



## Deforestation: A Threat to Global Climate, Biodiversity and Human Livelihood

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### Abstract

Deforestation, the elimination or destruction of large areas of forests is predominantly caused by anthropogenic activities. It is fueled by many causes, such as logging, agriculture, urbanization, mining, and partly by natural disasters, arson and accidental forest fires. Although it is a world-wide incident, tropical rain forests are being targeted due to an abundance of their forestry resources. This devastating occurrence has wiped out 50% of the earth's rain forests in the past 50 years, and according to The National Aeronautics and Space Administration (NASA), if not controlled, the remaining rain forests will be eliminated in less than 100 years. Deforestation causes loss of habitat for many plant and animal species, and may lead to their extinctions. It is also capable of substantial environmental problems by introducing more carbon in the environment, raising the levels of atmospheric greenhouse gases and disrupting earth's water cycle. Concerned scientists and environmentalists should diligently work to lessen the effects of deforestation and restore the forest ecosystems and earth's climate.

**Keywords:** Deforestation, reforestation, loss of habitat, loss of biodiversity, greenhouse gases, climate change, ecology.

### 1.0 Introduction

Deforestation is the loss of forests due to unsystematic logging or conversion of forests into urban areas, agricultural lands, pastures, water reservoirs, or other uses. Although, deforestation is mostly caused by anthropogenic activities, it can also be caused by natural disasters, such as forest fires, volcanic eruptions, massive storms, tsunami, etc. Although, deforestation occurs around the world, tropical rainforests are particularly targeted. The major areas of deforestations are Brazil, Congo, Indonesia, Thailand, parts of Africa and Eastern Europe (Bradford, 2015).

Forests play vital roles in the sustainability of biodiversity and human lives. Forests impact the air we breathe and the products (such as timber, paper, fruits, fuel, medicines, cosmetics, etc.) we routinely use in our daily lives. They help prevent soil erosion, maintain water cycle, and reduce global warming by using CO<sub>2</sub> (carbon dioxide) and releasing O<sub>2</sub> (oxygen). Moreover, forests provide habitats to diverse flora and fauna. However, it is highly unfortunate that over the past 50 years, the earth has lost about 50 percent of its original rainforests.

According to World Wildlife Funds (WWF, 2015), a global conservation organization whose mission is to stop degradation of the earth's natural environment and create a future in which humans live in harmony with nature, between 2000 and 2010, we have lost an average of 13 million hectares of forests per year because of deforestation. NASA predicts that if unrestrained deforestation is continued, in less than 100 years, the remaining earth's rainforests will be completely lost (Bradford, 2015). This will lead to a severe change in earth's climate, ecosystems, and biodiversity, and contribute to the extinction of thousands of plant and animal species.

### 2.0 Impacts of Deforestations

#### *Disrupted water cycle and climate change:*

Deforestation is considered to be one of the major promoting factors to climate change. Trees help maintain the level of water in the atmosphere. Loss of trees disrupts groundwater evaporation and alters rain belts, causing dryer climates in proximate areas. About one-third of the rain falls that the rainforests receive will be recycled into the atmosphere. Water evaporated from forest grounds and vegetation condenses into clouds and falls back as rain to repeat

the water cycle. Computer models show that replacement of rain forests by farmlands and pastures will create drier and hotter climates in tropical areas. Models also suggest that tropical deforestation will also disrupt rainfall patterns outside the tropical areas (NASA, 2015). According to a report from the National Science Foundation, deforestation has reduced global water vapor flow from land by about 4% (Bradford, 2015).

### ***Greenhouse gas emission***

The so called greenhouse gases are molecules such as CO<sub>2</sub>, methane (CH<sub>4</sub>), nitrous oxide (NO<sub>2</sub>), ozone (O<sub>3</sub>) and water vapor that are capable of absorbing thermal infrared radiations. CO<sub>2</sub> is known to be the most potent greenhouse gas. Trees utilize CO<sub>2</sub> during photosynthesis and thus help reduce the volume of CO<sub>2</sub> in the nature. Forests are considered to be the largest terrestrial storehouse of carbon and according to Greenpeace, an independent global campaigning organization that promotes protection and conservation of the environment, about 300 billion tons of carbon is stored in trees (Bradford, 2015; Voorhar and Myllyvirta, 2013). It is estimated that in the Amazon alone, trees contain more carbon than 10 years' worth of human produced greenhouse gases (NASA). Deforestation greatly disturbs these carbon depositories and is considered to be the third-largest source of greenhouse gas emission following coal and oil, and is associated with about 15% of the global greenhouse gas emission (WWF, 2015). In another study (Van Der Werf *et al.* 2009), it is reported that deforestation is responsible for 6% to 17% of the total CO<sub>2</sub> emission in the atmosphere. Forests are considered to be the lungs of the planet earth. Plants help to maintain O<sub>2</sub> availability in the Earth's atmosphere. The rainforests of South America are responsible for 20% of Earth's atmospheric O<sub>2</sub> (Rogoo, 2015).

### ***Soil erosion, flooding and drought***

Soil erosion following deforestation has been reported (Derose, *et al.* 1993). Tree roots help anchor the soil, and along with tree litters, they help prevent soil erosion by decreasing water runoffs. Deforestation can be associated with an abrupt soil erosion and coastal flooding. Tree roots also help maintain the moisture in the topsoil which provides the nutrients to support its plant and animal habitats. Soil erosion may contribute to loss of organic carbon and thus increases greenhouse gases (Holloway, 2004). Massive deforestation has also been linked to severe drought. In Brazil, deforestation has been associated with severe drought throughout its history (Robbins, 2015).

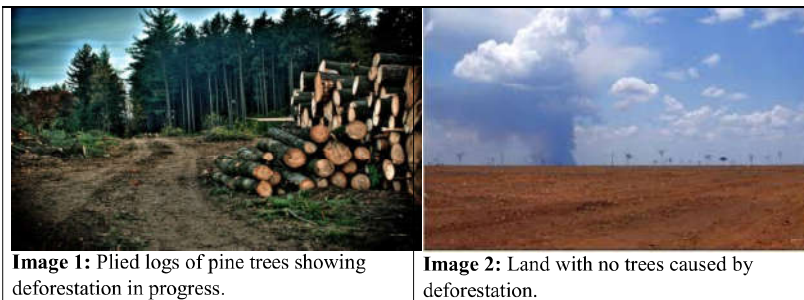
### ***Loss of habitat and unsettling biodiversity***

The trees in the rainforest that provide shelters for many animal species, also provide the canopy to maintain the climatic conditions such as temperature, humidity, sunlight, etc. in which the inhabitants thrive. Deforestation poses a significant threat to loss of habitat leading to unsettling biodiversity. Since about 80% of the animal species are contained in the rainforests (WWF, 2015), loss of habitat directly contributes to the loss of flora and fauna.

### ***Disrupted livelihood and local conflicts***

For thousands of years, humans, specially, indigenous tribes have been relying on forests for hunting, gathering and harvesting fruits, honey, medicinal plants, rubber, bamboo, timber, etc. to support their livelihoods. Uncontrolled deforestations have severely impacted such practices, and brought major economic losses and conflicts in Amazon and other local rainforest communities.

Figure 1 portrays the catastrophic destruction of rainforests.



**Image 1:** Plied logs of pine trees showing deforestation in progress.

**Image 2:** Land with no trees caused by deforestation.

**Figure 1:** Images 1-2 portray the catastrophic destructions of rainforests caused by unmanaged deforestations around the world.

### 3.0 Points of Concern

- Forests that cover about 30% of the Earth are facing elimination due to an alarmingly and rapid pace of deforestation, and among many causes discussed earlier, agriculture is the leading cause. About 1.5 acres of forests are being cut down every second, and in the past 50 years, about 50% of the earth's rainforests have been lost (WWF, 2015). NASA predicts that if deforestation continues, in less than 100 years, the remaining rainforests will be completely lost.

- Deforestation is also threatening the earth's climate. It is one of the largest anthropogenic causes of carbon to the atmosphere (Harris *et al.* 2012). Forests are super-size carbon reservoirs, reserving about 300-billion tons of carbon in the trees. Unmanaged deforestation is severely affecting the carbon cycle, producing greenhouse gases and contributing to global warming. Destruction of trees is also affecting the earth's O<sub>2</sub> cycle. As stated earlier, rainforests produce a bulk of the world's O<sub>2</sub>.

- Tropical rainforests are the habitats of over 80% of the plant and animal species of the world. Conserve Energy Future (CEF) predicts that if deforestation continues at the current pace, by the first quarter of the next century, about 28,000 species of flora and fauna will become extinct (CEF, 2015).

- Destruction of rainforests is causing loss of commodities (timber, bamboo, roofing materials, leaves, medicinal plants, fruits, honey, etc.) and raising regional conflicts as the indigenous and local populations heavily rely on them to support their maintenances. About 1.6 billion people around the world depend on the rainforests for their livelihoods (CEF, 2015).

### 4.0 Probable Measures to Counteract The Effects of Deforestation

#### *Reforestation*

It is a general believe that reforestation might counteract deforestation (Aide *et al.* 2013; Manjaribe *et al.* 2013). However, it is only partially effective (Lamb *et al.* 2005). Although, reforestation would gradually and partially replace the forests that

are lost and help reestablish the carbon cycle, it would not replace the lost animal and plant species or restore the ecological balance in the near future. Nonetheless, massive reforestation efforts coupled with planned wildlife habitat restoration endeavors will definitely slow down the impacts of deforestation (Parotta *et al.* 1997; Parrotta and Knowles, 1999). Yet, we must remember that new trees will take 20-50 years to be effective on carbon cycles and ecosystems (Kest, 2015). Forest conservation might increase carbon sequestration and decrease greenhouse gas emissions (Bonnie, 2000).

#### *Eco-forestry and recycling*

Along with reforestation efforts, selective commercially valuable trees can be harvested and carefully transported out of the forest without making significant damage to the area. Additionally, consumer products made from trees such as paper, wood products, timbers, etc. should be recycled. Efforts should be made in developing environmentally friendly wood alternative products to reduce our dependence on trees.

#### *Public awareness*

Creating global awareness on diminishing rainforests and ecosystem vulnerability could play a significant role in discouraging deforestation. An organization called Global Forest Watch has taken the initiative to create public awareness against deforestation using open data sources and satellite technology. They also encourage their online community to share their experiences on the overwhelming effects of deforestation (Bradford, 2015).

#### *Other measures*

A number of non-profit organizations are playing important roles in protecting forestlands. Conservation International, an American nonprofit environmental organization, trains local farmers to maximize the uses of their existing lands rather than clearing forests to seek for more farmlands. WWF is working on developing policies and partnering with the local communities to conserve forests (WWF, 2015). Amazon Watch, a Peru based nonprofit organization, is working with the indigenous people to defend their rights against industrial development (Ronca, 2015).

Forests provide raw materials for paper and wood products. People need to be environmentally smart and learn to be less dependable on forests by reducing consumptions and wastages of paper and wood commodities. According to Rainforest Action Network (RAN), a California based environmental organization, the United States contains less than 5% of the world's population, but consumes over 30% of world's paper. Industrialized nations consume about 70% of world's paper and 12 times more wood and wood products per person, as compared to non-industrialized countries (The Paperless Project, 2016).

Simple measures can be taken to counteract deforestation, such as, using products that use less packaging, supporting eco-friendly companies by purchasing their products, taking active roles in planting more trees at homes, in neighborhoods, in vacant lands, along the roads and highways, and joining organizations that work against deforestation.

## 5.0 Conclusion

The existence of the forests is severely threatened by an alarming rate of deforestation. Among many causes indicated earlier, agriculture is the leading cause of deforestation. About 1.5 acres of forests are being cut down in every second. In the past 50 years, the earth has lost about 50% of its rainforests, and NASA predicts that if deforestation continues at such a catastrophic rate, in less than 100 years, the remaining of the rainforests will be completely lost.

The disappearance of forests will have long lasting effects on the healthy sustenance of the earth's climate, flora and fauna, human health and livelihoods. As stated earlier, hundreds of billions of tons of earth's carbon is stored in the trees, and an unmanaged deforestation greatly disturbs these carbon depositories and causes significant amounts of the global greenhouse gas emission. It is also disrupting atmospheric O<sub>2</sub> levels since plants release and help to maintain atmospheric O<sub>2</sub>. Since most of the earth's plant and animal species inhabit tropical rain forests, by the next century, thousands of plant and animal species will become extinct if deforestation is not contained. It is predicted that by year 2100,

biodiversity will be greatly affected (Sala *et al.* 2000). Forests also play a vital role to support the basic needs of the indigenous and local populations. Over one and a half billion people around the world depend on the forests for their sustenance.

Deforestation is a global issue and thus addressing this issue requires global intervention. WWF Global, advocates zero net deforestation or forest degradation by 2020. Such an advocacy reflects the severity of the problem. Fifty-percent loss of major forests in the past 50 years is a sign of a major catastrophe. To divert such a catastrophe, immediate actions are needed. Scientists, environmental strategists and leaders must explore the best safeguards and practices to adequately address this enormous environmental issue. Existing laws are to be reinforced and new policies and laws are to be implemented as needed.

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