**The Greenhouse Effect**

The [Earth](http://www.bbc.co.uk/dna/h2g2/A18541%22%20%5Ct%20%22_top) is habitable by a process called the *greenhouse effect*. Gases, mainly carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O) and water vapour (H2O), are found in the atmosphere. When light rays from the sun come into the Earth's atmosphere, they are absorbed by the Earth, and then emitted as infra-red rays. The greenhouse gases trap some of them in the atmosphere, warming the Earth. The greenhouse effect is essential for life because without it, it would be too cold.

**Brazilian Deforestation: Effects on the Atmosphere**

Deforestation accounts for some of the increase in greenhouse gases. Trees have a large store of carbon in them, they take in CO2 from the atmosphere through [photosynthesis](http://www.bbc.co.uk/dna/h2g2/A588198%22%20%5Ct%20%22_top), and although a lot of what they absorb comes out through respiration, some of it stays in the tree in the form of carbon. When trees are cut down, and especially when they are burned, this carbon reacts with oxygen in the atmosphere and becomes CO2.

Less trees mean more carbon dioxide in the atmosphere and an increased greenhouse effect, which in turn intensifies global warming.

**E>A: (Deforestation cools the atmosphere)**

The Amazon is more than a unique ecosystem, it is also regulates climate and the day-to-day variability of temperature. The sun’s rays are most intense near the equator, and the large uninterrupted expanse of lush vegetation absorbs the incoming radiation and cools temperatures during the day. At night this heat is radiated back in the atmosphere and prevents sudden drops in surface temperatures. However, in areas where tropical forest were cleared nighttime temperatures dropped below normal.

**E>A: (Deforestation heats the Atmosphere)**

By cutting down tropical forests and converting grasslands to crops and pasture, creates surfaces that absorb more of the sun’s heat. Forest canopies create wind turbulence that cools the air. Low croplands and pastures, on the other hand, create less turbulence from winds and don’t cool the air as much.

Trees provide shade and the shaded area has a moderated temperature. With out the shade, temperatures would be much colder during the night and hotter is the day, similar to the desert.

**E>A: (Deforestation can affect the heat/energy cycle of the atmosphere influencing weather)**

Earth’s ongoing attempt to redistribute the intense radiation and heat it receives at the equator across the entire planet is the driving force of climate. Much of that redistribution occurs within the Earth’s oceans. But the atmosphere is also engaged in a continuous process of spreading the heat around the globe, and tropical rainfall drives the process.

**E>A: (Deforestation releases Carbon in the atmosphere)**

Te dense vegetation of the rainforest canopy is a sink for atmospheric carbon dioxide. Slash and burn increases the level of greenhouse gases in the atmosphere, trapping heat rays and gradually warming the Earth.

**E> A: (Deforestation causes drier air masses and duststorms)**

Moist humid regions can change to deserts. If large areas of rainforest are cleared, the pattern of precipitation (water falling to the Earth's surface)changes. This is because less evapo-transpiration (water evaporating from leaves)takes place due to the may lack of trees. The lack of moisture and the inability to keep moisture, allows soil that is exposed to the sun to become dry and turn into desert sand. Dust storms become more frequent.

**Factors Contributing to Increased Greenhouse Gases**

**(Cattle-ranching) > destroys rainforest > decreases Carbon Sinks > release of CO2 and Methane into the atmosphere > land then becomes unfertile**

Areas of rainforest are cleared by cutting down all the vegetation and then burning it. Pastures of grass are then grown and used for grazing cattle. Huge areas of rainforest have to be cleared to support several hundred cattle. After a few years, all the nutrients have been removed from the already poor soil and the land is useless, so another area deeper in the rainforest has to be cleared.

**(Slash and Burn) > releases carbon dioxide, dust and ash in the atmosphere**

Areas of forest are cleared to grow crops for a couple of years, then left for a few years for the rainforest to recover, then the process starts again. Slash and burn is the most sustainable of the farming o the soil is quickly exhausted. Slash and burn also increases air pollution.

**(Logging) > destroys Carbon Sinks>releases CO2 and dust**

The use of wood and paper, mainly in developed countries, is a huge factor driving deforestation all over the world. Hardwoods like mahogany are sought after for furniture, yet the whole area is often cut down for those few trees, with other trees left to rot, even if they are useful for something.

**(Farming)** **>** **local and commercial clearing cutting**

After a few years, all the nutrients have been removed from the already poor soil and the land is useless. This means that the farmers have to rely increasingly on fertilizers before eventually being forced to clear more land deeper in the rainforest.

**(Mining/Hydroelectric) > exposes buried metal sulfides to atmospheric oxygen causing their conversion to strong sulfuric acid and metal oxides**

Mining rare minerals such as [gold](http://www.bbc.co.uk/dna/h2g2/A3327103%22%20%5Ct%20%22_top), bauxite (aluminum ore) and iron ore causes huge portions of rainforest to be cleared, not just the area where the mine is, but also routes for roads and areas for storage of equipment and housing for workers. In places where there are large rivers running through rainforest, large tracks of forest is cleared in order to build [hydroelectric power stations](http://www.bbc.co.uk/dna/h2g2/A715637%22%20%5Ct%20%22_top). The resulting dams cause enormous amounts of flooding behind the walls and large areas of drought downriver. Pollutants are dumped in rivers.

Deforestation and chemical pollution from mining can impact the rainforest environment, downstream aquatic habitats fare worse. Increased sediment loads and reduced water flows can seriously affect local fish populations.

**(Urbanization/Population Increase)** >

The world population is increasing. With this increase the amount of land needed for humans to live on also increases. More and more areas are being cleared to provide living space. In developing countries people are moving into previously undisturbed areas of rainforest to log, mine or farm.

**(Road building) > land clearing > release of CO2 and use of fossil fuels**

Road construction gives developers and ranchers access to previously inaccessible forests in the Amazon. Infrastructure improvements can reduce the costs of shipping and packing beef. Road construction in the Amazon leads to deforestation. Roads provide access to logging and mining sites while opening forest frontier land to exploitation by poor landless farmers. Highway bisect the massive Amazon forest, opening rainforest lands to (1) settlement by poor farmers from the crowded cities and (2) development of timber and mineral resources.

Carbon dioxide levels in the atmosphere are also rising because of the increasing burning of fossil fuels (coal, oil and natural gas). Fossil fuels are made from dead organisms, which have gradually been compressed over millions of years, so they contain a lot of carbon. This means that when they are burned carbon dioxide is released into the atmosphere.

**E> Man: Loss of knowledge**

As the planetary gene pool continues to diminish, there are less opportunities for advancements in many fields, like medicine, which benefit from certain plants that grow only in rainforests. The medicines that come from them could cure cancer, AIDS, or other terminal diseases.

**E> L: Erosion**

Soil washes away during rainy season because trees are no longer anchoring and binding the soil and so mud slides take place. The earth is leached of minerals by the large amounts of water.

Previously moist forest soil and places full of life could become deserts if rainfall patterns change with the temperature increases. The exposure to the sun, the soil gets baked and the lack of canopy leaves nothing to prevent the moisture from quickly evaporating into the atmosphere. Thus, previously moist soil becomes dry and cracked.

**E> H** : Rivers often silt up as soil is moved downriver and deposition takes place.

**E> B**: Animal Migration: The lack of vegetation also means that there will be very few animals in the area. The lack of decomposing vegetation and animals means that the nutrients are not replaced and the area quickly becomes infertile.

Species Extinction: The extinction of the plants and animals leads to diminished gene pool. The lack of biodiversity and a reduced planetary gene pool could have many unforeseen ramifications, some of which could be fatal to the future of humanity

Fish and plants relying on clear water die as the river becomes more and more clogged, this effects the entire food chain.

**E>H**: Water is also not delayed before making its way through the ground because of the lack of trees, shrubs, and leaf litter.

The polar ice caps are melting and if this continues we are set for a significant rise in sea level, flooding many places.

**Resources:**

**Weather Makers: How We Are Changing The Climate**, by Tim Flannery

http://rainforests.mongabay.com/0808.htm

http://www.nws.noaa.gov/ost/climate/STIP/FY09CTBSeminars/eschneider\_042209.htm

<http://www.bbc.co.uk/dna/h2g2/A3556848>

http://earthobservatory.nasa.gov/Features/LBA/