more noticeable seasonal changes than tropical forests with an average annual rainfall of over 1300 mm which can occur unevenly throughout the year causing wet and dry seasons.



Figure 1.4d Subtropical forests



Figure 14b Cool temperate forest

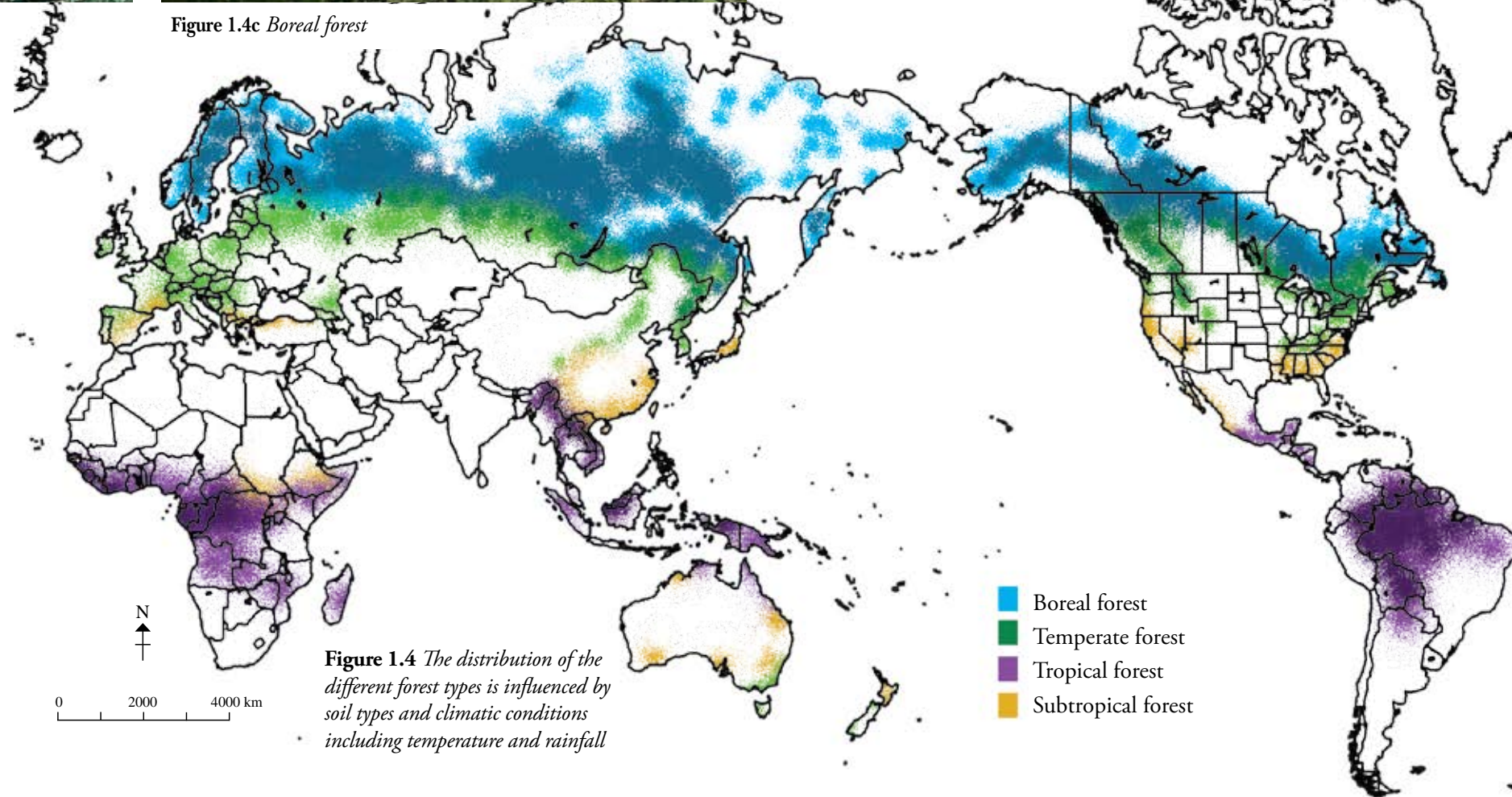


Figure 1.4e Tropical forests

Located in the moist mid latitudes between the tropics and the polar regions, temperate forests tend to be more open than tropical forest, with a great diversity of grasses and smaller plants. The average annual rainfall in these forests is between 500–1500 mm per year. Temperate forests can be classified as cool temperate or warm temperate. Within a cool temperate forest the trees are largely deciduous so they are able to survive in the cooler winter months when the temperature can drop as low as -10 degrees Celsius. The temperature rarely drops below zero in a warm temperate forest. With these milder temperatures and higher rainfall, the dominant vegetation of Australia's coastal warm temperate forests is eucalypts, tree ferns and broadleaved conifers.

Tropical forests – often referred to as tropical rainforests – are distributed along the equator and between the Tropics of Capricorn and Cancer. These environments are characterised by low variability in annual temperature and high rainfall of more than 2000 mm annually. Tropical forests are densely vegetated with tall trees forming a canopy to act like an umbrella over the lower storeys to maintain a moist and cool microclimate. There are many different types of tropical forests including lowland, montane, temperate and mangrove. Rainfall can further classify the type of tropical forest; evergreen and seasonal forests have little or no dry seasons and the vegetation is the same in both forest environments. However, in semi-evergreen and monsoon forests, the trees within these forests are deciduous to cope with extended dry periods with decreased rainfall.

Annual change in forest area by region, 1990–2010

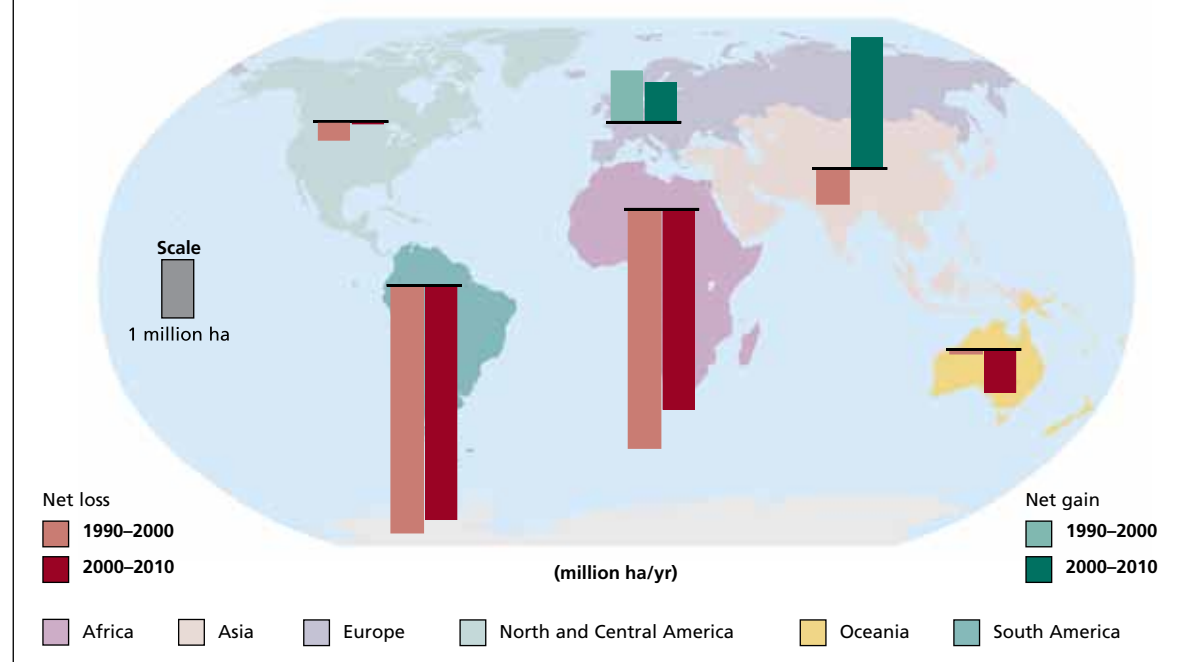


Figure 1.5 Annual change in forest area by region 1990–2010

Activities

Remembering and understanding

1. What is a forest?
2. True or false: rewrite the false statements to make them true.
 - a. The world's forest environments cover three per cent of the Earth's total land area – that's more than four million hectares!
 - b. Forests provide the livelihood for over 1.6 people and are home to over 300 million people.
 - c. The world's forests don't have a role in protecting our land and water resources, maintaining biodiversity and providing renewable raw materials and energy.
 - d. More than half of the world's forest cover is found in only three countries – Brazil, Canada and the United States of America.
 - e. In the 10 year period from 1990–2000 an estimated 16 million hectares of forests were lost every year as a result of deforestation and natural disasters.

Creating and analysing

3. Refer to figure 1.4.
 - a. Describe the distribution of the world's different forest types.
 - b. Using an atlas or researching the Internet, describe the relationship between the global distribution

of forest types and the climate conditions (temperature and rainfall).

4. Refer to figure 1.2.
 - a. Create a pie graph of the 10 countries with the largest forest cover 2010.
 - b. Refer to an atlas and figure 1.3 to describe the distribution of the 10 countries with the largest forest cover. Is there an obvious pattern? Do they contain predominantly one type of forest?
5. Refer to figure 1.9.
 - a. Which region of the world has experienced the greatest increase of forest area between 2000–2010? Explain why this occurred.
6. Construct a Venn diagram to compare the similarities and differences between tropical and temperate forests.

Applying and evaluating

7. Create a "Forest type quiz" to test your class members. Using the four forest types, write up three clues for each – the first clue will be worth three points, the second clue two points and the final clue one point. Test them out on your class members. Produce your quiz in an online environment (such as SurveyMonkey) and share your results through a social networking forum (e.g. create a class blog or a Wiki).

2 HOW DO FORESTS CONTRIBUTE TO ENVIRONMENTAL HEALTH? Sustainable Futures

Forests are vital to the survival of our planet. They have a greater biodiversity than any other ecosystem, absorb carbon dioxide and produce oxygen, stabilise the climate by moderating temperature and rainfall, regulate the water cycle and are a valuable resource of food, shelter and medicinal products for people. Most significant is the role that forests have in reducing the global threat of climate change.

Biodiversity – a wealth of species

Forests are the home to more than half the known species of land animals and plants. Tropical rainforests have an astonishing biodiversity with anywhere between 50–90 per cent of all species on Earth living in these environments.

A snapshot of Papua New Guinea tropical rainforest biodiversity

More than five per cent of the world's plant and animals species are found in Papua New Guinea's tropical rainforests: 9000 plant species 250 mammals 700 bird species 1571 known species of amphibians.

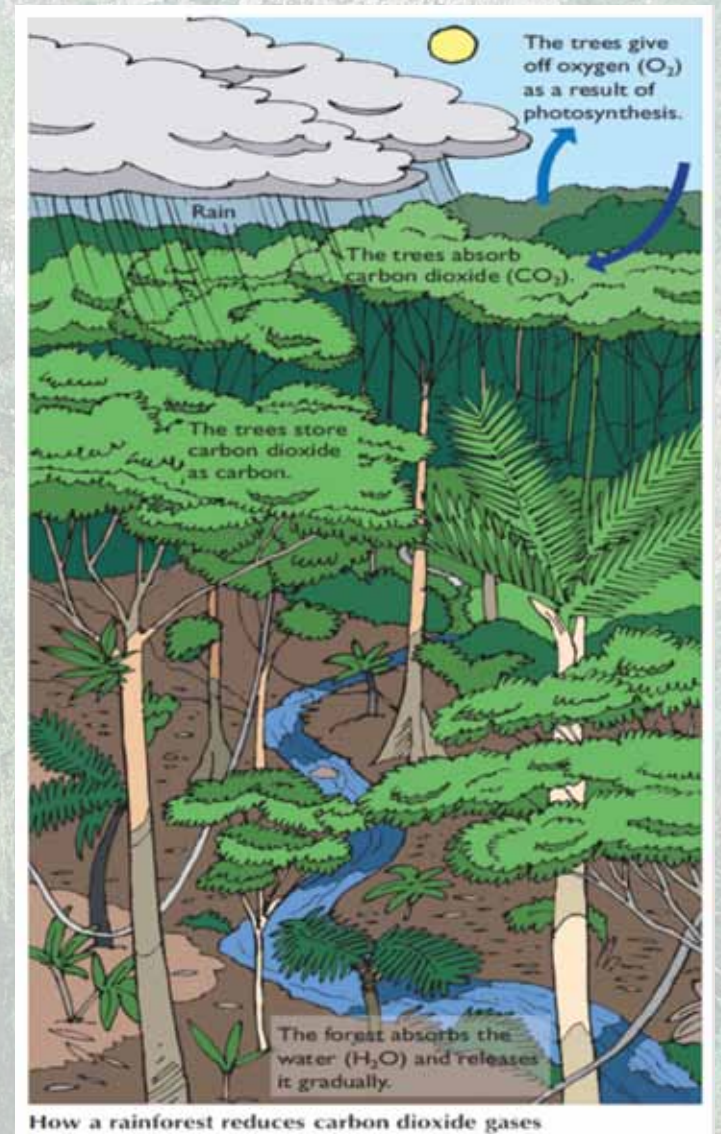


Figure 2.2 Forests help control the Earth's climate through the carbon-oxygen cycle

As recently as 2009, new species of plants and animals were discovered in PNG rainforests – two mammals, 24 new species of frog, 100 insects and nine plants.

Climate Control

Rainforests absorb large amounts of carbon dioxide from the Earth's atmosphere and the Amazon Rainforest alone is the source of more than twenty per cent of the world's oxygen. Plants are vital to our survival. Through the process of photosynthesis plants absorb water and carbon dioxide, they create energy with the help of the sun and release oxygen into the atmosphere. The water they absorb is also released into the atmosphere through transpiration – 75 per cent of

Figure 2.1 The Raggiana Bird of Paradise is one of the 43 species different types of Bird of Paradise found in PNG



the rainfall within a rainforests is returned to the atmosphere as water vapour which gathers to form clouds and produce more rain. This process helps to cool the environment – without this, rainforests would be up to five degrees Celsius warmer and much drier. Much of the sun’s heat is absorbed by rainforests rather than being reflected into the atmosphere, helping to keep the planet cool.

Forests combating climate change

Carbon dioxide traps the heat from the sun warming the Earth’s atmosphere contributing to the enhanced greenhouse effect. Forests reduce carbon dioxide concentrations by absorbing it and storing it as carbon. The trees and biomass (plant and animal material) act as a carbon sink, storing enormous amounts of carbon – in fact the world’s forests and soils store over one trillion tonnes of carbon, twice the amount than in the atmosphere. Deforestation of 13 million hectares of forests per year adds almost six billion tonnes of carbon dioxide into the atmosphere accounting for 18 per cent of global greenhouse gas emissions.

Climate change can be combatted not only by preventing deforestation but through afforestation and replanting of degraded forest areas (reforestation). In the tropics, where rapid vegetation growth quickly removes carbon from the air, forests can store up to 15 tonnes of carbon per hectare in trees and biomass. Climate change can also be reduced by using wood from sustainably managed forests for fuel, construction and furniture production rather than using large amounts of fossil fuels such as coal, oil and gas. Cutting down trees and burning wood does release carbon dioxide, but this is offset by replanting trees.



Figure 2.4 Kalimantan is the name given to the Indonesian section of the island of Borneo – the third largest island in the world

Case Study – Managing climate change in the Kalimantan forests

Indonesia is home to approximately half of the world’s tropical peatlands, with large tracts found in Kalimantan. Compared with other forests, peatlands retain much higher quantities of carbon. As a consequence, the degradation and burning of these forest peatlands contributes significantly to greenhouse gas emissions and, therefore, climate change.

A partnership between the Australia and Indonesia is aiming to demonstrate how the REDD agreement (Reducing Emissions from Deforestation and forest Degradation in developing countries – which was developed at the United Nations Convention on Climate Change and Control (UNFCCC) in Bali 2007) can be practically implemented to reduce emissions from deforestation and forest degradation, conserve biodiversity and improve livelihood of the communities dependent upon the forest. Australia has committed over \$30 million to the Kalimantan Forests and Climate Partnership (KFCP) to achieve these goals, initially focussing on an area of 120 000 hectares of forested and degraded peatland in Central Kalimantan.

Figure 2.3 A burnt out tree is all that remains of an entire forest in an area in Kalimantan, Indonesia

Oxygen tree

In one year, the average tree absorbs more than 12 kilograms of carbon dioxide and releases enough oxygen for use by four people per year.

Stressed out forests!

Forest environments become stressed because climate change is increasing temperatures, altering rainfall patterns and causing more frequent and extreme weather conditions.



Figure 2.5 An AusAID officer inspecting a protected forest. Much of the forest in Central Kalimantan has been destroyed by illegal logging, poor farming practices and fires. Activities of the KFCP aim to reverse the environmental degradation, improve forest management practices, avoid deforestation and prevent fires



Figure 2.6 During the 1990s, large-scale clearance of the forests and peatlands occurred and drainage canals were dug to support rice cultivation. The canals drained water from the forests and made them prone to fire. Dams are being constructed in the canals to raise the water table and, in doing so, wet the peat and re-establish the forests as well as reduce the incidence of fires which will help cut greenhouse gas emissions

3 HOW ARE FORESTS USED BY PEOPLE? Identity and Cultural Diversity



Figure 2.7 Protecting water resources from forest fires, illegal logging and land degradation is vital to reduce the impacts on the livelihoods and health of the people of the forest communities, as well as ensuring long term economic growth and development



Figure 2.8 Within the KFCP area, there are approximately 10 000 people who are directly dependent upon the forest to earn their living. These people are affected by the consequences of deforestation and land degradation so they need to be at the centre of the solution. This will be achieved by working with communities to adopt sustainable land use practices and conservation together with incentive-based payments linked to reduced fire incidence and reduction in greenhouse gas emissions

Activities

Remembering and understanding

1. Refer to figure 2.2.
 - a. Draw a sketch of this image.
 - b. After reading through this unit, annotate the diagram with facts and details about how the forests control the Earth's climate.
2. What is a carbon sink and how does it control the Earth's climate?

Creating and analysing

3. Construct a mind map to show why forests are important for environmental health. Compare, share and expand your mind map with another class member using a media presentation tool such as Emprssr.
4. Compile a list of how the Kalimantan peatlands can have both a positive and negative impact on the environment.

Applying and evaluating

5. Work in pairs to create a past, present and future timeline or flow diagram of the forests of Kalimantan. Include the causes, consequences and responses for both people and the environment. Use an online tool such as Timetoast to create your timeline.

Food and shelter

- More than 300 million Indigenous people rely on forest environments for their survival and livelihoods; they have been doing so for generations with minimal impact upon the environment. Many of the foods we use today originated from forests including bananas, mango, coconuts, pineapples, avocado, ginger, rice, coffee, tea, cashew and brazil nuts.
- Chocolate is made from cocoa from the cacao tree which is native to the Amazon Rainforest in Central America and is now extensively farmed in Western Africa.

Eco-tourism

- Eco-tourism is defined as a responsible travel experience into nature which protects the environment and improves the welfare of the local people.
- Many developing countries are able to preserve the rainforest environments through eco-tourism.
- Income generated by tourists visiting the rainforests, paying fees, donating money and purchasing handicrafts provide alternate local employment rather than relying on agriculture which contributes to deforestation.

Mining

- Beneath many of the world's forests lay vast stores of energy and minerals including zinc, copper, oil, gold, silver, bauxite and iron ore.

Agriculture

- Developing countries are home to many of the world's rainforests. These countries struggle to provide the many basic needs for their large populations. Land for farming is often more important than the preservation of the forest. Subsequently, forests are cleared for farming ranging from small-scale, subsistence farms to large-scale crops and cattle grazing.

Timber

- Rainforest timber is a highly valuable resource. It is generally a hardwood, suitable for building and furniture production as it is attractive and resistant to decay. The most popular timbers are mahogany, teak, ebony, balsa and rosewood.
- Indigenous forest dwellers also use timber for building shelter and fuel.

Scientific research

- Research of forest environments is invaluable to determine the impact of humans, to predict climate patterns, and manage and protect them for the future. Studies can cover:
 - satellite monitoring
 - impacts of deforestation, climate change and tourism
 - discovery of new species
 - Indigenous culture
 - conservation principles and management
 - water and temperature assessment
 - managing and monitoring impacts.

Cultural significance

- Forest environments are very important to Indigenous forest communities whose language, history, art, religion, medicine, politics and even social structure are strongly linked to their surroundings.



Figure 3.1 Approximately 40 per cent of all deforestation is a result of land clearing for small-scale farms

Penan people of Sarawak

The Penan people – known as guardians of the forest – are the last nomadic tribe of hunter gatherers in South East Asia. They live in the rainforests of the Malaysian state of Sarawak on the island of Borneo. Of the 10 000 remaining Penan people only 200 of them still live a nomadic lifestyle – the rest of the population live in settlements. However, the Penan still rely on the forest for food, medicine and other forest products.

Forest sign language

The Penan people have a complex sign language in the form of arranging twigs, sticks and folded leaves which leave messages about the hunting in the area or even about the mood of the person creating the sign.

The Penan are a gentle and softly-spoken people who live in a peaceful, classless community with very little gender division. For the Penan, their physical and spiritual wellbeing depends on the forest. They are so well adapted to this environment that any small changes in light, smell and temperature of the forest can impact significantly on their ability to hunt and collect clean water and plants for food.



MIRI DIVISION : PENAN SETTLEMENTS

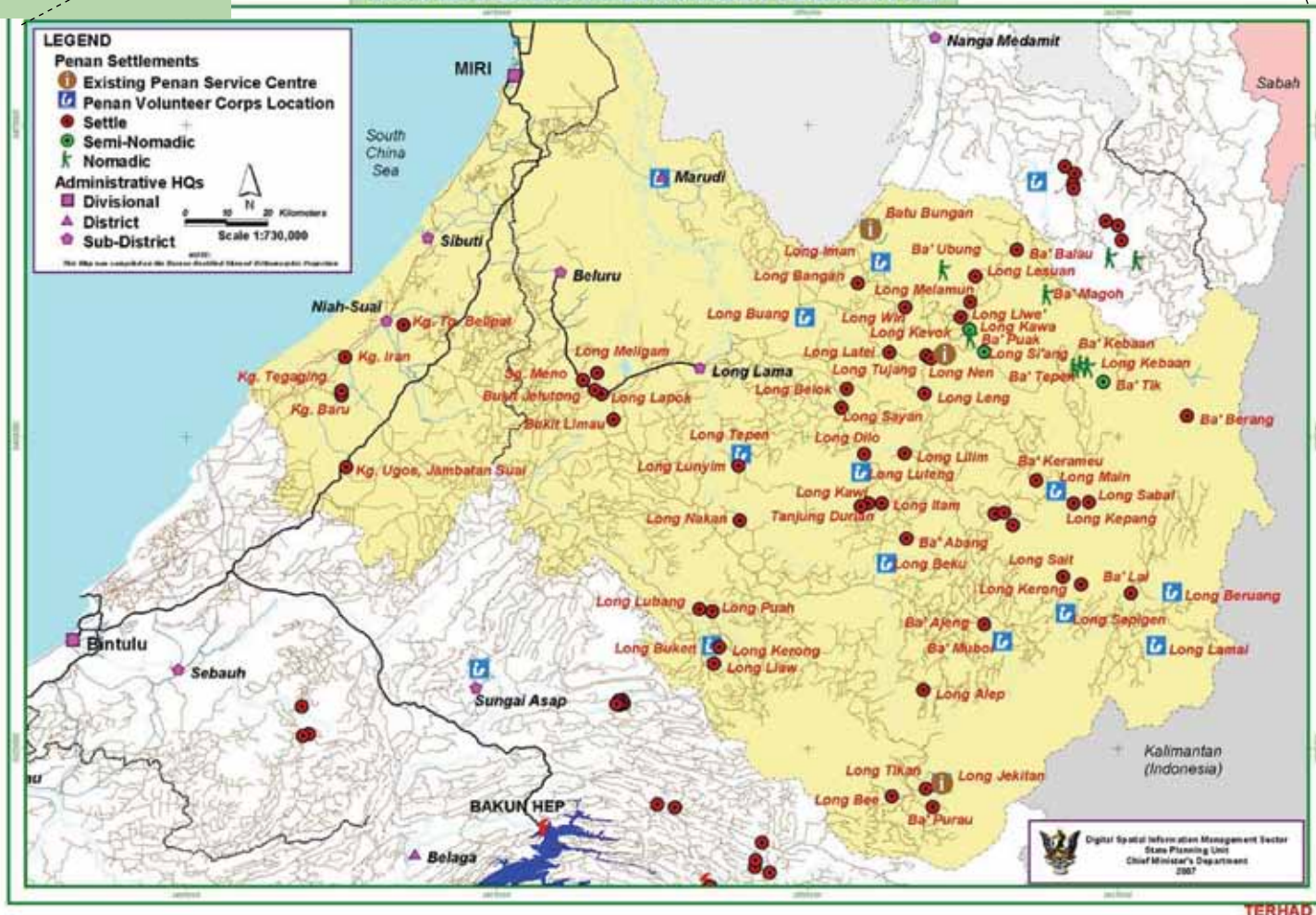


Figure 3.2 & 3.3 Map of Borneo and distribution of the Penan People of Sarawak



Figure 3.4 The traditional hunting method is blowpipe or keleput – manufactured from solid piece of iron wood with a dart dipped in a poison called tejam from the milk of a latex tree

The Penan live by the principle of “Molong” which means to care for the forest resources and to use the forest to ensure future sustainability. Hunters are famous for using blowpipes to hunt animals such as wild pig, deer, and smaller animals; catching fish and gathering ferns and fruit and berries also adds to their diet. The main source of food of the Penan is sago which comes from the core of palm tree and is processed into a thick paste and dried into blocks over a fire. Traditionally they do not practice agriculture or animal husbandry, however many have started to do so as they have been forced into settlements because of logging.

Fighting for their future

The Penan people are protesting and lobbying to protect their lands against continued logging and the spread of palm oil and acacia plantations (the raw material for the paper industry). The most recent threat is the Malaysian government's proposed construction of 12 hydroelectricity stations which will flood the Penan people's lands.

Spirits of the forest

The Penan people believe that each element of the forest has its own spirit and for this to survive they must maintain a harmonious balance with their surroundings.

A selap is the traditional shelter made from thick poles tied together with rattan. Each family has two selaps, one for living and a smaller one for sleeping. Some groups of nomadic Penan are as small as five or six people while others can be as large as 30 people. Every couple of months, they move through the clan territories, moving their selaps to find another patch of the forest.

Snapshot of Kombai – Papua’s lost tribe

The Kombai people are distributed across the dense forests in the foothills of the highlands of the Indonesian half of the island of New Guinea, which is the province of West Papua. This tribe of forest dwellers has only been discovered in the last 25 years; their lifestyle has remained unchanged for approximately 15 000 years. There is estimated to be only 4000 of these hunter gatherers, spread across hundreds of small tribes, each speaking their own language.



Figure 3.5 Tree houses are built nine to 30 metres off the ground and provide an escape from the heat and mosquitoes. The original purpose of the tree house was as a defence against flood and raiding parties from other tribes. They were also thought to help keep the Kombai away from sorcerers

© Robert Harding Picture Library / SuperStock

Rainforests may hold the key to disease cures!

The medicinal value of plants found in rainforests is already proven with anti cancer drugs derived from the periwinkle plant found in Madagascar. The sale of this drug significantly improves the survival rate for childhood leukaemia and also generates over \$AU150 million per year worldwide. In addition, the World Wildlife Fund (WWF) claims the rainforests of Borneo may hold the key to curing HIV/AIDS and tuberculosis. Scientists have discovered a unique chemical in the latex produced by the Bintangor tree which could be used to create a single drug to treat these two diseases which affect over 21 million people globally.

Activities

Remembering and understanding

1. Why are forests an important medical resource?
2. How and why are forests important to the culture of the Penan People?
3. Define the term “malong” and how it has meant that the Penan people have ensured the sustainable use of the forests they live in.

Creating and analysing

4. In small groups, create a visual or multimedia display of how people use the forests.
5. Visit the following website

www.bbc.co.uk/tribe/index.shtml

- Research one other group of Indigenous people who live in the forest. Include a sketch map of the country or region where the people are from.
- Construct a Venn diagram to compare the similarities and differences between the Penan people and the other Indigenous people you have researched. Share your findings with other members in your class using your class Blog or Wiki.

Applying and evaluating

Imagine that you are representing the Penan people’s protest against the Malaysian government’s plan to construct 12 hydroelectricity plants on their land. Put together a detailed report about the impact it will have on the Penan people and why this plan cannot go ahead. Use an online media tool such as Voicethreads or Empressr to create and share your presentation.

4 WHAT ARE THE FACTORS THAT CONTRIBUTE TO FOREST DECLINE? Interdependence and Globalisation

The destruction of the world’s forests is a significant environmental issue. It is estimated that half of the world’s forest environments have been lost in the last 60 years as a result of deforestation. Between 2000 and 2010, deforestation and other forms of forest degradation occurred in over 13 million hectares of forest per year. These forests were converted for other uses or lost due to natural disaster, and the majority of this loss occurred in developing countries. Some countries, such as China, have experienced a gain in their forest cover as a result of abandoned agricultural land being reforested as well as the growth of the commercial forestry industry.

What is deforestation?

Deforestation is the removal of the forest caused by either humans or natural disaster. Humans remove the forest to convert the land to another use, while natural disasters such as tsunami or forest fire sometimes leave the area incapable of regenerating.

Deforestation in the Asia Pacific Region



Figure 4.1 Map of the Asia Pacific regions



Figure 4.2 Distribution of forest resources in the Asia Pacific region

The Asia Pacific region consists of 47 countries and is home to more than half of the world’s total population. The region accounts for 18.6 per cent of the world’s tropical forest areas, and it is also home to a vast diversity of environments including tropical and temperate forests, coastal mangroves, mountains and deserts.

Subregion	Area (1 000 ha)			Annual change (1 000 ha)		Annual change rate (%)	
	1990	2000	2005	1990–2000	2000–2005	1990–2000	2000–2005
East Asia	208 155	225 663	244 862	1 751	3 840	0.81	1.65
Oceania	212 514	208 034	206 254	–448	–356	–0.21	–0.17
South Asia	77 551	79 678	79 239	213	–88	0.27	–0.11
Southeast Asia	245 605	217 702	203 887	–2 790	–2 763	–1.20	–1.30
Total Asia and the Pacific	743 825	731 077	734 243	–1 275	633	–0.17	0.09
World	4 077 291	3 988 610	3 952 025	–8 868	–7 317	–0.22	–0.18

Figure 4.3 Forest area of the Asia Pacific Region: extent and change

Factors contributing to forest decline

Causes	Explanation
Agriculture	The leading causes of deforestation are small and large-scale farming. Sugar was the first crop responsible for large sections of rainforest removal. More recently, crops such as coffee, bananas and palm oil have been responsible for large-scale deforestation.
Logging	Approximately 70 per cent of all deforestation began with logging and agriculture. The demand for timbers such as mahogany, teak, ebony, balsa and rosewood keeps the timber and logging industry thriving.
Mining	Beneath many of the world’s forests lie vast stores of energy and minerals including zinc, copper, oil, gold, silver, bauxite and iron ore.
Firewood and charcoal	Timber for fuel and charcoal, particularly cutting firewood for charcoal which is used as a fuel and industrial applications, is a significant contributor to deforestation.
Hunting and illegal trafficking of animals	The trade of animals has a destructive impact on the biodiversity of forests. Some overhunting is for food by local forest dwellers, however, much of this ends up in local or international markets. This is a problem in West Africa, Brazil and Indonesia. Animals hunted include all types of large cats, elephants, chimpanzees, orangutans and butterflies. Animals which are attractive for international trade include parrots, macaws, turtle, fish, monkeys, frogs, snakes and butterflies.
Aquaculture	Coastal mangrove forests are being affected because of the growth of fish and shrimp farming. Mangrove forests are cleared to make way for huge saltwater ponds where the shrimp are stocked. These ponds end up full of shrimp but also full of waste, silt and salty water, and result in ponds that are no longer usable.
Petroleum	Drilling and exploration for petrol is occurring off the coast of Indonesia and Burma which has required pipelines to be constructed through the forests contributing to deforestation and forest degradation.
Fire	The majority of forest fires go unreported. A total of one per cent of the world’s forests are affected by fires each year – 90 per cent of these of wildfires with the remaining 10 per cent prescribed burns.
Warfare	In recent history, forests have been destroyed during conflict. For example, Agent Orange was used by Allied forces in the Vietnam War to make the jungles safer for the soldiers and reduce the hiding places for the Viet Cong (Vietnamese National Liberation Front soldiers). In less than four minutes, one plane could spray enough Agent Orange to destroy 140 hectares of forest. The greatest ecological impact was on the dense tropical forest where chemicals caused the death of trees and animals, environmental pollution and the long-term disturbance of natural ecosystems.
Pests, disease and natural disasters	Each year, more than 25 million hectares of forests (mostly temperate and boreal) are damaged by forest insect pests. In Canada and western United States of America, the mountain pine beetle has devastated more than 11 million hectares.
Cattle grazing	The expansion of cattle grazing is having a significant impact in South and Central America. Once the rainforests have been cleared the land is quickly covered with cattle. Over 80 per cent of deforested rainforest in Brazil is now used for cattle grazing.
Urbanisation	Forest environments are removed in order to cater to an ever-increasing population and rapid expansion of urban areas. 2009 was the first year that more people lived in urban areas than in rural areas. For example, in India, significant coastal mangrove forest loss has occurred over a long period of time as the seven islands of Mumbai were reclaimed from the sea and linked together to form one continuous land mass. In the 1990s the Indian government implemented coastal regulatory zones limiting further reclamation of land out of concern for continued environmental degradation.

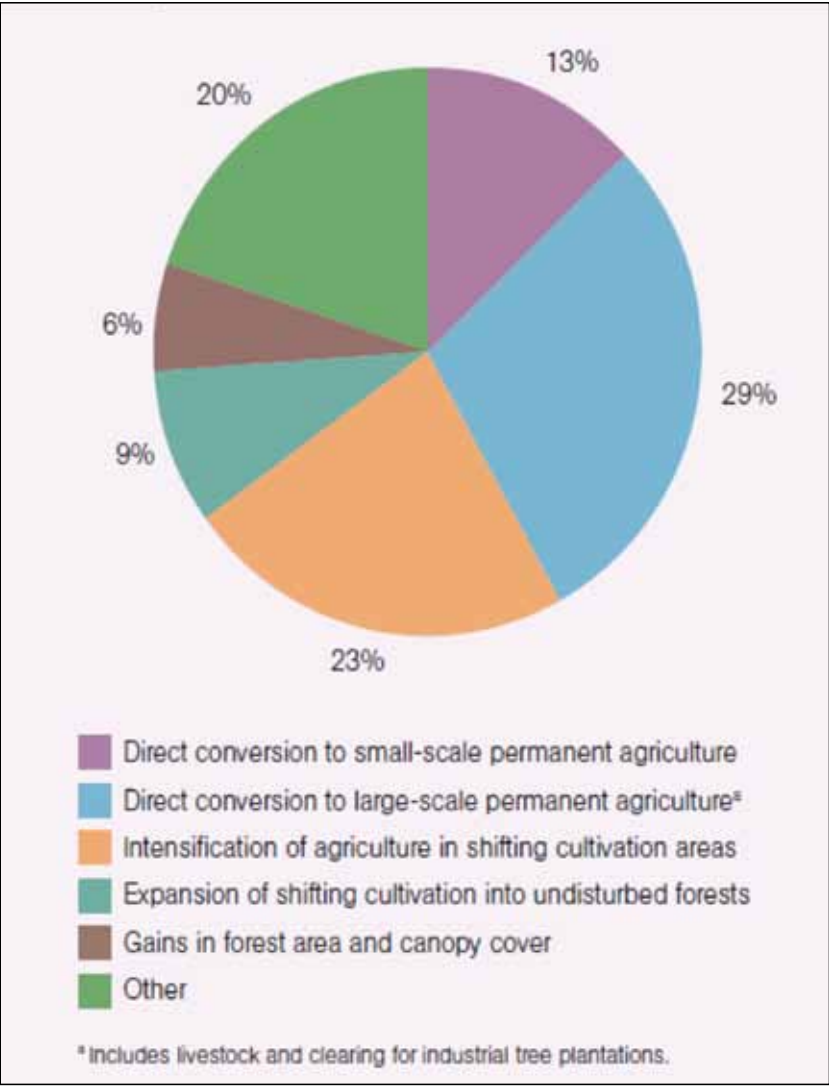


Figure 4.4 Direct causes of forest area change in tropical Asian and Pacific countries 1990–2000

Over half of the regions forest cover is located in Australia, Indonesia and China. The countries of the Pacific have the highest per capita forest cover of 5.88 hectares per person and the lowest deforestation rates with 130 000 hectares lost each year – 113 000 hectares of forest are lost each year in Papua New Guinea. In total, the Asia-Pacific region lost 3.7 million hectares of forest each year between 2000 and 2005. Agriculture accounts for the most significant change within the tropical forests of the Asia Pacific. Rapid population and economic growth within many of the countries in the region will increase pressure on forest environments through the expansion of small and large-scale farming, particularly palm oil plantations as well as unsustainable timber collection and cattle grazing.

Illegal timber
Each year, an estimated \$2.3 billion of illegally logged timber is traded between the countries in East and South East Asia; 73 per cent of the timber exported from Indonesia and 35 per cent from Malaysia is sourced illegally. Australia, China, Korea and Japan are the main importers and consumers of the region’s illegal trade in timber – 9 per cent of Australia’s timber imports are from illegal sources. China is the largest importer with approximately 35 per cent of timber for furniture, paper and pulp sourced from illegal logging.

Papua New Guinea: a snapshot of deforestation

Papua New Guinea is an island in the south-west of the Pacific Ocean, located 100 kilometres north of Australia. Papua New Guinea covers the eastern side of the island while the western side is West Papua, and part of Indonesia. Papua New Guinea has the third largest tropical rainforest in the world. It accounts for only one per cent of the world’s land mass yet it is home to five per cent of the world’s species – a staggering 1500 species of amphibians, birds, mammals and reptiles with a quarter of them endemic to the country. In the last 30 years, Papua New Guinea has lost 15 per cent of its rainforest with an additional 8–9 per cent damaged as a result of logging. Some of this change can be seen in figure 4.5 on page 18. The World Bank estimates that for every tree that is legally felled and removed from the forest another 17 trees are destroyed illegally. Deforestation also occurs because of agricultural plantations, particularly palm oil, as well as rubber, coffee and coconut sap plantations. If the current practices of deforestation continue in Papua New Guinea, the rate of loss will result in over half the forest cover lost by 2021.

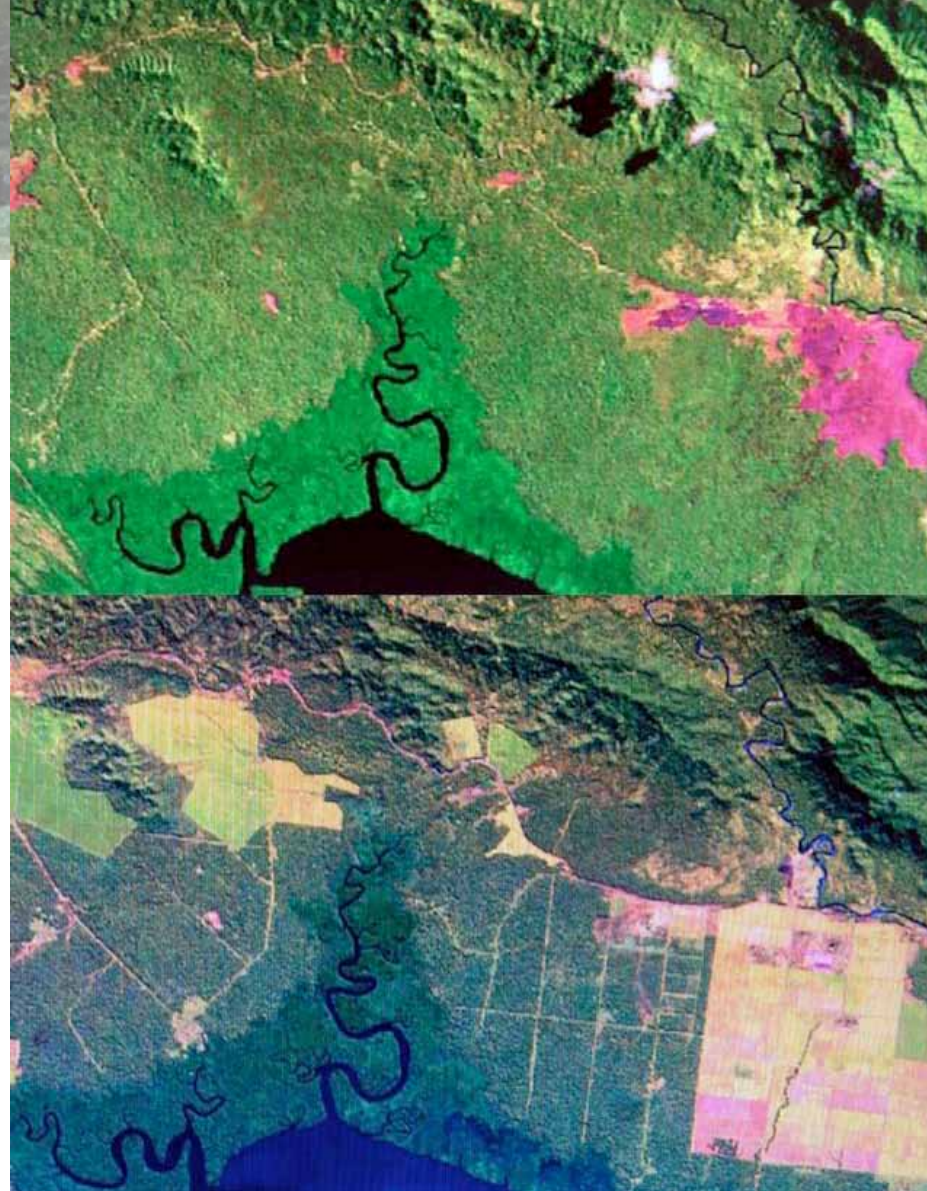


Figure 4.5 Satellite image of the South Eastern tip of Milne Bay, Papua New Guinea in 1990 and 2005 showing the expansion of palm oil plantations

AusAID lending a helping hand

AusAID has committed \$3 million to assist Papua New Guinea to reduce their greenhouse gas emissions from deforestation, tackle illegal logging and help manage forest sustainability.

Activities

Remembering and understanding

1. Explain deforestation in your own words.
2. Fill in the blanks in the following paragraph:
The Asia _____ region consists of _____ countries and is home to more than _____ of the world's total population. The region accounts for _____ per cent of the world's _____ forest areas. It is also home to a vast diversity of environments including tropical and _____ forests, coastal _____, mountains and deserts.
3. In total, how many million hectares did the Asia Pacific region lose between 2000 and 2005?
4. Refer to figure 4.4.
How much of the change to forest area is caused by small and large-scale agriculture?

Creating and analysing

5. Classify the factors contributing to forest decline discussed throughout this chapter using a SHEEPT (social, historical, environmental, economic, political and technological) factor table.
6. Refer to figures 4.1 and 4.3.
 - a. Copy or trace the map of the Asia-Pacific sub regions.
 - b. Select two different colours, one for loss and one for gain of forest area. Shade in the sub regions accordingly using the annual change (1000 hectares) for 2000–2005.
 - c. Annotate the sub regions with the actual figures of loss or gain of forest area.
 - d. Which sub region experienced an increase in forest area? Refer to the chapter to explain how this sub region achieved this.
 - e. What was the total number of hectares of forest cover lost throughout all of the sub regions?
7. Refer to figure 4.5.
 - Sketch the satellite images and annotate them to show the changes and causes that have occurred over time in Milne Bay, Papua New Guinea.

Applying and evaluating

Select one of the factors that contribute to forest decline. Conduct some further research and compile a fact file, including the positive and negative impacts this topic has for both people and the environment. Present this as poster or PowerPoint presentation or complete and share your findings using *Webnote* or *Springnote*. In small groups, discuss the topic of illegally logged timber. Brainstorm ways to educate Australians about where their timber comes from. Select one of your ideas and develop it into a slogan or advertisement. Post these on the class blog or Wiki.

5

HOW DOES DEFORESTATION AFFECT PEOPLE AND THE ENVIRONMENT? Social Justice and Human Rights

Deforestation and effects on people

Deforestation has a significant impact on the Indigenous inhabitants because their food, shelter and livelihood are provided by the forest. Deforestation can cause conflict between Indigenous communities and loggers and industrialists who are changing their land and way of life. If the end result forces people from their traditional lands, moving to settlements in urban areas is a difficult prospect as they may not have the money, skills or education to adapt – many end up living in poverty. Increased human activity within forest environments also has the potential to increase the spread of disease. The construction of rice paddies, dams, and irrigation channels on land cleared of rainforests can increase the amount of surface water stored, which in turn increases the amount of water borne diseases such as malaria, dengue fever and cholera.

Easter Island – a lesson for the world on the effects of deforestation

Easter Island, also known as Rapa Nui, is famous for over 800 giant stone statues built by Polynesian settlers to honour their ancestors – some statues measure nine metres in height with the average length around four metres. The island was once covered in a subtropical forest; the giant palms and trees were used for agriculture, fuel and building as well as to assist in the construction of the statues. Yet when this isolated island was discovered by Dutch explorers in 1722, the landscape was barren with no trees over 10 metres in height and the Polynesian islanders were struggling for survival. The population had decreased significantly as the natural forest resources were removed. Plants and animals no longer inhabited the forest, drinking water and streams disappeared and they were left with no trees to make canoes for fishing and transport, nor did they have adequate food and fuel. The mystery of the collapse of the Polynesian community on Easter Island is suspected to be strongly linked to deforestation because their survival depended on the forest environment which was decimated by the over-exploitation of resources.

Deforestation and effects on the environment

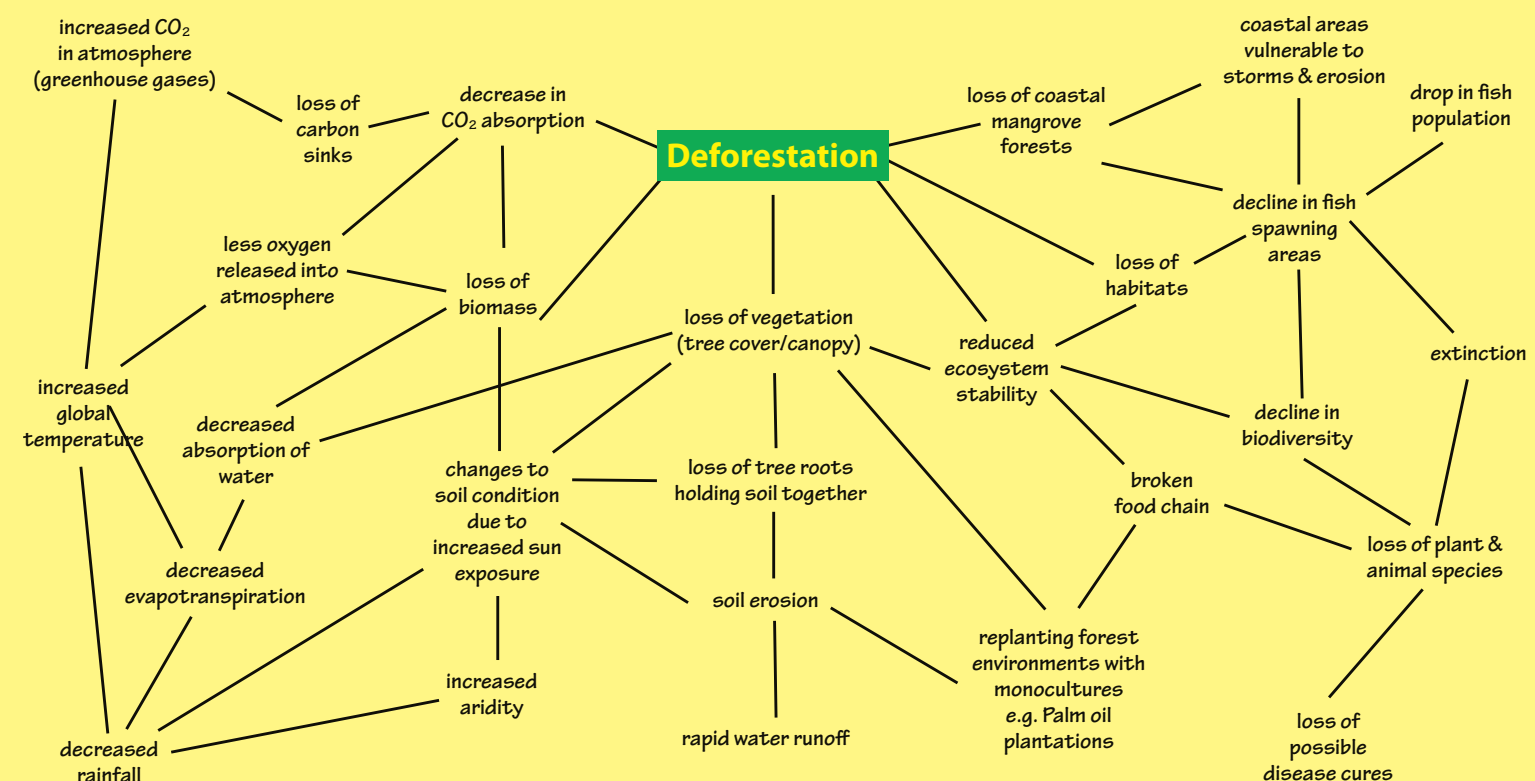


Figure 5.1 Deforestation and the environment – an interconnected ecosystem



Palm Oil as a cause of deforestation and its impacts

What is palm oil?

Palm oil is the world’s most important edible plant oil derived from the fruit of the oil palm tree. It is found in up to 50 per cent of all packaged food on supermarket shelves. The average Australian consumes 10 kilograms of palm oil per year as it is commonly used in a wide range of products such

as margarine, ice cream, biscuits, chocolate and cooking oil. It is also used in soaps, detergents, cosmetic, insecticides and fungicides as well as in brake fluids and is increasingly used as a biofuel.



Figure 5.2 Palm oil plantation in Borneo
Palm oil plantations are the leading cause of deforestation in Malaysia and Indonesia. It is estimated the 66 per cent of Indonesia’s palm oil plantations and 87 per cent of Malaysia’s palm oil plantations are on deforested land

What do cattle, rabies and vampire bats have to do with deforestation?

Across Central and South America, the population of vampire bats has been increasing as forests are cleared for cattle grazing. The large number of cattle means that the bats no longer have to search for prey resulting in an increased bat population. The bad news is that vampire bats carry rabies! In a two month period during 2005, rabies outbreaks from vampire bats killed 23 people in Brazil.

Palm oil production

Oil Palm	Million metric tons
Indonesia	23
Malaysia	18.6
Thailand	1.5
Nigeria	0.85
Colombia	0.82
Papua New Guinea	0.44
Ecuador	0.46
Cote d’Ivoire	0.3
Honduras	0.25
Brazil	0.27
World	47.91

Figure 5.3 Palm oil production – January 2010/11 Projected (million metric tons)

The production of palm oil requires a constant wet tropical climate with temperatures around 24–32 degrees Celsius limiting the growing region to 10°S and 10°N of the equator. There is a strong spatial association with the distribution of the world’s tropical rainforests.



Figure 5.4 Satellite image of deforestation for palm oil plantations. Huge areas of tropical rainforest have been destroyed throughout Malaysia and Indonesia. An estimated 80–100 per cent of birds,

mammals and reptiles do not survive the destruction of the rainforest for the establishment of palm oil plantations



Figure 5.5 A ranger rescuing an unconscious orang-utan from an area cleared for a new palm oil plantation

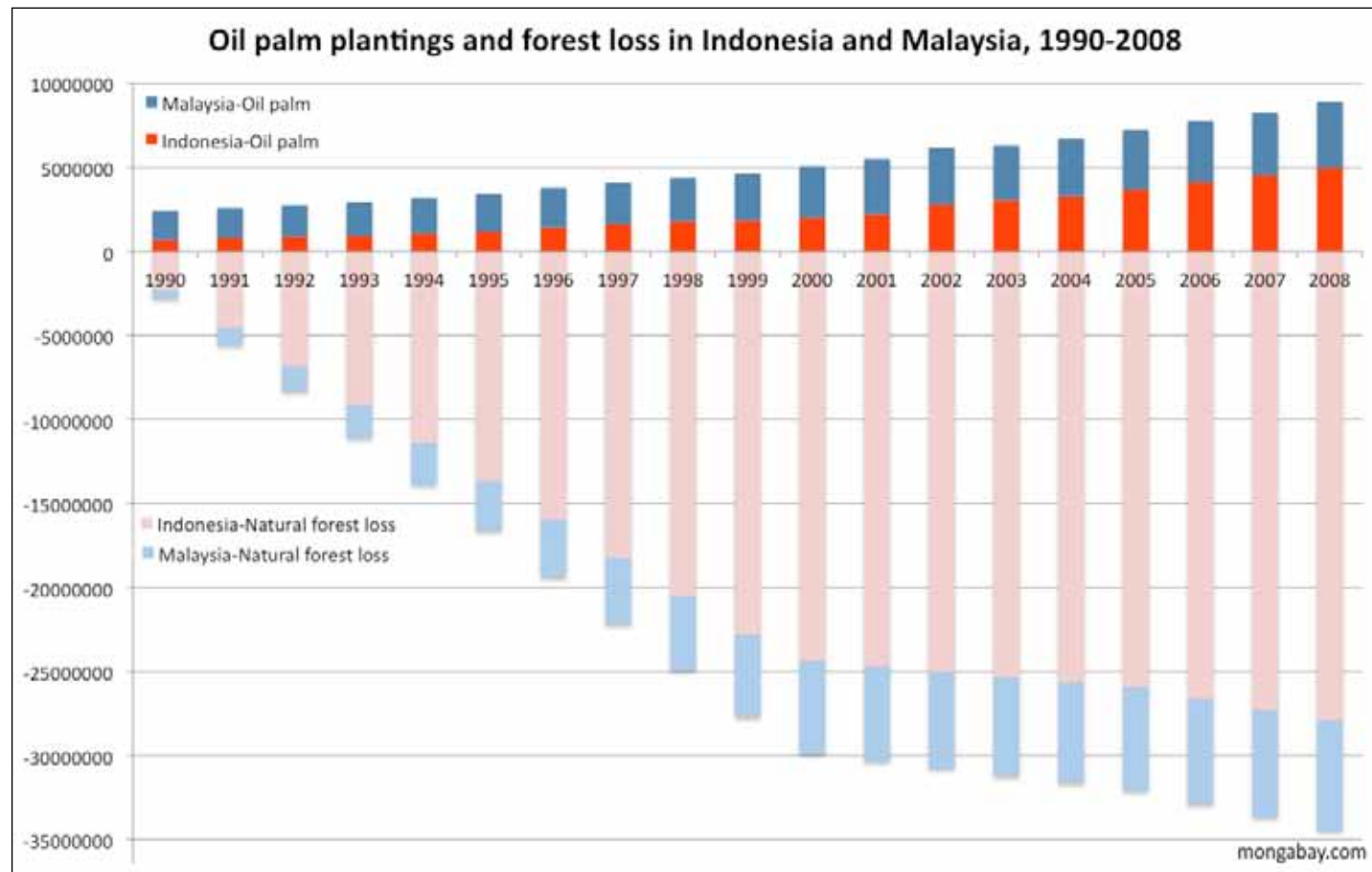


Figure 5.6 Oil palm planting and forest loss in Indonesia and Malaysia, 1990–2008. The production of this highly profitable crop has more than doubled in the last 13 years, largely at the expense of the rainforests. The Indonesian government has plans to increase palm oil plantations by a further 20 million hectares by 2020. This is to cater for the increasing demand for palm oil from countries with high populations such as India and China who use palm oil as a source of fat for a diet otherwise deficient in nutrients

Environmental effects

The environmental effects from increased production of palm oil include:

- deforestation
- soil and water pollution – over 25 different herbicides and insecticides are used on palm oil plantations
- soil erosion and increased sedimentation of rivers from water runoff
- waste water from palm oil production plants flowing into waterways killing aquatic life and degrading drinking water
- air pollution from forest fires to clear land, an illegal practice that still occurs
- increased number of endangered species as a result of habitat destruction.

The loss of species through clearing of the forests is perhaps the most publicised environmental impact of increased oil palm plantations. Both Indonesia and Malaysia have species that are critically endangered including the Sumatran Tiger, Sumatran and Borneo Orangutan, Sumatran Rhinoceros and the Asian Elephant.

Save a tiger – Rent a Tiger!

The Indonesian government has developed a strategy to protect the last 400 Sumatran tigers and raise money for ongoing conservation. A pair of tigers can be rented for one billion rupiah (over \$AU100 000). The tigers can only be rented by Indonesians and must be kept in a cage measuring six metres by 10 metres and be visited by veterinarians and government officials every three months. The tigers remain the property of the government and can be returned when they are no longer wanted. No fewer than 12 Non Government Organisations – NGOs – have complained about the Indonesian government’s plan to rent out their tigers.



Figure 5.7 Nestlé’s Kit Kat versus the orang-utan. Greenpeace launched a campaign in 2010 with a YouTube clip to attempt to stop Nestlé from using palm oil sourced from those involved in deforestation and habitat destruction. Over 23 000 Australians supported the campaign by contacting Nestlé. It took no more than two months for Nestlé to commit to no longer sourcing palm oil from farms contributing to deforestation

Palm oil and the orangutan

Every week up to 50 orang-utans are killed as a direct result of deforestation for palm oil plantations. They face starvation when the forests are cleared. Desperately searching for food, they even venture into human settlements and face capture. Rescue organisations such as *Orangutan Outreach* (operating in the Indonesian province of West Kalimantan on the island of Borneo) provide homes for more than 600 orphaned and rescued orang-utans.

It is estimated that there are as few as 50 000 orang-utans in the wild, with 80 per cent of them found in Indonesia and the rest in the Malaysian states of Borneo – Sabah and Sarawak. At the current rate of deforestation and subsequent loss of orangutans, the World Wide Fund for Nature predicts the species could become extinct in the next twenty years.

People and palm oil

Palm oil and the poverty cycle

Despite the heavy costs on the world's rainforests as a result of the palm oil industry, it plays a significant role in breaking the poverty cycle for many palm oil farmers in Malaysia and Indonesia. For example, in Indonesia approximately 44 per cent of the palm oil plantations are owned by small farmers, with the average farm size being two hectares. Due to the high demand for palm oil, farmers are able to quickly repay loans used to purchase land for their farms, raise themselves out of poverty, and increase their living standards and income. Unfortunately, the governments are left with the dilemma of conservation of the rainforests or improving the livelihood and living conditions of millions of people in their countries.

Women's rights

In Malaysia, women make up half of the workforce on palm oil plantations. The majority of women were born and raised on the plantations which once grew rubber trees and have since been converted to the more profitable oil palm. These women have been neglected by government plans to eradicate poverty and are trapped in a cycle of poverty. With little social status and limited education and skills, these timid and compliant workers are given jobs on plantations that are dangerous and physically taxing. Women carry chemicals in a pack on their backs, spraying up to 300 litres on to the crops each day. The cloud of chemicals they are exposed to is the toxic chemical *paraquat dichloride* which has the side effects of causing blood noses, eye irritation, nail loss and abdominal ulcers; the long term effects are unknown. Many of the women doing this job are not told what the spray contains and the only protective clothing they are given are safety boots and something to cover their mouth.

Activities

Remembering and understanding

1. Why would increased human activity in rainforests contribute to the spread of disease?
2. What do vampire bats have to do with deforestation?
3. Go to YouTube and search for *Ancient Forest destruction*. View the video and write down a list of words that describe how you feel. What action is advised?

Creating and analysing

4. In your own words, explain why the mystery of Easter Island is a lesson for the world about the exploitation of our forests.
5. Create a mind map about the impacts of palm oil production on both people and the environment.
6. Refer to figure 5.3.
 - a. Construct a column graph of the Projected Palm Oil production for January 2011.
7. Refer to 5.5.
 - a. Describe the connection between increased palm oil production and forest loss in Malaysia and Indonesia. Use figures extracted from the graph to support your response.
8. Using the information covered in this unit and the data created in the previous questions, create a pamphlet about palm oil production and its impact on forest environment and people.

Applying and evaluating

9. Empathy Task.
 - a. Imagine you are small-scale farmer in Indonesia and you want to convert your land to palm oil production to earn more money to provide for your family and educate your children. Keep a diary of your thoughts and feelings as you prepare the rainforest to be cleared of all vegetation and remove the habitat of the animals.
 - b. Why is the issue of palm oil production and poverty reduction difficult to resolve? Brainstorm some alternatives for the people who need to earn an income from forests.
10. Develop a set of strategies to be implemented on the Malaysian palm oil plantations to improve the working conditions and the rights of women.
11. Go to YouTube and search for the Greenpeace Nestlé video. Do you think this is effective as a message? Discuss.



6

HOW CAN FORESTS BE MANAGED TO HELP REDUCE POVERTY?

Social Justice and Human Rights

Approximately 1.6 billion people rely on forest resources for their livelihood, food, fuel, shelter and medicine; 1.2 billion of these people use trees from farmed forests for food and to create income. A large percentage of these people are living in extreme poverty on less than \$US1 per day. The strong spatial association between the world's poor and the distribution of forests poses a challenge for governments and NGOs to balance the need for economic development and the conservation of the world's forests.

SNAPSHOTS OF FOREST HELPING TO REDUCE POVERTY

Solomon Islands – forest awareness and good practice

The Solomon Island Government together with AusAID is supporting small-scale, village-based forest plantations including reforestation of the islands and a campaign to safeguard against unsustainable practices. Through a program to promote forestry awareness and training, approximately 9000 individuals and families have planted 6000 hectares of high-value trees.

With good management over the next 20 years, forests of teak and mahogany will increase the income of the local people as the trees have a high value in both export and local markets. AusAID will advise and train the people involved in this industry providing economic development with a social perspective.



Figure 6.2 Solomon Islanders measuring the rate of growth

Beijing – logging to reduce poverty

Beijing's Miyun watershed provides the city with 70 per cent of its drinking water. After many years of extensive logging, the area was reforested and extremely strict regulations for logging and land use were put in place. As a result, the forest was neglected and poorly managed, the forest environment suffered as did the local communities whose access to the

Figure 6.3 Miyun County, Beijing China



Figure 6.1 Solomon Islanders amongst trees in a two-year-old teak forest





forest and ability to generate an income decreased significantly. With the help of The International Union for Conservation of Nature (IUCN) development of a new Chinese Government policy resulted in the Livelihoods and Landscapes Strategies and replaced the old regulations with a new forest development and management strategy. This strategy permits timber harvesting and access to the forest for other resources for the local communities to generate an income. The local communities will implement silviculture which means forests will be managed to ensure ongoing harvest of forest products.

Sri Lanka – Community Forestry

AusAID’s Community Forestry Program is providing \$AU5 million during 2010–2015 to manage forest resources and to improve livelihoods and reduce poverty in Sri Lanka. This program continues to build on the Sri Lanka Australia Natural Resource Management Project implemented by AusAID in 2003. Both projects promote the importance of the forests through awareness and education, encourage forest management activities such as fire control, new planting and management and establish new tree species that can be used for fruits, fuel and building materials.



India – Australian trees providing a future

Around 15 years ago, a tree breeding program began in India to meet the high demand for the seeds for the Australian species Acacia, Casuarina and Eucalyptus. The Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Institute of Forest Genetics and Tree Breeding produced genetically modified seeds that were affordable for small farmers to purchase. These tree species now account for two-thirds of tree plantations in India. The Project is now funded by AusAID and continues by educating local farmers. The goal at the end of the project is that the farmers will take over full control of seed production. This will ultimately protect the forest by meeting timber needs, improving the livelihoods and incomes of the local communities as well as responding to climate change.

Figure 6.4 Local Indian farmers and scientists in a tree plantation

Vietnam – farming to protect the forest

Bach Ma National Park is located in the Central Highlands of Vietnam. It is a protected forest of over 22 000 hectares that is facing immense pressure from more than 6500 people that live in the buffer zone surrounding the national park. These people grow crops and raise cattle in the buffer zone but they also rely on the forest for their livelihoods – forest products, food sources from animals and edible plants and the large stores of valuable medicinal plants. A joint project between Bach Ma National Park, the University of Queensland, and Hue’s University of Agriculture and Forest and the University of Science, and funded by Tropnebos International (a Dutch NGO) aims to improve the living conditions of the villages in the buffer zone. By improving farming practices, incomes will increase and the need to exploit forest resources will decrease. Training sessions are being established on model farms that farmers can visit to learn about new practices. Topics covered include animal husbandry techniques, growing improved stock feed, native tree species, and fruit and vegetable planting. Marketing campaigns for farmers to sell organic products are also being initiated.

Lao People’s Democratic Republic – non wood products as a way out of poverty

Almost half of Lao People’s Democratic Republic is covered in forest environments and 80 per cent of its population lives in rural areas. Non wood products sourced from the forests generates an estimated \$US316 million each year which helps support the large percentage of the population who live in and around forest environments. The Lao Government recognises the significance of non wood products such as spices, gums, oils, plaiting materials, medicinal plants and animal products, and the role they play in eradicating poverty and improving living conditions. It is because of this recognition that they wish to promote sustainable use and management of forests and support the non wood products market economy. With the assistance of the United Nations Food and Agricultural Organisation (FAO) and the Netherlands Developing Organisation (SNV), Laos has been able to reduce rural poverty and establish 10 pilot village enterprise groups where rattan, bamboo, paper mulberry and mushrooms are produced, resulting in an increased income for local entrepreneurs.

Millennium Development Goals	How Non Wood Forest Products are addressing the MDGs
Goal 1: Eradication of extreme poverty and hunger	More than 25 million people work in the informal forestry industry; gathering and selling products from the forest can alleviate extreme poverty. It can be a poverty trap if income for the amount collected is low and access to market is reduced because of poor infrastructure. Forests can provide plant and animals food sources to control hunger.
Goal 3: Promotion of gender equality and empowerment of women	Selling forest products can provide financial empowerment for women/They can manage their household while contributing financially, reinvesting the money into family needs such as education and food.
Goal 4: Reduction of child mortality	Forest plants and animals as a food source can provide rich nutrients to reduce illness and improve child mortality. For example, iron deficiency can be prevented by eating tree ants and mushrooms.
Goal 6: Combating HIV/AIDS, malaria and other diseases	It is estimated by the World Health Organisation (WHO) that 80 per cent of people still use medicinal plants for cures for illness. Research is being conducted on the plant <i>Artemisia annua</i> , for the treatment of malaria as the plant could be three times more effective than quinine.
Goal 7: Ensuring environmental sustainability	Protecting the natural resource, the forest, and ensuring its sustainable development provides the resource for non wood forest products. These need to be managed sustainably to ensure the future of the products and the industry.
Goal 8: Developing global partnerships	This goal aims is to develop non discriminatory trading systems focussing on the needs of developing countries as non wood forest products face the barriers of tariff and non tariff restrictions in the international export market.

Figure 6.5 Addressing the Millennium Development Goals through Non Wood Forest Products

Activities

Remembering and understanding

1. Describe the management challenge that governments and NGOs face?
2. Match the following strategies with the correct program

Strategy	Program
“...these projects promote the importance of the forests through awareness and education, encourage forest management activities such as fire control, new planting and management as well as establish of forest of new tree species that can be used for fruits, fuel and building materials.”	Lao People’s Democratic Republic – non wood products a way out of poverty
“...promote forestry awareness and training, approximately 9000 individuals and families have planted 6000 hectares of high value trees.”	India – Australian trees providing a future
“...funded by AusAID and continues by educating local farmers with the goal at the end of the project the farmers will take full control of seed production.”	Vietnam – farming to protect the forest
“Training sessions on model farms are being established with animal husbandry techniques, growing improved stock feed, native tree species, fruit and vegetable planting that farmers can visit to learn about new practices.”	Sri Lanka – community forestry
“This strategy permits timber harvesting and access to the forest for other resources for the local communities to generate an income.”	Solomon Islands – forest awareness and good practice
“...recognition that they wish to promote sustainable use and management of the forests and support the non wood products market economy.”	Beijing – logging to reduce poverty

Creating and analysing

3. Develop a set of regulations about how much non wood forest products are permitted to be gathered from forest environments to ensure they are sustainably managed yet still address the Millennium Development Goals.

Applying and evaluating

4. View the video about forests and poverty at the following website www.iucn.org/about/work/programmes/forest/?6842/Forests-and-poverty-the-latest-thinking While viewing the video clip take some notes. Write a brief report about the latest thinking on poverty and forests. Do you think these ideas have merit? Justify.
5. Imagine that you are in charge of an NGO concerned with improving the living conditions and alleviating the poverty of a forest community. Write notes for a proposal outlining what your organisation’s name is, your mission statement and goals as well as how you aim to achieve your goals. Choose your method of presentation and share with your class using *Scribd*.

7 WHAT ACTION CAN BE TAKEN TO CONSERVE FUTURE FORESTS? Sustainable Futures

Global Action

UN REDD

The United Nations has developed a collaborative programme called REDD – *Reducing Emissions from Deforestation and Forest Degradation in Developing countries*. This was launched in September 2008 in an effort to assist developing countries in constructing and implementing REDD strategies for the conservation and sustainable management of the forest environments and to work on increasing the carbon storage of forests while reducing emissions.



Figure 7.1 *The International Year of Forests aims to raise awareness about the significance of world’s forests and need for sustainable management for the future*

UNFF – United Nations Forum on Forests

Established in 2000, the main aim of the United Nations Forum on Forests is to reinforce long term political commitment towards the conservation and sustainable management of all forest environments around the world.

Greenpeace

Greenpeace believes that an end to deforestation by 2020 is necessary to protect the world from the climate change and the significant loss of biodiversity.

Google

In December 2010, Google launched Google Earth Engine which will enable environmentalists and researchers access to an extraordinary resource of satellite images and environmental data. Google will donate over 10 million CPU (central processing unit) hours over the next two years for monitoring and management of the world’s forests.

FSC – Forest Stewardship Council

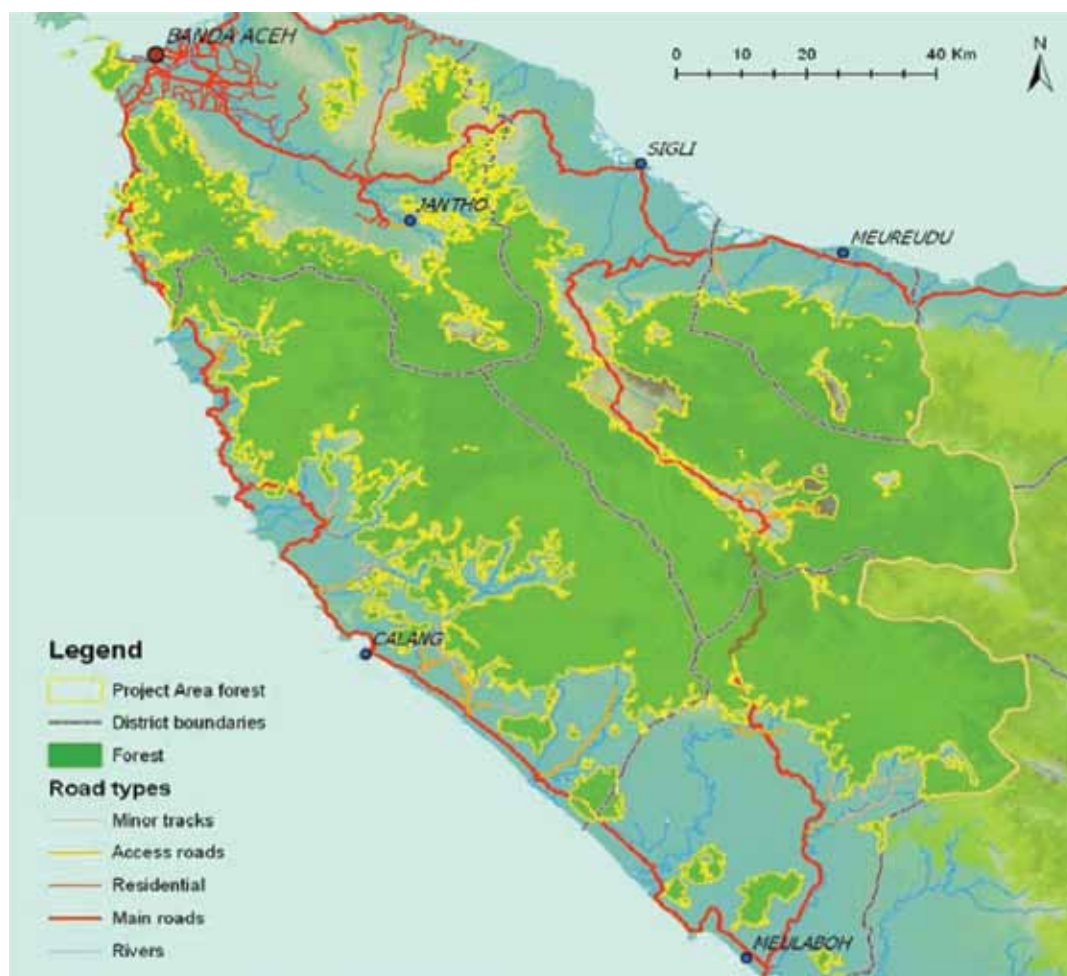
This international non-profit organisation was set up in 1993 to promote the responsible management of the world’s forests. Representing a wide range of interest groups including Indigenous peoples’ organisations, social interest groups and forest management companies, the FSC has developed 10 principles that cover the rights and recognition of the forest people in the reduction of environmental impacts to monitoring, assessment and managing the forests.



Figure 7.2 *Former illegal loggers are now employed as rangers in the Ulu Masen forest to patrol to protect the forest from illegal logging and animal poaching*

Regional Conservation – a world first deforestation program in Aceh, Indonesia

Aceh is located on the northwest of the Indonesian island of Sumatra and the Ulu Masen forest ecosystem in Aceh is the world's first forest to be protected under the REDD program. A joint effort between the government of Aceh, the NGO Fauna and Flora International (FFI) and the Australian-based company, Carbon Conservation, has established a 750 000 hectare site as a carbon forest which, over the 30 years of the project, will reduce greenhouse gas emissions by 100 million tonnes – the equivalent of Mexico's annual emissions or the emissions from flying from Sydney to London 50 million times! The greenhouse gas emission savings from protecting the forests – also known as “avoided deforestation” – is to be converted into carbon credits which are planned to be sold to wealthy countries or companies to offset their carbon emissions and assist them in reaching their emissions targets. The money that is raised through the sale of the carbon credits is returned to the Ulu Masen forest and the people it supports. Not only will the project generate \$26 million in the first five years thus providing substantial incentive to protect the forest, it will always alleviate poverty, protect the rainforest and endangered species and contribute towards reducing the effects of climate change.



The Burning Season and Dorjee Sun

The Burning Season is a documentary about Dorjee Sun and his campaign to respond to the deforestation in Indonesia. Chief Executive Officer (CEO) of the company he established, *Carbon Conservation*, Dorjee Sun developed the scheme of avoided deforestation. This scheme is now the first of its kind to protect Aceh's rainforests.

Figure 7.3 Map of the Ulu Masen Forest Ecosystem. The 750 000 hectares will consist of long term, high protection and conservation areas as well as land that will be rehabilitated and reforested acting as a buffer zone

Many environmental organisations are opposed to carbon emissions trading as they view it as a way for wealthy countries and companies to buy carbon credits from developing countries and continue polluting and meet their emissions targets without addressing a way to reduce their greenhouse gas emissions.

What can you do to make a difference?

Lend your support

“Truth in Labelling” – Nick Xenophon, the Federal Government Independent member for South Australia has a website (www.truthinlabelling.com.au) dedicated to raising awareness about the need for Australian food packaging to be labelled with all ingredients. Currently, 50 per cent of all packaged food on Australian supermarket shelves contains palm oil, however it is only listed as vegetable oil preventing consumers from making informed decisions about the products they are purchasing. From this website you can fill in a petition and access links to find out who your local parliamentary member is to write them a letter.

Take action at school!

- put together a petition for students at your school to sign support the change in food labelling
- write a letter to your local member about food labelling changes or banning illegally sourced timber
- investigate the food served in the canteen – how much of it contains palm oil? Could it be replaced with other products? Encourage change!
- create a video clip that can be played on your school network or shown at an assembly
- make posters to put up around school with facts and figures about deforestation
- raise money to sponsor endangered rainforest species such as the orang-utans.

Activities



Remembering and understanding

1. What does the acronym REDD stand for? What is the aim of the REDD program?
2. Why is it important to have an International Year of Forests?

Creating and analysing

3. Select three of the global responses and construct a tri-Venn diagram to compare the similarities and differences between the three responses.
4. Which of the global responses to deforestation do you think is the most effective? Explain your response.
5. View the rainforest awareness campaign video at the following website
www.youtube.com/watch?v=boEDMVNAPk4
 - a. What are your initial thoughts about this video clip?
 - b. How effective do you think this advertising campaign was? Why?
6. Work in small groups to write your own script for a short film about forests that could be submitted into the United Nations International Year of Forests Film Festival. Make this film using a program such as *Movie Maker* to be viewed at assembly or put on the school network or other social networking medium.

Applying and evaluating

7. Conduct a class debate on the following topic:
“Carbon emissions trading should not be permitted because it is a way of wealthy countries and companies avoiding emissions reductions so they can continue to pollute the atmosphere”.
8. After the debate write a personal reflection about how successful you feel the debate was. Did the debate change your opinion on this issue?
9. Use ideas in this chapter or create your own to take action to protect forests.



Acknowledgements

The Geography Teachers' Association of Victoria Inc. and the Global Education Project gratefully acknowledge the support of the following people and organisations for supplying source information, for permission to use copyright information or for supplying photographs:

Front cover: Rhett A. Butler / mongabay.com

- 1.1: AusAID
- 1.2: Food and Agriculture Organization
- 1.3: United Nations Environment Program
- 1.4: Food and Agriculture Organization
- 1.4a: Food and Agriculture Organization: Jim Ball
- 1.4b: www.oren.org.au
- 1.4c: Food and Agriculture Organization: Christel Palmberg Lerche
- 1.4d: Food and Agriculture Organization: David Gilbert
- 1.4e: Food and Agriculture Organization: Kenichi Shono
- 1.5: Food and Agriculture Organization
- 2.1: Corbis
- 2.2: Reprinted with permission of John Wiley & Sons Australia
- 2.3: AusAID Josh Estey
- 2.4: E-Borneo.com
- 2.5: AusAID Josh Estey
- 2.6: AusAID Josh Estey
- 2.7: AusAID Josh Estey
- 2.8: AusAID Josh Estey
- 3.1: Corbis
- 3.2: E-Borneo.com
- 3.3: sarawakupdate.com
- 3.4: Robert Harding Picture Library / SuperStock
- 3.5: edwindwianto.wordpress.com
- 4.1: Food and Agriculture Organization
- 4.2: Food and Agriculture Organization
- 4.3: Food and Agriculture Organization
- 4.4: Food and Agriculture Organization
- 4.5: University of Papua New Guinea
- 5.1: Kelli Ashton
- 5.2: Creative Commons – Badly Drawn Dad www.flickr.com/photos/dhedwards/
- 5.3: United States Department of Agriculture
- 5.4: Earthobservatory
- 5.5: [Hardi Baktiantoro/orangutanprotection.com](http://HardiBaktiantoro/orangutanprotection.com)
- 5.6: Rhett A. Butler / mongabay.com
- 5.7: Greenpeace
- 6.1: Photograph supplied with permission from URS
- 6.2: Photograph supplied with permission from URS
- 6.3: IUCN/Andrew Ingles
- 6.4: Photograph supplied with permission from URS
- 7.1: United Nations
- 7.2: © Abbie Trayler-Smith / Panos / Department for International Development
- 7.3: www.climate-standards.org

While every care has been taken to trace and acknowledge copyright, the publishers tender their apologies for any accidental infringement where copyright has proved untraceable. They would be pleased to come to a suitable arrangement with the rightful owner in each case.