Deforestation success stories

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A case study about recent changes in some parts of the Amazon rainforest

Synopsis
This GeoFile looks at recent changes in deforestation in the Amazon, and the reasons for those changes. Until 2004, deforestation was increasing and Brazil was one of the world’s worst polluters of greenhouse gases. Political change in 2002, and pressure from NGOs in 2006 brought about a decline in deforestation.

The use of satellite images and GPS has enabled the Brazilian government to monitor deforestation more closely. In addition, Brazil was paid for not destroying its rainforest. Living rainforests provide a range of ecosystem services (positive things ecosystems can do for people) such as flood control, climate regulation, pollination etc.

Brazil appeared to have passed through a forest transition curve. However, over the last two years rates of deforestation have risen.

Elsewhere, in other parts of the Amazon, deforestation is taking place due to energy developments, such as oil exploration in the Peruvian Amazon. This is destroying trees, polluting rivers and causing health problems among local residents.

Key terms
deforestation, ecosystem services, land-use changes, forest transition curve, moratorium

Learning outcomes
At the end of this case study, you will have learned about:
- pressures on the Amazon rainforest
- how deforestation is monitored
- public support and political will are needed if deforestation is to be reduced
- the role of NGOs in stopping multinational companies from destroying the forest
- why success is only partial and may only be short term.

Exam Board | Link to specification
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WJEC | Unit G1, Unit G1, Changing Physical Environments, Theme 2, Investigating Tectonic and Hydrological Change, see page 20 [http://www.wjec.co.uk/uploads/publications/6312.pdf](http://www.wjec.co.uk/uploads/publications/6312.pdf)
CCEA | Unit A2 2: Physical Geography and Decision-making, Sections A: Physical Geography, the Dynamic Earth, see page 29 [http://www.rewardinglearning.org.uk/qualifications/results.aspx?g=1&t=1&c=R&s=0&v=O&f=O&q=182&d=d](http://www.rewardinglearning.org.uk/qualifications/results.aspx?g=1&t=1&c=R&s=0&v=O&f=O&q=182&d=d)
International Baccalaureate | Geography Diploma Programme, Core Patterns and Change, Patterns in Environmental Quality and Sustainability [http://ibgeog2009.wikispaces.com/Environmental_Quality_Sustainability_Patterns](http://ibgeog2009.wikispaces.com/Environmental_Quality_Sustainability_Patterns)
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According to the Union of Concerned Scientists, there has been success at reducing tropical rainforest deforestation at a variety of scales. This ranges from whole countries and regions, such as Brazil and central Africa, to quite small areas in parts of other countries, such as in Madagascar and Mozambique. Some funding has been provided by the REDD+ programme (Reducing Emissions from Deforestation and forest Degradation), and some from trading of carbon credits between countries. Deforestation has been reduced in a number of ways:

- the development of policies to reduce emissions from deforestation
- the promotion of reforestation or afforestation
- payment for ecosystem services
- changes in government policy change.

The main reason for success is the REDD+ programmes. These provide both financial and political support from the international community for tropical countries’ efforts to reduce deforestation. These programmes include:

- Payments for ecosystem services: landowners who protect forest carbon, water quality, biodiversity and the environment are paid to keep trees standing.
- Efforts to enforce existing laws, often combined with increased use of technology, eg satellite images and GPS (global positioning systems) to monitor deforestation.
- Government reforms, including the recognition of land tenure (who owns the land) and protecting the rights of indigenous populations.
- Moratoria (bans) on permits to deforest, or on trade in products that come from deforested lands.

Although in some locations deforestation has been reduced and reforestation increased, success is not complete.

Rates of deforestation

In the 1990s, deforestation was destroying about 16 million hectares of forest a year and was responsible for about 17% of total greenhouse gas emissions. Brazil and Indonesia were the world’s fourth and fifth largest emitters of CO₂. By 2004 deforestation was down by 19%, to 13 million hectares annually.

<table>
<thead>
<tr>
<th>Supporting services</th>
<th>Regulating services</th>
<th>Provisioning services</th>
<th>Cultural services</th>
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<tbody>
<tr>
<td>These are the essentials for life and include primary production (weight of plant and animal matter produced each year), soil formation, and the cycling of nutrients. All other ecosystem services depend on these.</td>
<td>These are a varied set of services, and include pollination, control of pests and diseases, and production of goods, such as food, fibre and wood. Other services include climate and hazard regulation and water quality regulation.</td>
<td>These are the services people obtain from ecosystems, such as food, fibre, fuel and water from aquifers, rivers and lakes. Goods can be from heavily managed ecosystems or from semi-natural ones.</td>
<td>Places where people interact with nature. Open spaces – such as forests, lakes, and wilderness – provide opportunities for outdoor recreation, and improvements to human health, both physical and mental.</td>
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<tr>
<td>(Not listed but they are considered necessary for the production of all other ecosystem services.)</td>
<td>Climate regulation</td>
<td>Timber</td>
<td>Recreation and tourism</td>
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<td>Flood regulation</td>
<td>Species diversity</td>
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<td>Erosion control</td>
<td>Fuelwood</td>
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<td>Disease and pest control</td>
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<td>Air and water quality regulation</td>
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<td>Health benefits</td>
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Figure 1 Types of ecosystem services
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A forest transition curve (Figure 2) shows that over time the amount of forest in a country changes. It begins with high levels of forest cover, then deforestation causes the amount of tree cover to be reduced. Finally, the level of forest cover begins to recover.

Some countries, including Guyana in South America, are today in the early stages of the forest transition. Guyana still has high levels of forest cover. Other countries, such as Madagascar off East Africa, have a high deforestation rate and have lost much of their forest cover. Further along the curve, and approaching the low point, are Mexico and Brazil. Finally, Costa Rica and India have passed beyond the bottom of the curve and are now increasing their levels of forest cover. These changes are not inevitable.

Since 2004, Brazil's emissions of greenhouse gases have fallen (Figure 3). The overall decrease was more than 750 million tons of CO₂ equivalent annually, a reduction of nearly 33%. It was achieved by changes in land use.

Only a little over a decade ago, Brazil's rainforests were disappearing at an alarming rate. This made Brazil the worst country for deforestation worldwide. How did it manage to change?

Political and economic change
Brazil's reduction in deforestation began with the creation of new protected areas in the Amazon. This became part of a broad plan to combat Amazon deforestation – the PPCDAm (Plan for the Prevention and Combating of Deforestation in the Amazon) – following the election of President Lula in 2002. However, during the first three years of the Lula administration, there was little success. Indeed, deforestation rose to a high point in 2004–05, driven by the expansion of soybean and beef production due to increasing international prices.

A number of environmental pressure groups helped change public opinion and political will.

The soy moratorium
The first dramatic change came in the soy industry. In 2006 Greenpeace released *Eating Up the Amazon*, a report that showed the connections between the soybean industry and deforestation, global warming, water pollution, and slave labour. It focused on two multinational companies in particular:

- Cargill, an enormous soy and grain trader
- McDonald's, the largest fast food chain in the world

Within weeks, the soy industry declared a moratorium (a decision to stop) on deforestation, promising not to buy any soybeans produced on Amazon lands that were deforested after June 2006.

Figure 2 The Forest transition curve

Figure 3 Brazil's global warming emissions from 1990 to 2012, by economic sector
By 2009–10, only 0.25% of land with soybean crops had been planted in areas that had been deforested since the moratorium began. Monitoring by satellite images, combined with land tenure information, provided evidence of the moratorium’s success.

Despite the slow-down in the clearing of land for farming, the soybean industry was increasing its yields. It achieved this through multiple cropping (more harvests per year). The harvest for 2013–14 was estimated at 95 million tonnes, up from 88 million in 2012–13. Brazil overtook the United States to become the world’s largest soybean producer.

The cattle moratorium
The most important factor in Amazonian deforestation (Figure 4) after soybeans – the beef and leather industry – came under the spotlight in 2009. Reports by two NGO – Friends of the Earth (Brazil) *Time to Pay the Bill* and Greenpeace’s *Slaughtering the Amazon* – made the connection between expansion of cattle pasture and destruction of the Amazon forest.

The slaughterhouses agreed to buy cattle only from ranchers registered with the rural environmental land registry. In order to register, ranchers had to provide the GPS coordinates of their property boundaries. This allowed a comparison of a map of ranch locations with a map of deforestation. The cattle moratorium has forced change, but it has come more slowly than with soy.

Expanding indigenous reserves and other protected areas
Another factor which has reduced emissions from deforestation has been the continuing expansion of Brazil’s network of indigenous lands and protected areas across the Amazon since 2002. More than 50% of the Brazilian Amazon forest is now under some form of legally recognised protection, and nearly half of this land is reserved for indigenous peoples.
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International support
The Brazil-Norway agreement is the largest REDD+ programme anywhere in the world. It has paid $670 million to rainforest countries in compensation for reductions in deforestation. The Amazon forest is assumed to contain 100 tons of carbon per hectare (although it is probably higher over much of the region), and the estimated reduction in emissions is paid for at a fixed rate of five dollars per ton of CO₂.

Recent changes
However, two changes in 2013 cast doubt on the future of Brazil’s success. Data show a 28% increase in the 2012–13 deforestation rate compared with 2011–12. Even so, the 2013 figure was 70% below the 1996–2005 average, so the picture is generally positive.

As well as agricultural expansion, deforestation increases due to illegal logging and the invasion of public lands adjacent to big infrastructure projects in the Amazon, such as roads and hydroelectric dams.

Foreign oil companies have been operating in and polluting the Peruvian Amazon for more than 40 years. Oil companies have cleared forests to build roads and helicopter pads. They have cut down huge areas of the Amazon for pipelines and other installations, and they have pumped hot, muddy, toxic waste from oil extraction directly into the rivers.

Since 2008, oil developments have increased at a dramatic pace after Lima offered up to 75% of the Peruvian rainforest to oil companies. In recent years, the Peruvian government has declared environmental emergencies in all four headwaters (upper river basins) of the Amazon.

Oil and rainforest in Peru
During 2014 five separate oil spills along a main oil pipeline through the Peruvian Amazon deposited thick black clots of crude oil across rainforest and swamp and polluted local fishing lagoons with dead fish. Many of the indigenous peoples living downstream on the banks of the Marañón River experienced increased bouts of illness: headaches, nose bleeds, nausea and stomach aches. Locals blame the illnesses on exposure to oil in the water and in the fish that are the main staple.

The Peruvian government is promoting a rapid expansion of oil and gas operations in the Amazon. Illegal logging and forest clearance by oil companies now accounts for about two-thirds of Peru’s carbon pollution. Indigenous peoples and campaigners claim that the state-owned oil and gas company have not done enough to maintain the pipeline, which dates from the early 1970s.

Conclusions
There are conflicting patterns in the rate of deforestation. In some parts of the Amazon, deforestation has declined and is much lower than at its peak in 2004. However, exploiting mineral resources underground leads to deforestation too. Deforestation varies from one country to another because governments have different policies. There is also a forest transition – countries increase their rate of deforestation as they initially develop, and then slow down as their economy matures. It is likely that pressures on the rainforest will increase due to population change and the need for more food and resources, plus climate change. It is a very dynamic system.
Focus questions

1. Outline the range of goods and services that ecosystems provide.
2. Describe the forest transition curve. Suggest reasons why it occurs.
3. Examine the role of (a) donor countries (countries giving aid) and (b) NGOs in achieving reductions in deforestation.
4. Why might some areas of tropical rainforest be threatened in the future? Can any deforestation be justified?

Learning checkpoint

After working through this unit, consider the following questions:

• What are the main services to people provided by ecosystems? Make a list.

• Why do countries/companies want to change forest into other land uses? Try to give some examples.

• Draw a diagram to illustrate the forest transition curve. You could use a copy of Figure 2 and add annotations (explanatory labels).

• List the main pressures on tropical rainforests. Who:
  ➢ exploits the forests?
  ➢ produces goods from them?
  ➢ trades in goods from them?