



## Deforestation and Ecological Implications: An Impact Study of Deforestation in Malakand Division, Pakistan

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| <b>CC License</b><br><b>CC-BY-NC-SA 4.0</b> | <p style="text-align: center;"><b><i>Abstract</i></b></p> <p>This research is about to investigate the level of deforestation and how the phenomena is leveled with ecological consequences in the selected region of Malakand, Pakistan. The region selected has been formerly renowned for its thick and lush forests. However, it has been observed that due human intervention, the number of forests is decreasing with the passage of time and the current study is thus planned to investigative the causes of deforestation and how such degradation is a threat to the local ecological life. The study has also examined deforestation patterns over space and time, as well as their direct and indirect impacts on flora and fauna. The methodology comprises GIS analysis, field surveys, and community involvement. Preliminary results indicate significant community awareness regarding deforestation, with varied views on causative factors and affected zones. Recommendations stress the need for improved monitoring, community engagement, and policy adjustments. The research underscores the critical need for sustainable conservation measures to safeguard Malakand's biodiversity.</p> |
|   | <p><b>Keywords:</b> Perception, Response, Deforestation, enhancement, sustainable, development</p>   |

## 1. Background:

According to Khwaja, (2010), the selected locale i.e. Malakand Division is the center for connecting all the 08 districts of the Khyber Pakhtunkhwa province including Dir Lower, Swat, Shangla, Bajawa, Dir Upper, and Chitral and thus exhibits diverse topography for inclusion of extensive forest cover, which significantly enriches its ecology. The study of Umar et al., (2012) shows that nonetheless, the area has experienced a noticeable uptick in deforestation in recent decades, attributed to various human activities and similarly, such the expanding agriculture, logging, and infrastructure development aggravate the issue to another extent (Ahmed et al., 2018). Satellite-based assessments depict a stark transformation in land cover dynamics, indicating a significant decline in forested areas within Malakand Division (Bwalya, Bridget, 2019). The encroachment upon these vital ecosystems raises concerns about potential ecological ramifications, particularly regarding biodiversity. The forests here serve as vital habitats for numerous plant and animal species, many of which may be endemic or endangered, relying on the delicate ecological equilibrium provided by these ecosystems (Duinker, Peter N, 1998).

Globally, the correlation between deforestation and biodiversity loss has garnered considerable attention (Wilcove et al., 2013). However, the specific nuances of this relationship within the unique context of Malakand Division remain underexplored. Understanding the impact of deforestation on the diverse array of indigenous flora and fauna in the region is crucial for devising targeted conservation strategies and sustainable land-use policies. Various studies stress the necessity for localized investigations to comprehend how deforestation alters biodiversity dynamics, considering the distinctive ecological and socio-economic factors influencing the Malakand landscape (Ahmed et al., 2018; Malik and Khan, 2019). The escalating threats posed by climate change further emphasize the urgency of understanding and mitigating the impacts of deforestation on the resilience of Malakand's ecosystems (Kumar and Sah, 2021).

Within this context, this research aims to fill existing knowledge gaps by conducting a comprehensive analysis of the ecological implications of deforestation on biodiversity in Malakand Division. Through systematic assessments and empirical investigations, the study seeks to provide nuanced insights that can inform evidence-based conservation initiatives, guide sustainable land management practices, and facilitate the preservation of the region's unique biodiversity.

## 2. Objectives

- To know about the spatial and temporal changes in deforestation within Malakand Division.
- To assess the consequences of deforestation on the richness and variety of plant and animal species.

### **Method and Procedure for the identification and Analysis of the Issue**

This study aimed to identify the barriers impeding local community involvement in forest management and assess their effects on forest resources in Pakistan. The total country's forest i.e. out of 100%, majority 41% are in the province of Khyber Pakhtunkhwa and thus spread over the regions located at high mountainous regions i.e. Himalayas, Hindu Kush, and Karakoram, Hazara and Malakand Divisions within the province. The estimated forest cover in Malakand Division encompasses around 365,903 hectares, accounting for eight percent of the division's total area. Similarly, the Hazara forest cover is estimated at 316,318 hectares, constituting roughly five percent of its overall area (Shaheen Rafi, Moeed Yusuf, 2006).

Data were gathered from selected respondents for comprehensive interviews in this research, targeting members of Joint Forest Management Committees (JFMCs) and personnel from the Forest Department. The respondents were classified into Executive Body Members, General Body Members, and Forest Department Staff. Among the Executive Body Members, 14 individuals, all male, were interviewed. Regarding General Body Members, the study conducted interviews with 6 males and 6 females, totaling 12 respondents. For Forest Department Staff, interviews included 21 males and 3 females, amounting to 24 respondents. The total sample size for in-depth interviews in this study was 96, comprising 69 males and 27 females. This classification facilitates a thorough exploration of viewpoints and insights from various stakeholders, offering a comprehensive understanding of the dynamics within JFMCs and the Forest Department. On-site visits will be conducted in predetermined areas identified through satellite imagery, allowing for a firsthand evaluation of the environmental landscape. Concurrently, interviews will be conducted with key stakeholders, including local

communities and forest officials. These interviews aim to capture valuable qualitative information, elucidating the community's perceptions regarding deforestation, its root causes, and the observed alterations in biodiversity within the region.

Furthermore, community surveys will be developed and administered to directly engage with local populations. These surveys seek to collect both qualitative and quantitative data, providing insights into the community's interactions with the forest, their perspectives on perceived biodiversity changes, and the socio-economic impacts attributed to deforestation. The integration of satellite data, field surveys, and community input will constitute a comprehensive dataset, enabling a holistic understanding of the intricate relationship between deforestation and biodiversity in Malakand Division.

#### DISTRIBUTION OF RESPONDENTS FOR IN-DEPTH INTERVIEWS

| CATEGORY                | NUMBER OF RESPONDENTS | GENDER DISTRIBUTION   |
|-------------------------|-----------------------|-----------------------|
| EXECUTIVE BODY MEMBERS  | 14                    | ALL MALE              |
| GENERAL BODY MEMBERS    | 12                    | 6 MALES , 6 FEMALES   |
| FOREST DEPARTMENT STAFF | 24                    | 21 MALES , 3 FEMALES  |
| TOTAL                   | 50                    | 27 MALES , 23 FEMALES |



TOTAL SIZE FOR IN-DEPTH INTERVIEWS : 96 (69 MALES, 27 FEMALES)

#### Objective 1: Explore the Spatial and Temporal aspects related to changes in Deforestation within Malakand Division

This investigation will utilize Geographic Information System (GIS) tools to examine deforestation's spatial patterns. The primary aim is to produce maps illustrating deforestation's distribution and scale, pinpointing hotspots and areas of significant deforestation. Furthermore, a time-series dataset will be established to analyze temporal shifts, identifying periods of notable change. Statistical techniques will be employed to quantify the rate of deforestation. To complement this analysis, statistical examinations will be conducted to reveal significant spatial or temporal trends, and correlations between deforestation and potential drivers, such as population growth and economic activities, will be explored.

#### Objective 2: Knowing the impact of deforestation on Plant and Animal Species' Abundance and Diversity

The evaluation of deforestation's direct and indirect impacts on plant and animal species will adopt a thorough approach. Data gathered from field surveys will undergo meticulous analysis to gauge alterations in species abundance and diversity in deforestation-affected areas. Statistical analyses will be utilized to identify connections between deforestation and changes in species abundance and diversity. The demographic breakdown of survey participants, classified by gender, will be taken into account in data analysis. Relationships between deforestation and ecological variables will also be investigated, aiming to uncover both direct and indirect impacts on biodiversity.

#### Integration of Results and Consideration of Demographics

The outcomes from spatial and temporal analyses will be merged with the findings from assessments of species abundance and diversity. This integrated methodology will facilitate a more holistic understanding of the connections between deforestation dynamics and ecological consequences. Additionally, the demographic breakdown of survey participants, as detailed in Table 1, will be factored into the analysis. Gender-specific perspectives on deforestation and its impacts will be explored, acknowledging potential discrepancies in experiences and perceptions.

#### Questionnaire Survey and its Data Presentation

#### Community Perception regarding Deforestation: Forest Landscape and the Various Alteration

Available online at: <https://jazindia.com>

Findings: The Idea was supported by a majority of 70% of respondents where they have actively observed drastic changes in available forest landscape during the past few years. This also analyze the level of awareness of the local people regarding deforestation and its implications.

### **The Deforestation Drivers and People Perception:**

Thematic Examination: The open ended and in-depth analysis of the participants unveiled the recurring themes like unsustainable logging (supported by 37%), agricultural expansion (supported by 24%), and infrastructure development (supported by 13%) which were the primary causes or drivers of deforestation.

### **Specific Deforestation Areas:**

Insights: The views of the respondents to have knowledge about some specific location within Malakand Division that are affected severely by deforestation and the idea was supported by 65% of respondents while pointed the region including Shangla, Thana, Batkhela, and both lower and upper Dir Hills. A notable identified these areas, shedding light on localized impacts and providing valuable insights into environmental concerns' distribution.

### **Observing the Biodiversity:**

#### **Variations in Biodiversity**

Findings: Changes in the biodiversity of the region were acknowledged by 81% of respondents and thus added to the questions that plant and animal species are affected severely by increase in deforestation in the affected areas. This also shows that level of awareness of the people on the impact of biodiversity, showcasing an increased awareness of ecological changes. However, the open ended thematic analysis further revealed that specific instances of biodiversity impact, including the decline of certain bird species (up to 45%) and the disappearance of indigenous plants (up to 31%) are also noteworthy while majority 80% of respondents provided concrete instances, contributing to a deeper understanding of biodiversity loss intricacies.

### **Socio-economic Impacts:**

**Local Community Effects:** In this context, respondents were asked to report the impacts related to socio-economic condition and varying degrees of impact on the local community have been obtained in which 45% significantly affected, 25% moderately affected, and 20% slightly affected in multiple dimensions and thus explains the understanding of deforestations on the socio-economic consequences and the community's diverse experiences. On the other hand, open-ended thematic and qualitative responses revealed that socio-economic changes attributed to forest landscape alterations, including disruptions in majority of the traditional livelihoods (more than 50%), an increased agricultural pressure on the local community (recorded by 30% of the people), and a growing need for alternative income sources (30%) which shows that multifaceted view of deforestation's socio-economic impacts.

### **Efforts for Conservation through Community Engagement:**

#### **Awareness of the Community on Conservation Initiatives**

In this context, the idea was supported by 62% of the respondents and they were of the view that the awareness on the ongoing conservation initiatives through involvement of community-based efforts is compulsory for the rehabilitation of the forests and other environmental concerns. Similarly, the qualitative examination indicates that the roles of local communities in biodiversity conservation and sustainable forest management is the dire need of the time and this can be the best solution of the issues. In this context, the active participation in reforestation projects was supported by 33% of the people, community-led awareness campaigns were supported by 35% of the people and thus overall, the data shows an emphasis on active role of community in environmental preservation. Additionally, respondents provided diverse additional information concerning deforestation's impact on water sources, initiating stricter environmental policies and to enriching the overall understanding of the community's sentiments on deforestation and related issues.

### **Recommendations**

#### **Monitoring and Enforcement:**

- Strengthen monitoring systems for real-time tracking of deforestation activities.

Implement stricter enforcement measures against illegal logging and land-use changes.

Community Engagement and Awareness:

- Develop community-based awareness programs to educate residents on deforestation consequences.

Encourage local participation in conservation initiatives and sustainable land management practices.

Targeted Conservation Efforts:

- Prioritize conservation efforts in areas identified by the community as experiencing significant deforestation.

- Implement reforestation projects and habitat restoration in collaboration with local communities.

#### **Policy Reforms:**

- Advocate for and participate in the development of policies addressing deforestation root causes.
- Promote sustainable land-use policies balancing economic development with environmental conservation.

#### **Alternative Livelihoods:**

- Explore and implement alternative livelihood options for communities heavily reliant on forest resources.
- Support initiatives promoting sustainable income sources, reducing reliance on forest exploitation.

#### **Economic Incentives for Conservation:**

- Introduce economic incentives for communities engaged in sustainable forest management and conservation practices.
- Explore mechanisms like eco-tourism for economic benefits while preserving natural habitats.

#### **Cross-Sectoral Collaboration:**

- Facilitate collaboration between government agencies, NGOs, and local communities for holistic conservation efforts.
- Foster partnerships addressing environmental and socio-economic aspects of deforestation.

#### **Capacity Building:**

- Provide training and capacity-building programs for local communities to engage in sustainable practices.
- Empower local organizations to lead conservation initiatives.

#### **Long-Term Research and Monitoring:**

- Support long-term research for continuous monitoring of conservation impacts and strategy adaptation.
- Invest in studies assessing policy and intervention effectiveness over time.

#### **Inclusive Decision-Making:**

- Involve local communities in forest management and conservation decision-making.
- Ensure diverse voices, including women and marginalized groups, are considered in conservation strategies.

These recommendations aim to tackle identified challenges and promote a holistic, sustainable approach to deforestation in Malakand Division. Implementing a blend of these strategies, tailored to the region's context, can foster effective environmental conservation and community well-being.

### **3. Conclusion**

In conclusion, the survey on deforestation in Malakand Division illuminates heightened awareness among respondents regarding landscape alterations. Key factors, such as unsustainable logging and agricultural expansion, necessitate targeted interventions. Biodiversity impacts, encompassing the decline of specific species, stress the urgency for conservation measures. Socio-economic ramifications, ranging from disruptions in livelihoods to heightened agricultural pressure, highlight the significance of a balanced approach. Recommendations encompass enhanced monitoring, community engagement, and policy reforms to tackle the underlying causes. Awareness of existing conservation initiatives within the community lays a positive groundwork for collaboration. Looking ahead, a comprehensive strategy, involving stakeholders, inclusive decision-making, and sustained monitoring, is imperative for sustainable preservation efforts.

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