Deforestation

Facts and Figures

Key Stage 3

Key Terms

Biomass, Carbon Storage, Charcoal, Climate, Deforestation, Ecology, Erosion, Extinction, Global Warming, Greenhouse Gas Emissions, Nutrients, Plantations, Rainforest, Soil, Subsistence Agriculture, Tropics, Water Cycle

Deforestation - What is Happening?

•1.5 acres of forest are cut down every second, 36 football pitches every minute: 18 million acres (7.3 million ha) are lost every year

•Half of the world's **tropical** forests have already been lost

•A 2012 study by UNEP and Interpol states that illegal logging accounts for up to 30% of the global logging trade and contributes to over 50% of tropical **deforestation** in Central Africa, the Amazon Basin and South East Asia

• Illegal trade of forest resources undermines international security, and is frequently associated with corruption, money laundering, organized crime, human rights abuses and sometimes violent conflict

•Deforestation leads to **soil erosion**, flooding, wildlife **extinctions**, increases in **greenhouse gas emissions** and loss of **carbon storage**

•Main causes are human activities (chiefly logging and clearing for agriculture) and direct **climate change** impacts (including, increasingly, wildfires)

Terms in bold are defined in the Glossary

Some global facts – Rainforests and Deforestation

•Tropical rainforests cover only 6-7% of the Earth's surface but contain over half of all the plant and animal species in the world!

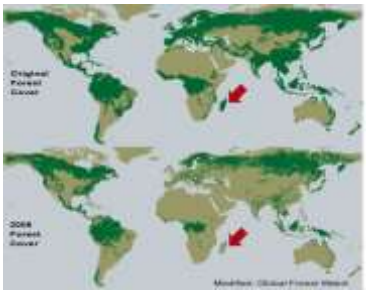
•1 in 4 people depend directly on forests for their livelihoods

•Deforestation accounts for 6-17% of **greenhouse gas emissions**

•Forests cover 30% of the Earth's land

•At current rates of loss all rainforests could be lost in just 100 years

•Agriculture is the main cause of deforestation



Original forest cover compared to forest cover in 2005

Note Madagascar, which was almost fully forested

•On a global scale there was twice as much tropical forest at the start of the 20th century as there is today, with only around 700 million of the original 1.5 billion hectares remaining.

•Globally deforestation and desertification (caused by human activities and climate change) are causing major human impacts and greatly decreasing land's productivity

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Some global facts – Causes

•Create land for agricultural use - food production, luxury crops, rangeland, crops for animal feeds

•Clearance for living space – houses to cities

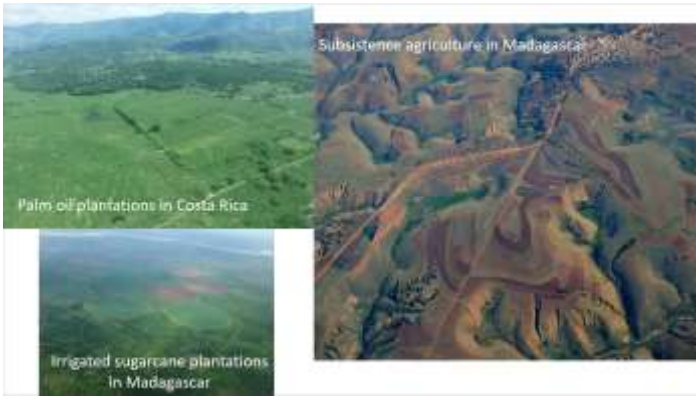
•Timber harvesting – luxury timber, building materials and fuel wood

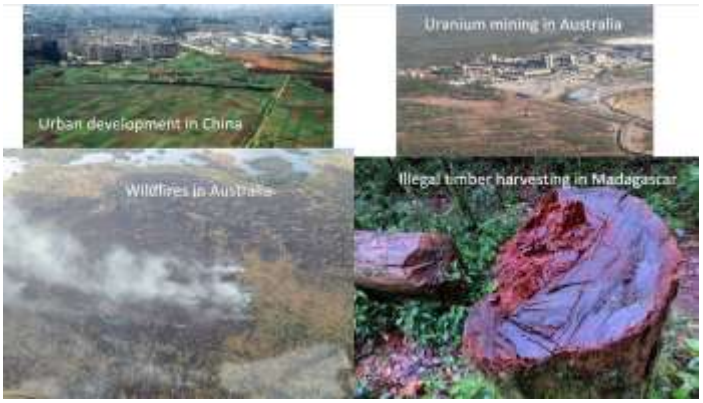
•**Mining** – 'strip' mining for gems, metals, fossil fuels

•Wildfires – increasingly important as a result of climate change

•**Climate change** – sea level rise, droughts, floods, fires

•Conflicts and wars – destruction of forests and cropland





Some global facts –Effects

•Loss of biodiversity – 70% of species live in forests

•Climate change – Deforestation accounts for 6-17% of GHG

•Impacts on global warming – solar reflection, rainfall and air currents

•Soil erosion – tree roots hold soil, cutting leads to erosion and loss of soil biodiversity and fertility

•**Water cycle** – disruption of water cycle and rainfall patterns, **erosion** leads to flooding, silting and poor water quality

Rainforest Benefits

•High biodiversity – provide homes to over half of all plants and animals on the planet – up to 300 species of trees per acre

•'Lungs of the planet' – produce oxygen, absorb carbon dioxide and purify the air

•Climate stabilisation – storing carbon and modifying climate impacts

•Storing water and maintaining the water cycle, protecting against floods, droughts and erosion

•Maintain a healthy soil, minimising erosion by protecting it from heavy rains and anchoring the soil and recycling nutrients from leaf fall

Effects of Forest Fragmentation

•When areas are deforested the animals and many plants living there are killed or forced to move leading to reduced biodiversity

•Reducing the size of habitat patches leads to changes in the patches remaining, in terms of species composition, hydrology, and soil characteristics

•Population sizes are reduced, leading to increased likelihood of local extinctions, especially if subjected to other challenges such as climate change impacts

•Edge effects increase and alter the conditions in the remaining habitat

•Many plants and animals in rainforests:

- •Have irregular distributions within the forest,
- •Require a range of habitat types or species for feeding, nesting or protection
- •Require a large home range in which to carry out feeding – especially large predators
- •Cannot live close to others of their species

The Indri

•Largest living lemur – an extinct lemur species was the size of a gorilla

•Adults weigh 6 – 9.5 kg, and they are the only lemur without a tail

•Lives in family groups – pair and their infant; pair for life with one infant born every 2 – 3 years from the age of about 8

•Strict vegetarians, they require over 40 types of forest plants

•Can leap up to 10 m between tree trunks

•Call every morning to other groups in the area, a haunting howling sound that can carry for 4 km. The pair synchronise their calling, and sing duets for up to 3 minutes at a time

•Lives only in eastern rainforests in Madagascar

•Cannot survive in captivity

•Severely endangered as its habitat is being lost

Baobab trees

•1 Genus - 8 species globally, 6 endemic to Madagascar, one in Australia, one in Africa– distribution demonstrates continental drift

•Live in forests – when found isolated, as in Avenue of the Baobabs, the forest has been removed

•Trees can store thousands of litres of water (up to 120,000 l), making them well adapted to draught conditions

•Wood is fibrous and of no use for firewood or building, bark can be used for roofing, clothing and rope, harvested relatively sustainably (though tree is damaged)

•Provide food and homes for many species of animals and plants

•Some subspecies are critically endangered as there is no natural regeneration – pollinators or seed dispersers no longer exist

•Trees are long-lived, hundreds of years at least. Radiocarbon dating has aged an African baobab at 1275 years, but some may be much older

•They are the oldest known flowering tree

Baobabs, iconic trees of Madagascar, are forest dwellers, left behind after deforestation

What Rainforests do for People

•**Providing:** food, medicines, firewood, shelter, incomes

•**Regulating:** water quality and quantity, climate, air quality, soil health

•**Modifying:** weather, impacts of climate change, flooding

•**Cultural Services:** local cultures and history, recreation, tourism,

aesthetics

•**Supporting:** biodiversity, soil formation, nutrient cycling, water cycling, oxygen production and CO_2 absorption

Some Deforestation Facts - Madagascar

•Almost all soil is either highly or very highly damaged

•In the last 80 years 75% of forested land has been converted to crops, rangeland or towns and villages

•Need for cropland and firewood has pushed 'slash and burn' further up slopes and left almost no natural forest outside of reserves

•In May 2015, 420 tonnes of rosewood, worth an estimated $13m, was seized on just one operation

•Illegal logging continues with no effective checks – almost no trees large enough to reproduce remain outside reserves

•Soil erosion results from deforestation and causes infrastructure damage, flooding and degradation of waterways

How is deforested land used in Madagascar?

•Urbanisation and villages

•Agriculture

- •Commercial – rice and export crops, sisal
- •Subsistence – rice and vegetables
- •Cattle and rangeland

•Energy – **charcoal**, especially Eucalyptus and Pine which are also used for building

•**Infrastructure** - roads, electricity

•Resources – mining (legal and illegal)

Slash and Burn

•A way to clear forested land for farming

•Valuable timber is removed in advance and either sold or used for charcoal

•Carried out throughout the tropics, where soils are thin, low in **nutrients**, and vulnerable to erosion

•Nutrients from burning are available for one or two years of crops, but after that the soil is unproductive and people clear more land for crops

•Particularly damaging on slopes where erosion leads to rapid soil loss

Eucalyptus Woodland

Benefits

•Timber for building

•Firewood and charcoal

•Jobs and incomes

•Limited soil stabilisation (when compared to bare soil)

•Some shelter for other plants and animals

Problems

•Soil erosion from clearing land

•Poor soil health – low soil microbial diversity

•Eucalyptus are very 'thirsty' and highly efficient at extracting soil water, decreasing that available for other plants or downstream human use

•Alien species, provides almost no food for native animals

Big Issues – Impacted by and impacts on:

•Climate Change

•Energy

•Water

•Soil

•Air

•Biodiversity

•Waste and Pollution

•Health

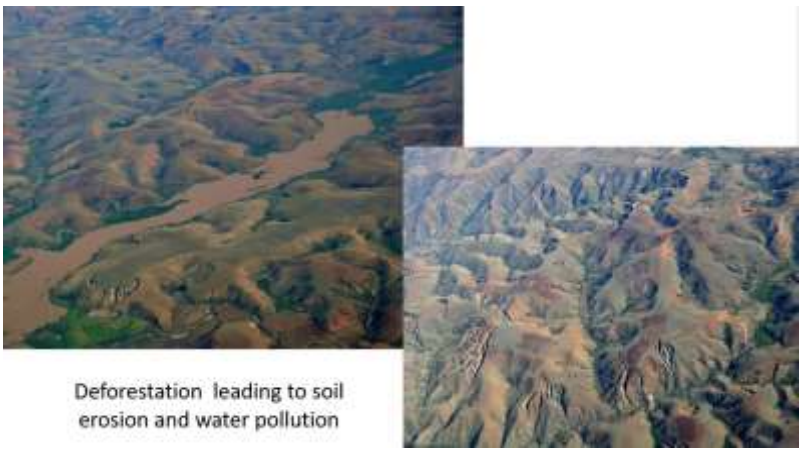
•Food

How does deforestation impact on each of these?

How does each of these affect land that has been deforested?

In Madagascar? In Northern Ireland? On a global scale?

Connections



Deforestation leading to soil erosion and water pollution

•Land use impacts on water quality

•Climate change exaggerates the impacts of poor soil management and damages infrastructure, and leads to droughts and famine

•Slash and Burn is having serious impacts on the biodiversity and ability of the land to support varied wildlife

•Use of charcoal as the main energy source drives expansion of plantings of exotic trees and further clearing of forests

•Human health suffers from poor water quality, reduced ability to travel to healthcare and a limited diet

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Big Actions for Madagascar

•Raise awareness of the impacts of deforestation on people's lives

•Help local people understand the problems caused by deforesting uplands

•Develop local, multiple use reserves that show the benefits of rainforests

•Provide alternatives so people stop deforestation

•Encourage renewable energy solutions for cooking to replace wood and charcoal

•Manage land to reduce negative impacts – promoting sustainable agricultural practices, halting erosion, improving water retention

•Promote jobs and incomes that rely on intact rainforest, such as tourism

•Reinstate forests

•Provide incentives for replanting forests and woodlands

Reforestation Around the World

•The UN has set a target to restore 350m hectares by 2030 – an area bigger than India.

•China is using soldiers to plant forests the size of Ireland to combat air pollution and global warming

•A province in Pakistan has planted 1 billion trees in two years, in response to floods in 2015.

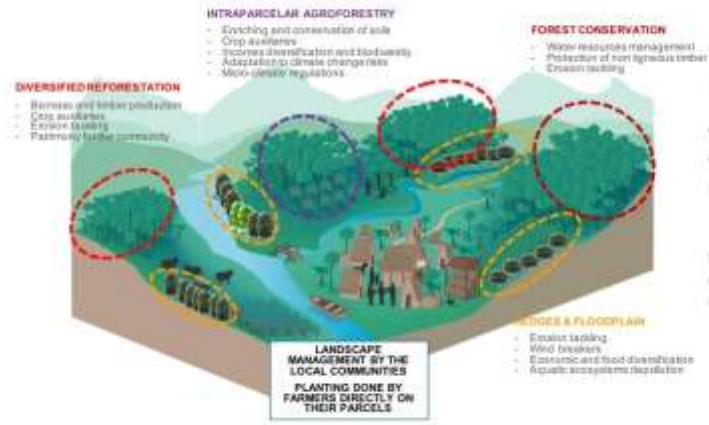
•In July 2017, 1.5 million people in the Indian state of Madhya Pradesh planted more than 67 million trees in a 12 hour period

•11 countries plan to build a wall of trees from east to west across Africa in order to push back the desert

•Cameroon is committed to restoring over 12 million hectares of forest in the Congo Basin

•Brazil started a project to plant 73 million trees, the largest tropical reforestation project in history

•200m trees in Niger have been planted or encouraged to naturally regenerate on 5m hectares; food production has increased by 600,000 tonnes a year in the places where the trees have returned



Local Links - Forests in Northern Ireland

•Until the 17th century much of Northern Ireland was woodland

•Northern Ireland is one of the least wooded areas in the EU, with only 10% of land as woodland, including scrub

•40% of this tree cover is coniferous woodland planted for timber

•There is less than 0.04% Ancient Woodland remaining

•Targets for reforestation have been set but are repeatedly missed

•Agroforestry has many potential benefits which are just being recognised

Glossary of Key Terms

Biomass – the total weight of organisms within a given area.

Carbon sink – the ability of natural environments and organisms to absorb and retain carbon.

Charcoal – carbon obtained from burning wood, bone or other substances in the absence of air. Used for cooking on open fires.

Climate – weather conditions in a wide area over a long period.

Deforestation – removal of trees and woodlands, often leading to complete destruction of the woodland habitat.

Ecology – interaction of living things with each other and their physical environment.

Erosion – process by which stone and soils are weathered away by action of water, wind or other natural factors.

Extinction – when all members of a species have died.

Global Warming – the gradual increase in the overall temperature of the earth's atmosphere caused by greenhouse gases and other pollutants.

Greenhouse Gas Emissions – a group of gasses which contribute to global warming by absorbing infrared radiation.

Infrastructure – basic physical and organisational structures and facilities needed for society to function (roads, buildings, power, water).

Mining – removal of valuable materials contained within the soil.

Nutrients – substances providing nourishment essential for life and growth.

Plantation – an area of trees or plants grown as a crop for commercial purposes; generally consisting of only one species.

Rainforest – forests growing where rainfall is high. Can be tropical or temperate.

Sisal – a Mexican agave plant with large leaves cultivated for fibre used in ropes or matting.

Soil – surface of the earth generally containing a mixture of inorganic minerals and particles and organic remains.

Subsistence Agriculture – self-sufficient farming where people grow food to feed themselves and their families, sometimes with modest amount of local trade.

Tropics – region north and south of the equator reaching between the Tropics of Cancer in the North and Capricorn in the South.

Water Cycle – cycle of processes by which water circulates between oceans, atmosphere and land, including precipitation, drainage, evaporation and transpiration.