

# Rain forest

## Deforestation

### Forest and deforestation

According to FAO the definition of deforestation is closely related to the definition of forest. Infact, a forest is determined by the presence of trees and absence of forms of use which prevail in territories different from forests. FAO believes a "forest" is a part of land superior to 0,5 hectares, characterised by the presence of trees with a minimum 10% cover and a potential in situ height of at least 5 metres. A forest, therefore, doesn't include all those lands which, although included in the definition above, are employed mainly for agricultural or urban use. Deforestation is defined as the conversion of a forest to another form of use of the territory for example for agricultural, cattle breeding, extraction, building or infrastructural purposes) or the reduction in the long term of forest cover below a 10% limit (FAO, 2001).

Deforestation doesn't occur in forests if timber is extracted for cultivation treatments, for construction work or combustibles and if vegetation is capable of spontaneous renewal or thanks to forestry actions. On the contrary, therefore, deforestation occurs when the impact of biotic or abiotic disturbances doesn't allow plant cover above 10% of a given area. Variations within forest categories, for example, as the transition from closed to open forest, are defined "forest degradations" even if they cause negative impacts on soil and land.

In 2005, global forest extension amounted to about 3,952 million hectares (MHA), which is about 30% of land surface (FAO, 2006). 38,4% of global forests, equivalent to 1,338 million hectares, are defined by FAO as "primary forests", which means forests of native species, in which ecological processes aren't disturbed by human action.

59,8% of primary forests, about 2,000 million hectares, are represented by modified natural forests formed by native species generated by spontaneous renewal and where interference in ecological cycles are clearly related to the presence of mankind. Plantations are defined as forests with introduced species or, in some cases, native species planted or sown (3,8% of total forest cover, about 140 MHA). 78% of plantations is used for timber and fiber production, 22% for protective functions. Deforestation constitutes a serious threat to survival of forests as, apart from tree extraction, it implies road construction and immigration of populations in deforested areas.

The proportions of this environmental disaster are really impressive and the phenomenon has reached its most dramatic aspects in Africa. In the last thirty years, Africa has lost two thirds of its tropical forest and centuries-old forests by now are reduced to 8% of their original surface. In the Congo Basin, 85% of forests have been lost and the remaining 15% is now threatened by the logging industry. From 2000-2005, 7,3 million hectares have been lost every year (as a median annual difference between 12,9 million hectares of deforestation and 5,6 million hectares of afforestation and reforestation) and an annual deforestation rate around 0,18%.

### The causes of deforestation

Deforestation causes can either be direct or indirect. Among direct causes are:

**Natural causes** as hurricanes, fires, parasites and floods

**Human activities** as agricultural expansion, cattle breeding, timber extraction, mining, oil extraction, dam construction and infrastructure development.

Among indirect causes are:

**Insufficient political actions** and governance failure as inadequate land tenure system, corruption, wrong public administration investments

**Political and socio-economic causes** as population growth, military conflicts and climatic changes

The main causes of deforestation can actually be lead back especially to:

- substitution of forest areas with cultivations and breeding
- timber extraction

- firewood collection
- road and infrastructure construction

### ***Cultivations and livestock farming***

We should consider, in fact, that with regards to the substitution of forest areas with cultivations and livestock farms, the impact is much higher because after the extraction of the most precious trees which are destined for timber commercialization, forests are set on fire causing a great impact on local animals and plants. The most disastrous year for the Amazon forest has been 1991 when over 50,000 fires were registered by aerial views or satellite images.

### ***Timber extraction***

Centuries-old trees are cut down to make timber or cellulose for the furniture or paper industry. Any system employed for wood cutting causes serious damage to the ecosystem, and these damages are amplified by construction of roads required for vehicles and to transport chopped timber to its destination. For this reason, also many other economically unattractive trees which have an important biological and ecological value are cut down.

### ***Firewood collection***

This activity is undertaken especially by native populations, which due to recent population growth, must provide energy sources for their survival. This phenomenon adds to large-scale industrial timber exploitation.

### ***Road Construction***

Besides the construction of roads to transport timber, also dam construction and industrial exploitation of mines contribute to massive deforestation.

## **Deforestation consequences**

Forests play a crucial role for the water cycle and deforestation entails climatic imbalances both at a global and local level as it influences the composition of the atmosphere and, as a consequence, also has an impact on the greenhouse effect. Forests, in fact, have an important role to play for air and climate. Every tree produces, on average, 20-30 litres of oxygen per day. In particular, a virgin tropical forest produces about 28 tons of oxygen per hectare every year, equivalent to a total of 15,300 million tons per year.

On the contrary, forest destruction caused by fires to create areas for agriculture and cattle breeding, burns oxygen and releases in the atmosphere carbon dioxide which has been stored by trees during their whole life cycle in the form of wood and vegetation. Deforestation is responsible for about a fifth of global greenhouse gas emissions and is, indeed, one of the major causes of carbon release in the atmosphere.

## **Forests and climatic change**

The destruction of forests adds almost 6 billion tons of carbon dioxide to the atmosphere per year. To avoid the release of carbon stored in forests, therefore, not only forest destruction should be prevented but also afforestation actions should be undertaken in areas not covered by forests, which means planting new plants in areas where there have never been any and provide for reforestation, which implies planting trees in deforested areas. In tropical areas, vegetation grows much more rapidly and for this reason growth removes carbon from the atmosphere at a quicker pace. Planting trees in tropical forests can remove great carbon quantities from the atmosphere in relatively short time. Tropical forests can store in their biomass and wood up to 15 tons of carbon per hectare every year. According to a FAO report, lowering deforestation and increasing forest regrowth, agri-silviculture and forest settlements, over the coming 50 years could compensate around 15% of carbon emissions generated by fossil fuels.

According to a 2011 NASA research, the Amazon forest plays an absolutely primary role for the environmental clean up to remove carbon from the atmosphere: 49% of the absorption of carbon dioxide occurs in the forests of Latin America. Brazil alone, provides for a storage of CO<sub>2</sub> equivalent to almost 61 billion tons (almost equivalent to 62 million tons of CO<sub>2</sub> stored in all of Sub-Saharan Africa).

The forests of the 75 nations studied in the report, on the whole, contain 247 billion tons of CO<sub>2</sub>, an enormous value when considering that current global CO<sub>2</sub> emissions caused by men are equivalent to about 10 billion tons of carbon

dioxide. These figures clearly show the reason why deforestation is an incredibly serious phenomenon for the health status of the planet and can contribute to generate even from 15 to 20% of total emissions produced by men. Also timber, which is employed for buildings or furniture, is a carbon reservoir. Building materials used as an alternative to timber as plastic materials, aluminium and cement, require great quantity of fossil fuels for their processing. For this reason, substituting these building materials with timber and employing wood fuels as an alternative to petroleum, coal and natural gas effectively contributes to the reduction of carbon dioxide. Even if, during combustion, firewood and forest biomasses release stored carbon dioxide in the air, if they come from forests which are managed sustainably, emissions can be compensated by reforestation.

## Forests, clouds and soil

Forests play a crucial role with regards to the management of the water cycle. Forests are the factories of clouds. While the structure of roots keeps the soil compact, vegetal organic material in decomposition combines with minerals forming a sort of giant sponge which, following a slow, regular rhythm releases water in surrounding areas. Humidity coming from forests, especially tropical forests, creates clouds and governs microclimates, which also play a role holding moisture. For this reason forests prevent desertification, produce rainfalls and provide freshwater.

For example, a big jungle tree can free in the atmosphere about 760 litres of water per day in the form of water vapour, which means that half hectare of primary jungle releases about 75,000 litres, 20 times more than the release occurring on an equivalent marine area.

## Forests and soil

Forests preserve soil, preventing floods and landslides, especially in mountainous areas and on slopes. Tree roots and vegetation, in fact, hold and anchor the soil and humidity keeps humus compact. At the time when trees are cut down, the soil is washed by rainfalls and humus is dispersed by wind.