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Research Article

Impact of Deforestation on Climate Change: Devasatation of Uttrakhand

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A B S T R A C T

Deforestation, or the large-scale cutting of forests, has emerged as one of the most important environmental challenges of the modern era. This study explores the causes, consequences, and potential solutions to forest cutting across different regions of the world. The major drivers identified include agricultural expansion, urbanisation, Illegal logging, and industrial development. The environmental impacts are profound, ranging from biodiversity loss, soil erosion, and disruption of water cycles to the acceleration of climate change through increased greenhouse gas emissions. Social and economic consequences also arise, particularly affecting indigenous communities and local livelihoods dependent on forest resources.

Keywords: Biodiversity loss, Climate change, Soil Erosion, Carbon Emission, Agriculture Expansion, Illegal logging

Introduction

Forests are playing vital role to maintaining ecological balance on Earth. Forests provide oxygen, store carbon and support countless species of plants and animals. Deforestation defined as human work that cut trees for timber or to convert forest land into other land uses, is a major anthropogenic disturbance. According to global estimates lakhs of hectares of forest are removing every year. Deforestation, the process of clearing forests for various purposes, is a silent devastation happening across the globe. Forests, which cover about 31% of the land area on Earth, are disappearing at an alarming rate. This article aims to shed light on what deforestation is, its causes, its impact on the environment and humanity. Globally this problem of augmenting growth in the context forest cutting has been studied in line with policies and business and population dynamics. An increase in population and business of timber products both increase forest cutting. In the Amazon region, the key drivers of deforestation are trade openness and cattle ranching, with significant results of spatially lagged variables indicating the spillover effects of deforestation.

Literature Review

Forests are affected by extreme weather and biological attacks by living organisms. Due to their impact on growing stock, such damage disrupts the wood flow from forests to industries, leading to wood quality reductions, changed management plans, long-term wood supply shortfall and risk, and increased costs.[1] It is expected that forest damage will worsen, partially as a result of global warming; "projected climate change, combined with non-climatic drivers, will cause loss and degradation of much of the world's forests.[2] Disordered land use has been associated with advances in the processes that reduce the forested areas adversely affecting the quality of surface water resources in artificial reservoirs, the main source of water

in the region. On a global scale, areas of tropical forest are now smaller with reduced structural complexity and species richness and occupy steeper terrain than they did half a century ago. These primary tropical forests show increasing levels of deforestation and degradation, which are associated with conversion to agropastoral use, unregulated logging, forest fires and mining.[3]

Major causes of forest cutting

- **Agricultural Expansion:** Forests are cleared to create farmland for crops and livestock.
- **Urbanisation:** Growing populations lead to increased demand for housing, roads, and infrastructure
- Commercial timber extraction contributes significantly to forest loss.
- **Industrial Development:** Mining and industrial projects often destroy large areas of forest.
- **Fire and Natural Disasters:** Uncontrolled forest fires also result in severe damage.

Impacts On Environmnet And Human Life

Deforestation has far-reaching effects on both the environment and human life as Loss of Biodiversity: Many species lose their natural habitat, leading to extinction, Climate Change: Trees absorb carbon dioxide, cutting them increases greenhouse gases, Soil Erosion: Without tree roots to hold the soil, land becomes dry and infertile, Water Cycle Disruption: Reduced rainfall and drying of rivers affect agriculture and drinking water, Impact on Indigenous Communities: Forest-dependent people lose their homes and livelihoods.[4] Forests are important terrestrial carbon sinks and help in mitigating the emissions of CO_2, and other greenhouse gases (GHGs). Besides, it provides multiple ecosystem goods and services including livelihood security, socio-economic development, ecosystem functioning, biodiversity maintenance, carbon dynamics, nutrient cycling, and climate regulation. Population explosion, land-use change for agriculture, industry, urbanisation, and improper forest management are considered as the major reasons responsible for the acceleration of forest degradation.[5] Shifting cultivation, the traditional land-use technique is another leading cause of global tropical forests degradation. Forest Cutting and forest loss set off a series of environmental change that significantly reduce the valuable provisioning services and also affect local to global biodiversity.[6]

Case Studies

Case 1: Devasation In Uttrakhand

According to the data from the Union Ministry of Environment and Forests (MoEF), 44,868 ha of forestland have been diverted to non-forest use in Uttarakhand since 1980. By this limit of 9,500 ha has been redirected for the development of the streets, followed by 5,500 ha for the hydel ventures and 3,100 ha for transmission lines. The greater part of the woodland preoccupation (68 percent) in the state has been occurred after the arrangement of the state in 2000.[1]

The greatest number of advancement extends that necessary woods redirection have been endorsed in the Chamoli area. An aggregate of 1,767 ha forestland has been cleared in the locale, second just to Haridwar where the greater part of the woods has been cleared for restoration ventures. Strikingly, the most extreme woods territory that has been cleared for hydel activities, streets and transmission lines is in Chamoli, Tehri Garhwal, Pithoragarh and Dehradun.[9,7]

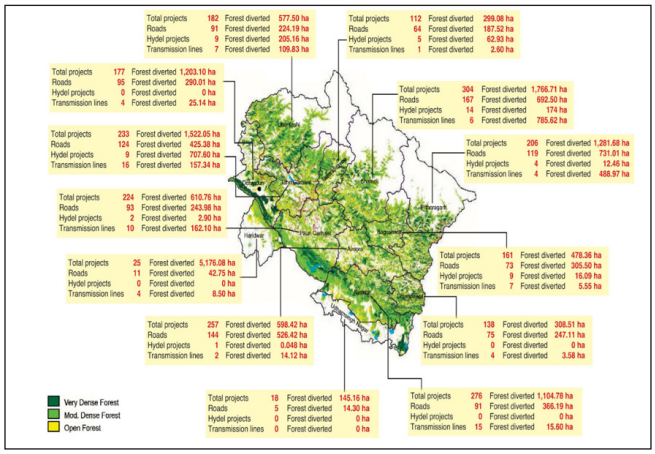

Figure 1.Districts of Uttarakhand showing different development projects and area of forest diverted

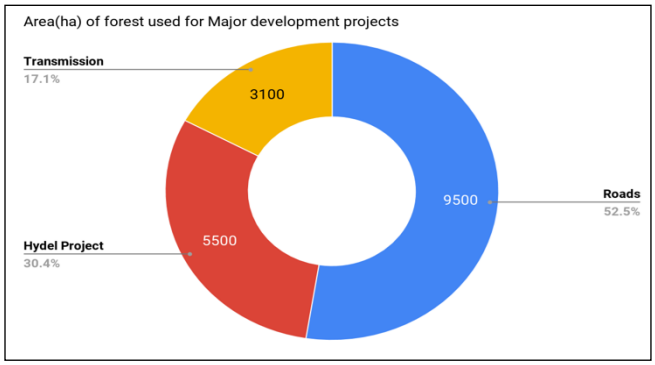

Figure 2.Chart showing different development projects and percentage of area of forest diverted in Uttarakhand

Case 2 :South America's Forest Crisis

In 2024, devastating forest fires ripped through huge portions of South America, hitting the Brazilian Amazon particularly hard. The situation in Brazil was alarming: over 30.87 million hectares of land were lost to these wildfires. In fact, one crucial ecosystem, the Pantanal, has seen a staggering 62% of its area burn at least once since 2019. These fires were caused by a perfect storm of conditions: an ongoing drought, extreme high heat (a

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direct consequence of climate change), deliberate human clearing, and a landscape already made fragile by logging and fragmentation[8]. Tragically, in this region, fire is now the single biggest cause of forest destruction, surpassing traditional threats like agricultural clearing or logging on their own.

Case 3: The Hasdeo Forest Tree-Felling

In October 2024, a controversial event unfolded in Chhattisgarh's Surguja district, specifically within the Hasdeo forest region. Officials had plans for a massive tree-felling operation to clear land for the Parsa East & Kanta Basan (PEKB) coal mining project.[9] The plan involved cutting down an estimated 5,000 trees across six villages, an action directly tied to expanding the coal block.

Forest Protection

To protect our forests, several actions must be taken[9]

- Afforestation and Reforestation: Planting new trees and restoring damaged forests.
- Sustainable Forest Management: Using resources responsibly without harming the environment.
- Government Policies: Implementing strict laws against illegal logging and land clearing.
- Public Awareness: Educating people about the importance of forests.
- Use of Alternatives: Promoting recycled wood, bamboo, and digital paper to reduce demand for timber.

Conclusion

When we chop down forests, we're essentially hitting the global warming accelerator. Trees store massive amounts of carbon, and clearing them immediately releases that carbon into the air, pumping up greenhouse gas levels. At the very same time, we're getting rid of nature's best defence mechanism, the trees themselves, which act as a vital "carbon sink" out of the atmosphere. The double whammy of adding carbon while reducing our ability to clean it up is making global warming affect us badly, which leads to more extreme weather conditions and making the remaining forests even more fragile. That's why protecting and restoring forests is absolutely crucial for stabilising our climate.

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