

FOREST RESOURCES

and their relation to Climate Change

Forests are complex communities of plants and animals in which trees are the most abundant. Over recent years, human activity has led to the destruction of many of these forests. One of the many effects of forest degradation is climate change, due to an increase in greenhouse gases. We hear the term very often, but what exactly is climate change? Climate change is a global shift in the Earth's average temperatures and weather patterns. This article looks to explain "One of the many effects of forest degradation is climate change" causes of forest degradation, as well as mitigation and adaptation strategies in forest conservation, and perceived effects if these strategies are not carried out.

CAUSES OF FOREST DEGRADATION

Increase in Atmospheric CO₂

The increase in CO₂ over decades of emission stimulates increased photosynthesis in trees. This changes the chemical composition of leaves in plants and trees, and as a result reduces the uptake of available nutrients in the soil (Lukac et al 2010). Consequently, the growth and development of trees are significantly reduced. Thus, the ability of forests to grow or recover from damages is hindered.

Changes in Climatic Conditions

Inconsistency in precipitation patterns have caused forests to become stressed as the forests attempt to adapt to the new conditions. Thinning begins to set in and forest density decreases. Extreme climatic events also affect the forests. The passage of Hurricane Ivan over Grenada in 2004 destroyed an estimate of ninety percent of the total forest coverage on the island

(Williams, 2010).

ADAPTATION TO CLIMATE CHANGE

Adaptation strategies reduce the vulnerability of forests against climate change and increases their adaptive potential.

Preservation of Rare Tree Species

Learning about forest-dependent peoples' needs can allow forest managers to substitute the extractive use of rare species with those that are more abundant. It is important to preserve these rare species, as they have a role to play in their respective ecosystems. Large mora trees are an example of a rare tree species in Trinidad and Tobago, which in the past were frequently used to construct bridges due to their hardness and pliability.

Fire Protection

Many fires influenced by increasing temperatures can be largely reduced or prevented with improved fire vigilance systems, such as the proper management of fire traces and patrols. Removing highly flammable trees, such as Caribbean pine (*Pinus caribaea*), also help reduce a forests' susceptibility to fire.

MITIGATION STRATEGIES

Mitigation refers to measures taken and implemented to facilitate in the stabilization and reduction of atmospheric greenhouse gases.

Reduction of Deforestation and the Increase in Afforestation/Reforestation

Afforestation and reforestation ensure that more trees are planted and that forest coverage is increased. Through the process of photosynthesis, trees absorb CO₂ and other pollutant particles. With afforestation and reforestation efforts, trees act as 'carbon sinks', removing high levels of carbon out of the atmosphere.

Did You Know? According to the Intergovernmental Panel for Climate Change (IPCC), fifty percent of climate change mitigation potential in the tropics can be achieved by decreasing deforestation.

Maintaining or increasing the carbon density within the forest

Simply put, carbon density refers to the amount of carbon stored within a forest. The role of forests in climate change mitigation mainly involves the absorption of CO₂, which they use for photosynthesis.

According to Braatz (2014), carbon absorption can be maximised through sustainable forest management techniques, such as planting and improvement of tree quality, coupled with longer forest rotations and fire management. These techniques are implemented by the Ministry of Agriculture, Land and Marine Resources (Forest Division) in Trinidad and Tobago.

EFFECTS ON THE CLIMATE

Carbon sequestration is the main role forests play in climate control. If the



Fire trace (brown trail in the centre) in the Northern Range, Trinidad.

- Photo Credits: S. Baldeoingh, 2015.

mitigation strategies discussed are not implemented, these are potential effects to be expected.

Increase Occurrence of Extreme Weather Events

Heavy rainfall events have increased both in frequency and intensity (Blackburn 2011), causing shorter return periods for extreme flood events. The frequency of drought has also increased and rising temperatures tend to make droughts more severe and widespread. Atlantic hurricanes have increased both in magnitude and frequency, coinciding with warming oceans that provide energy to these storms.

Impact on Food Security

Agriculture and forestry, which are a primary source of livelihood for thirty-six percent of the world's total workforce (ILO 2007), are sensitive to the climate and hence their production is likely to be affected. In tropical regions that already experience high levels of heat and humidity, trees and crops may not be able to tolerate or adapt to these extreme conditions fast enough. Extreme weather events also increase the likelihood of storm and drought damage. In addition to this, an increased occurrence of pests and diseases could devastate the agricultural sector, putting world food security under major threat.

Forests are therefore extremely important – in fact absolutely essential – in helping reduce climate change. However, in order to protect our forests from the many strains which are placed upon their survival, effective adaptation and mitigation strategies must be employed. If these strategies aren't put into place, we may see many adverse environmental and economic effects to come, both locally and globally.

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St.Michael Forest Reserve, Trinidad. - Photo Credits: K. Quash. 2016.