Deforestation

4.7.3.4 · Ecology · revision notes

Large areas of tropical forest have been cut down to make room for cattle and rice fields and to grow crops for biofuels. Expect to explain why this happens, and how it reduces biodiversity and increases the carbon dioxide in the atmosphere.

Key facts

- Tropical deforestation: land for cattle, rice fields and biofuel crops
- Burning trees → CO_2 released by combustion
- Habitat loss → lower biodiversity
- Fewer trees → less CO_2 removed by photosynthesis
- Rotting wood → microorganisms respire → CO_2 released
- Cattle and rice fields → methane

Notes

Why tropical forests are cut down

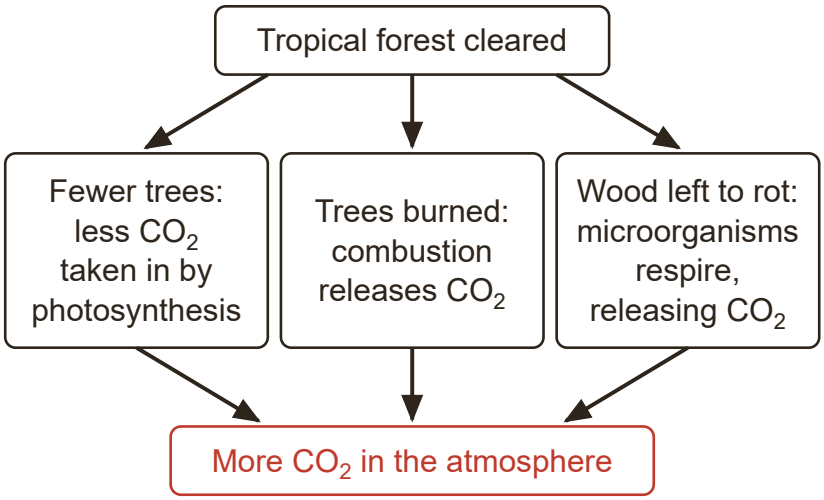
- Huge areas of tropical forest have been cleared (**deforestation**) mainly to:
- provide land for **cattle** and for **rice fields**, producing food for a growing population;
- grow crops for **biofuels**, such as sugar cane or oil palm, which are used to make fuels.

Effect on biodiversity

- Tropical forests have very high biodiversity. Clearing them destroys the habitats of many species.
- The forest is replaced by grassland for cattle or by large fields of a single crop, which support far fewer species.
- Species that live only in that forest may become extinct.

Effect on the atmosphere

- Trees remove carbon dioxide from the air by **photosynthesis** and store the carbon in their wood. Fewer trees means less carbon dioxide is removed.
- The trees are often **burned** to clear the land. Combustion releases carbon dioxide.
- Wood and roots left to rot are broken down by **microorganisms**, whose **respiration** releases carbon dioxide.
- More carbon dioxide in the atmosphere contributes to global warming.



Three ways deforestation adds carbon dioxide to the air.

- Cattle and flooded rice fields also release **methane**, another gas that contributes to global warming.

Conflicting needs

- People in tropical countries need land, food and income, and biofuels are a renewable alternative to fossil fuels.
- But clearing forest releases a large amount of carbon dioxide and destroys habitats that cannot quickly be replaced.

How to answer each type of question

Give reasons for deforestation 2 marks **Grade 4**

1. Use the reasons in the specification: land for cattle, land for rice fields, crops for biofuels.
2. Link them to a growing population needing food and fuel if the question asks you to explain.

Example. Give **two** reasons why large areas of tropical forest have been cut down.

Model answer. Any two from: to provide land for cattle (1); to provide land for rice fields (1); to grow crops for biofuels (1)

Explain how deforestation affects biodiversity

2 to 3 marks | Grade 5

1. Say that habitats (food and shelter) are destroyed.
2. Say that one crop or grazing land replaces the forest, so fewer species can live there.
3. Conclude that biodiversity falls and species may become extinct.

Example. An area of tropical forest is cleared to grow oil palm. Explain how this affects biodiversity. (3 marks)

Model answer. The forest habitat, with food and shelter for many species, is destroyed (1). Only one plant species is grown, so few animal species can find food or shelter there (1). So biodiversity is reduced and some species may become extinct (1).

Explain how deforestation increases carbon dioxide in the atmosphere

3 marks | Grade 5

1. Combustion: burning the trees releases carbon dioxide.
2. Decay: microorganisms respire as they break down the remaining wood, releasing carbon dioxide.
3. Less photosynthesis: fewer trees take carbon dioxide out of the air.

Example. A forest is cleared by cutting down and burning the trees.
Explain **three** ways in which this increases the concentration of carbon dioxide in the atmosphere.

Model answer. Burning the trees releases carbon dioxide by combustion (1). Branches and roots that are left decay, and the microorganisms release carbon dioxide by respiration (1). There are fewer trees to remove carbon dioxide from the air by photosynthesis (1).

6-mark: evaluate clearing forest for a crop

6 marks | Grade 7

1. Give benefits: food, income and jobs; biofuels as a renewable fuel.
2. Give environmental costs: loss of biodiversity, more carbon dioxide, global warming.
3. Use any data given.
4. Finish with a justified conclusion.

Example. A government is deciding whether to allow an area of tropical forest to be cleared to grow sugar cane for biofuel.
Evaluate this proposal.

Model answer. Level-marked. A level 3 answer (5 to 6 marks) covers both sides in detail and gives a justified conclusion, for example: biofuel is renewable, so it can replace some fossil fuels; the crop provides jobs and income; however, burning and decay of the trees release carbon dioxide, and fewer trees remain to remove carbon dioxide by photosynthesis, adding to global warming; the forest habitat is destroyed, so biodiversity falls and species may become extinct. Conclusion: the forest should not be cleared, because the carbon dioxide released and the loss of biodiversity outweigh the benefits; the sugar cane could be grown on land that has already been cleared.

Don’t lose marks

- Writing that deforestation 'means less oxygen for us to breathe'. This rarely scores; focus on carbon dioxide and biodiversity.
- Saying the trees 'release carbon dioxide' without the process: combustion when burned, or respiration by microorganisms when they decay.
- Forgetting that fewer trees means less photosynthesis, so less carbon dioxide is removed from the air.

More tips

Memory tricks

- Reasons, CRB: Cattle, Rice, Biofuels.
- Three ways carbon dioxide rises: burning, rotting, and less photosynthesis.
- Almost every mark on this subtopic comes from biodiversity or carbon dioxide. Link each point to one of them.

Exam technique

- Give three separate ways deforestation increases carbon dioxide: burning, decay and less photosynthesis.
- For 6-mark evaluations, include people's needs as well as the environmental costs, and end with a judgement.
- Write 'microorganisms respire', not just 'the wood decays'.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 3 — **Define deforestation**
Cutting down large areas of forest so the land can be used for something else.

Grade 4 — **Give reasons for tropical deforestation**
To provide land for cattle and rice fields, and to grow crops for biofuels.

Grade 5 — **Explain how deforestation reduces biodiversity**
Forest habitats are destroyed and replaced by grazing land or one crop, so many species are lost.

Grade 5 — **Explain how deforestation increases atmospheric carbon dioxide**
Burning releases carbon dioxide, microorganisms respire as the wood decays, and fewer trees remove carbon dioxide by photosynthesis.

Grade 5 — **Explain how cattle and rice fields add methane**
Cattle release methane from digestion, and microorganisms in flooded rice fields release methane.

Grade 7 — **Evaluate clearing forest for crops or cattle**
Weigh food, income and renewable fuel against habitat loss and the carbon dioxide released.

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