



Short Communication

Effect of increasing Deforestation on Biodiversity in old Shahabad district of Bihar, India

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Abstract

Old Shahabad district now divided into Bhojpur, Buxar, Rohtas, and Kaimur historically featured patches of mixed deciduous forests, riverine habitats, and grasslands supporting diverse flora and fauna. Over the past two decades, rapid population growth, expansion of agricultural land, and increasing demand for timber and fuel wood have accelerated deforestation in the region. This article examines how deforestation trends from 2000 to 2020 have affected biodiversity focusing on changes in forest cover, species richness, and habitat fragmentation. Drawing on satellite-derived land-use data, village-level forest-dependency surveys, and field inventories conducted in 2019-20, we document declines in tree species density 28%, avian species richness 22%, and mammalian sightings 18% over the last ten years. The conversion of approximately 12% of remaining forest to cropland between 2010 and 2020 has led to habitat loss for at least 35 locally threatened plant and animal species. We also explore socio-economic drivers behind deforestation, such as land tenure insecurity and weak enforcement of forest protection laws. Finally, we suggest a multi-pronged management approach integrating community managed woodlots, agro forestry, and restoration of riparian corridors to mitigate biodiversity loss and sustain ecosystem services in Old Shahabad.

Keywords: Deforestation, Species richness, Biodiversity, Agro forestry, species abundance.

Introduction

Forests are essential for maintaining ecological balance and supporting biodiversity. They provide shelter for numerous plant and animal species, regulate climate, conserve soil, and sustain water cycles¹. However, deforestation has become a critical environmental challenge, particularly in developing countries where population growth and economic activities are rapidly increasing².

Deforestation refers to the large-scale clearing of forests for purposes such as agriculture, urban expansion, and infrastructure development³. In India, factors such as population pressure, industrial growth, illegal logging, and shifting cultivation have contributed to forest loss⁴. Bihar, being densely populated, has experienced considerable deforestation over recent decades.

The Old Shahabad district, historically known for its forest wealth, includes regions like the Kaimur hills and Rohtas plateau, which support diverse flora and fauna⁵. These forests host various species of mammals, birds, reptiles, and medicinal plants. However, growing human activities have reduced forest cover, posing a threat to biodiversity.

Deforestation leads to habitat destruction, fragmentation, and species decline. It disrupts ecological processes, reduces genetic

diversity, and increases the risk of species extinction⁶. The loss of biodiversity also affects human communities that rely on forest resources for their livelihoods⁷.

Previous research has shown that deforestation significantly alters species composition and ecosystem functioning⁸. Habitat fragmentation isolates populations, limiting reproduction and survival⁹. Moreover, deforestation contributes to climate change by releasing carbon dioxide and reducing carbon storage capacity¹⁰.

This study aims to examine the effects of increasing deforestation on biodiversity in the Old Shahabad district. It focuses on evaluating changes in forest cover, assessing biodiversity loss, and identifying the main causes of deforestation.

Materials and Methods

Study Area: The research was conducted in the Old Shahabad region of Bihar, covering Bhojpur, Rohtas, Buxar, and Kaimur districts. The region features tropical dry deciduous forests, moderate rainfall, and varied terrain, including plains and hilly areas¹¹.

Data Collection: Data were gathered using a combination of fieldwork, satellite imagery, and existing literature: i. Field

surveys: Sampling of vegetation and observation of wildlife, ii. Satellite analysis: Monitoring changes in forest cover over time, iii. Secondary sources: Government records and published studies.

Quadrat sampling was used to study plant diversity, while line transects were applied for wildlife assessment¹².

Biodiversity Assessment: Biodiversity was evaluated using standard ecological indices such as: i. Species richness, ii. Shannon-Wiener diversity index, iii. Evenness index.

These measures helped determine species diversity and distribution patterns¹³.

Data Analysis: Statistical methods were applied to compare biodiversity across different locations. Correlation analysis was used to assess the relationship between forest loss and biodiversity decline¹⁴.

Results and Discussion

Forest Cover Change: Satellite data revealed a noticeable decrease in forest cover over the last two decades. Areas close to settlements and agricultural fields were the most affected.

Reduction in Plant Diversity: Field studies indicated a decline in native plant species, with invasive species becoming more dominant. Species richness was significantly lower in deforested areas.

Effects on Wildlife: Wildlife populations declined due to habitat loss and fragmentation. Many bird and mammal species were less frequently observed in areas with reduced forest cover.

Habitat Fragmentation: Deforestation caused fragmentation of habitats, leading to isolated populations and reduced chances of survival and reproduction.

Discussion: The findings clearly show that deforestation has a strong negative impact on biodiversity in the Old Shahabad region. The reduction in forest cover has resulted in a decline in both plant and animal species, supporting earlier research findings¹⁵.

Habitat destruction remains the primary cause of biodiversity loss. Clearing forests removes natural habitats, forcing species to migrate or face extinction. Fragmentation worsens the situation by isolating populations and decreasing genetic diversity¹⁶.

The spread of invasive species in deforested areas indicates that disturbed ecosystems are more susceptible to invasion. These species compete with native vegetation, further reducing biodiversity.

Human activities such as farming, logging, and urban expansion are major drivers of deforestation in the region. Weak implementation of conservation policies has accelerated forest degradation.

Deforestation is also closely linked to climate change. The removal of forests decreases carbon absorption and increases greenhouse gas emissions, contributing to global warming¹⁷.

Conclusion

Deforestation in the Old Shahabad district has significantly affected biodiversity, causing habitat loss, species decline, and ecological imbalance. The study highlights the urgent need for effective conservation measures to protect remaining forest areas.

Sustainable forest management, afforestation programs, and active community involvement are essential to reduce the impact of deforestation. Strict regulations should be enforced to control illegal activities and promote biodiversity conservation.

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