
Deforestation And Loss Of Biodiversity

Introduction

People have lived in forested areas for thousands of years. They have always cut down trees, either to make room for agriculture or to use the timber for firewood and for building purposes. Wood has been the most important heating and cooking fuel and the main construction material for houses and ships for most of recorded history.

In the last five thousand years human activity has reduced forest coverage of the Earth's land surface from 50% to under 20%. More than 20% of the world's tropical forests have been cleared since 1960. If deforestation continues at current rates there will be no forest left in some Asian countries in less than 20 years.

In the 20th Century vast quantities were used for producing paper - this now accounts for about 25% of the total timber harvest around the world.

Deforestation has a variety of effects on the Earth:

- **Desertification**

Many of the large grasslands of the world, such as the pampas of Argentina and the savannahs of Africa were once covered by forests. In drier areas such as Australia and North Africa the removal of forest was followed by over grazing of the resulting grasslands. This led to loss of soil and **desertification**.

- **Loss of species**

Another consequence of deforestation is the loss or endangerment of about 10% of the world's tree species. In addition, forests provide a habitat for many other plant and animal species. It is estimated that between 15 and 20% of all species will have become extinct by the year 2005 because of the destruction of tropical rain forests.

- **Carbon dioxide build up**

Deforestation removes plants that convert carbon dioxide into oxygen by photosynthesis. In addition, much forest is removed by burning the trees. Forest clearing and burning currently accounts for up to 30% of annual global atmospheric carbon emissions.

- **Climate change**

Deforestation can have varying effects on local, regional and global climates.

Causes of deforestation

There are various reasons for deforestation including:

- **Logging**

It is estimated that logging for tropical hardwoods was causing the removal of about 20,000 square miles of tropical rain forest per year. The highest rate being in Malaysia. The import of tropical hardwoods by industrialised nations has increased 15 fold since 1950.

- **Fuel wood**

It is estimated that the gathering of wood to use as fuel for fires destroys about 5,000 square miles and severely disrupts another 5,000 square miles of forest annually. In addition, trees are also being cut and burnt to produce charcoal.

- **Clearing for agriculture**

It is estimated that over 20,000 square miles are destroyed each year and at least an equivalent area is severely disrupted. Many peasant farmers operate what is known as the 'slash and burn' method. The farmers cut down the trees and burn an area of forest. This is used to raise crops for 2 or 3 years until the soil loses its fertility. They then move on and repeat the process on a nearby piece of forest.

In temperate forests, over 90% of the nutrients required for plant growth are stored in the soil. In tropical forests over 90% of the nutrients required for plant growth are contained in the vegetation itself and are lost in the slash and burn process.

Slash and burn agriculture can be sustained when the population density is very low. However, in many areas the densities are now too high and the land does not have time to recover.

- **Raising cattle**

It is estimated that about 8,000 square miles are cleared each year for raising cattle. This is a major problem in Central America, especially in Costa Rica.

The forest is replaced by grassland which only remains productive for 5 to 10 years before it degenerates to scrub land. The beef is exported mainly to the USA.

- **Total loss of forest**

Allowing for some overlap among these four reasons for deforestation, the total amount of tropical rain forest being lost annually amounts to about 40,000 square miles with an equal amount being severely disrupted.

This equates to a loss of about 200 square miles per day.

Recovery after deforestation

The different methods of deforestation have diverse effects on the ground and the surviving plants and animals that make up the rain forest.

- **Slash and burn farming**

In a tropical rain forest almost all the life sustaining nutrients are found in the trees and other plants, not in the ground as in temperate forests. When the trees are cut down and burnt they release nutrients into the soil which sustain crop growth for only a few years.

When it rains most of the nutrients are eventually washed away leaving the soil less fertile. After only two or three years the 'slash and burn' farmers move on. The land is left to grow back, but will do so only very slowly. It can take up to 50 years to recover.

- **Shade agriculture**

Another type of farming used in the rainforest is called shade farming. In this method, many of the original trees are left standing to provide shade for crops such as coffee and cocoa. When the farmer moves on the forest grows back more quickly, in about 20 years.

- **Banana plantations**

Areas that are cleared to grow bananas are particularly badly affected. Chemicals and fertilisers are often used. These kill the plants and animals living in the local habitat. In addition, irrigation channels are built which affect the local hydrology. When the farmer moves on it can take up to a century for the natural habitat to recover.

- **Natural phenomena**

On August 27, 1883, one of the largest natural explosions ever recorded rocked the Krakatau island group near Java. The volcanic eruption reduced the main island, now called Rakata, to one-third its previous size. Since then Rakata has been left undisturbed and uninhabited, due to the absence of freshwater.

It is now covered with what may seem like a lush tropical rain forest, including a dense canopy of trees, which closed up only 40 years after the eruption. However, compared with a similar area of undisturbed tropical rain forest that contains as many as 800 to 1,000 species of trees, the "recovered" area on Krakatau has only about 80 species.

This suggests that the recovery of rain forests after destruction may be measured in millennia rather than decades or centuries. It also carries implications regarding loss of biodiversity.

The future

The three main reasons of the rain forest deforestation are farming, ranching, and logging.

- **Farming**

Farmers and their families need food to live on, so they farm for their food, and earn money. When they cut down the trees in the rain forest, there is fertile land for them to grow crops. But after a few years, they have to move on to more fertile land. This means that they just keep cutting down more and more of the rain forest.

- **Cattle ranchers**

Ranchers also clear a lot of land for pastures for their cattle. It doesn't cost the ranchers much and they earn a lot of money by doing so. The main customer for the beef is the USA. It is cheaper for the Americans to buy this beef

- **Logging**

Loggers cut down the trees for household items like chairs and also for houses. Paper is another main reason for logging. The wood from the rain forest is used for newspapers, books, magazines and paper.

The destruction of tropical rain forests caused by human beings is proceeding at a rate of 50 to 100 acres every minute, and there are no signs that the pace is slackening.

While scientists and politicians continue to argue about the exact rate of deforestation, the main international concern is the long term effects of deforestation on biological diversity and global climate.

However, developing countries, deep in financial crisis, have little interest in saving the rain forests unless they benefit from it. Many studies have shown that traditional non destructive uses of forests such as managed timber extraction and rubber tapping give a much higher return than mass logging or slash and burn farming.

Loans from the World Bank and other international organisations have supported many projects that cause deforestation such as large scale highway construction work and hydro electric power projects.

The loss of rain forests is the result of many complex issues. The solutions are just as complex. The future requires solutions that are based on solving the economic problems of the countries that contain the remaining rain forests. This must include improving the day to day lives and living conditions of the poor people who are responsible for the deforestation.

Loss of Biodiversity

Life is everywhere on Earth. The oceans, atmosphere, and land all play critical roles in sustaining life on Earth. The nature of ocean currents, wind patterns, and topography can lead to one area being a desert and another a rain forest.

Living organisms can be found from the poles to the equator; from the bottom of the sea to upper atmosphere; from freezing waters to undersea thermal vents; from surface waters to groundwater thousands of feet below the Earth's surface.

For over 3.5 billion years, living organisms on Earth have diversified and adapted to almost every environment imaginable including, agricultural lands, alpine/tundra, beaches, deserts, dunes, forests, grasslands, island, oceans, savannahs, shrubland/scrub, urban lands and wetlands.

Biodiversity, or biological diversity, is the variety of life forms, from both the plant and animal kingdoms. There are a huge number of species living in the various different ecosystems which make up the Earth's biosphere.

The biosphere provides us with many things such as :

- timber for building, furniture etc.
- fibres for clothing
- food for consumption
- medicines and drugs
- the gene pool
 - genetic material to enable more productive crops to be developed
 - genetic material to enable cures for diseases to be found

Science has identified and named only about 1.8 million species. Estimates suggest that there could be between 50 and 80 million species in existence. Tropical rain forests are thought to contain over 50% of all species. Many species can only be found in small areas as their habitat is so specialised. It is estimated that over 100 species are disappearing every day.

Loss of biodiversity is the result of a variety of factors including :

- **Habitat Loss and Fragmentation**

For example, 98% of the tropical forest along Central America's Pacific coast has disappeared and Thailand lost 22 % of its mangroves between 1981 and 1985.

marine ecosystems, coastal development has wiped out reef communities. In tropical rain forests, the expansion of slash and burn agriculture and commercial logging operations have devastated vast areas.

Loss of Biodiversity

- **Introduced species**

Introduced species are responsible for many recorded species extinctions, especially on islands. A new predator, competitor, or pathogen can rapidly endanger species that did not evolve alongside the newcomer.

For example, in Hawaii, some 86 introduced plant species seriously threaten native biodiversity. One introduced tree species alone has displaced more than 30,000 acres of native trees.

- **Over-exploitation of plant and animal species**

Numerous forest, fisheries, and wildlife resources have been over-exploited, sometimes to the point of extinction. Historically, both the great auk and the passenger pigeon yielded to such pressure.

- **Pollution of soil, water, and atmosphere**

Pollution damages ecosystems. This may reduce or eliminate populations of sensitive species and may affect other organisms along the food chain. For example, barn owl populations in the United Kingdom have fallen by 10% since new pesticides were introduced.

Soil microbes have also suffered from pollution by heavy metals and agricultural wastes. Acid rain has made thousands of Scandinavian and North American lakes virtually lifeless. Marine pollution has contaminated the Mediterranean and many estuaries and coastal seas throughout the world.

- **Global climate change**

In coming decades, the effects of global warming could play havoc with the world's living organisms. There could be a global temperature rise of some 1 to 3 degrees Celsius during the next century, with an associated rise in sea level of up to a metre.

It is estimated that each 1 degree Celsius rise in temperature will displace land species some 125 kilometres towards the poles, or 150 meters vertically to the mountains. Many species will not be able to relocate fast enough to keep up with these changes.

- **Industrial agriculture and forestry**

Until recently, farmers bred and maintained a tremendous diversity of crop and livestock varieties around the world. This diversity is shrinking fast due to modern breeding programs and the resulting productivity gains achieved by planting fewer varieties of crops that respond better to water, fertilisers, and pesticides.

Similar trends are transforming diverse forest ecosystems into high yielding single species (monocultural) tree plantations.

Assessment

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Questions 1 to 5 - Select the correct response for the following questions :

1. In the last 5000 years human activity has reduced the forest coverage of the Earth's land surface from 50% to ?

A 40%
B 30%
C 25%
D 20%

2. What % of the annual world timber harvest is turned into paper ?

A 5%
B 10%
C 15%
D 25%

3. What % of species are estimated to become extinct by 2005 ?

A between 5% and 10%
B between 10% and 15%
C between 15% and 20%
D between 20% and 25%

4. What % of annual global atmospheric carbon emissions is a result of slash and burn farming?

A 40%
B 30%
C 20%
D 10%

5. By how much has the import of tropical hardwoods by industrialised countries increased in the last 50 years ?

A 15 fold
B 12 fold
C 8 fold
D 5 fold

Questions 6 to 10 - Decide whether each of these statements is True (T) or False (F).

6. i) The removal of forest and over grazing of the resulting grasslands can lead to desertification.
ii) Deforestation removes plants that convert carbon dioxide into oxygen by photosynthesis.

Which option best describes the two statements?

- A i) T ii) T
B i) T ii) F
C ii) F ii) T
D ii) F ii) F

7. i) Logging for tropical hardwoods removes about 20,000 square miles of tropical rain forest per year.
ii) Gathering wood for fuel removes about 25,000 square mile of tropical rain forest per year.

Which option best describes the two statements?

- A i) T ii) T
B i) T ii) F
C i) F ii) T
D i) F ii) F

8. i) In temperate forests over 90% of the nutrients are in the vegetation itself.
ii) After slash and burn farming methods are used it can take up to 50 years for the forest to recover.

Which option best describes the two statements?

- A i) T ii) T
B i) T ii) F
C i) F ii) T
D i) F ii) F

9. i) Using 'shade agriculture' allows the rain forest to grow back more quickly than slash and burn agriculture.
ii) The use of pesticides can adversely affect biodiversity.

Which option best describes the two statements?

- A i) T ii) T
B i) T ii) F
C i) F ii) T
D i) F ii) F

10. i) Deforestation has only local effects on climate.
ii) Introducing new species to island habitats is good for biodiversity.

Which option best describes the two statements?

- A i) T ii) T
B i) T ii) F
C i) F ii) T
D i) F ii) F