

# **The Impact of Deforestation On Local Climates and Weather Patterns**

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## **Abstract:-**

Deforestation in the Hazaribagh Forest Complex has severely impacted neighborhood weather and meals manufacturing. Over 100,000 hectares of wooded area were misplaced considering that 1988, leading to disrupted rainfall patterns, growing temperatures, and a degraded hydrological cycle. This look at analyzed woodland cowl changes the use of Landsat imagery and GIS for the years 1988, 1998, 2008, and 2024. Climate information from the India Meteorological Department and household surveys inside five km of the forest provided additional insights. Findings display that unlawful logging, charcoal manufacturing, and settlement boom were foremost drivers of deforestation. Rainfall variability and temperature will increase correlate with declining agricultural productivity. The examine highlights the urgent want for conservation, reforestation, and sustainable land control. Addressing these demanding situations is essential to make certain environmental resilience and lengthy-time period food safety.

## **Keywords:-**

- Geographical Location
- Land Use
- Climate Rainfall
- Temperature
- Population

## **1. Introduction:-**

Enhanced food production is crucial for the nation's progress and the realization of Vision 2030 (Vick, 2012). Attaining national food security in India constitutes a primary objective of the agricultural sector. The agricultural sector plays a vital role in accomplishing Vision 2030, aspiring to create a food-secure nation, thereby facilitating greater development. Global environmental challenges encompass climate variations and their detrimental effects on sustainable development goals (SDGs) (FAO, 2007). These trends are chiefly driven by regional fluctuations in future precipitation and geographical vulnerability to extreme occurrences, especially drought frequency (FAO, 2009). Climate change and variability contribute to reduced crop yields (Lowell et al. , 2011). Unpredictable weather patterns in India are projected to thrust the already impoverished population dependent on agriculture into deeper poverty

and vulnerability by the year 2050, according to the IPCC (2012), a principal indicator of health and physical wellbeing for human existence (FAO, 1991). Water availability, soil nutrients, and optimal temperatures are essential for maximizing crop production and growth (FAO, 2002). According to UNEP, the Hazaribagh forest lost over 107,000 hectares of its coverage between 1991 and 2011 due to the expansion of cultivation, tree poaching, and rapid population growth (IFWG, 2006).

**Problem Statement:-** The Hazaribagh forest creates favorable conditions for crop farming due to its influence on the regional microclimate and rainfall patterns, covering an area of 400,000 hectares and thereby affecting all of North India both ecologically and economically.

**Hypothesis :-** Deforestation has impacted the climate, consequently affecting food production in the study area.

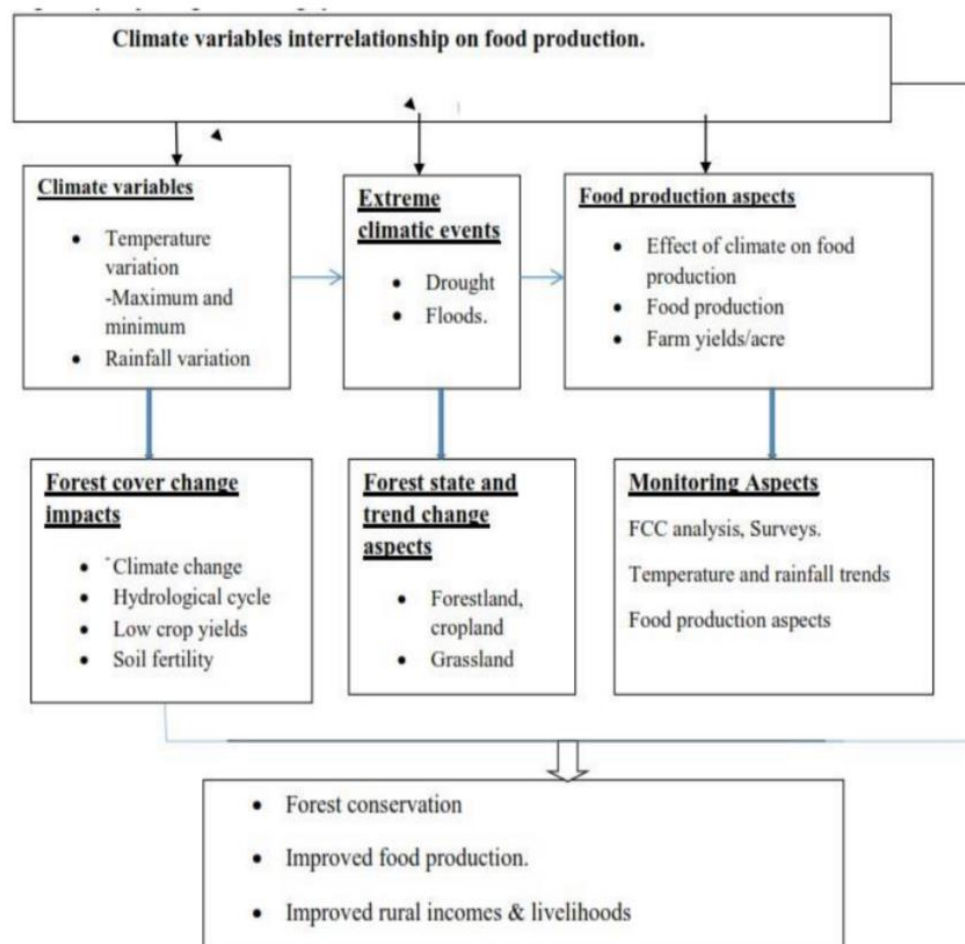


Fig:- Flow chart procedure with linkages of the various variables of the conceptual framework. Source: Author

**Study Objectives:-**

The primary objective was to investigate the effects of deforestation on climate and its implications for food production in the study area. The following specific objectives were pursued:

1. To assess the trend in forest cover change.
2. To analyze the trends in observed rainfall and temperature variations.

**2. Materials and Methods: -**

This look at integrates each number one and secondary information to research woodland cover trade and weather variability within the Hazaribagh Forest Complex over a 30-year period (1987–2024). Forest cowl information had been acquired thru processed LANDSAT satellite imagery, whilst rainfall and temperature information have been sourced from the India Meteorological Department. GIS and far flung sensing techniques have been hired to classify pics from 1988, 1998, 2008, and 2024 the use of a 4:3:2 band mixture. Time-series analysis of weather records became carried out using statistics from 5 meteorological stations. Primary statistics have been accrued via family surveys, interviews, and awareness group discussions with groups inside a 5 km radius of the wooded area. Sampling accompanied simple random strategies to ensure illustration. Data were analyzed the usage of SPSS and Microsoft Excel, with thematic coding applied to qualitative records. Correlation evaluation turned into used to determine the connection between woodland loss and weather exchange.

**Primary data:-**

Comprising a cumulative population of 11,050 individuals. This includes primary information obtained from the perspectives and insights of local residents and key informants in the region. Primary data sources included.

**Data Accessibility.**

**The duration of the data spans 30 years. The types of data are:**

Variable	Type	Source of data
Forest conversion (dependent)	Binary	Landuse classification maps of landsat imagery
Rainfall data(independent)	Continuous data	India meteorological department
Temperature data	Continuous data	India meteorological department

**Table 1: Rainfall stations utilized.**

Main activities	No of respondents	Percentage of respondents
Population growth	31	18.6
Illegal logging	65	38.9
Charcoal burning	44	26.3
Agriculture expansion	17	10.2
Infrastructure development	7	4.2
Others	3	1.8
Total	167	100

### **3. Result and Discussions:-**

The take a look at analyzed deforestation, weather trade, and agricultural influences in Hazaribagh Forest from 1988 to 2024. Satellite imagery and household surveys showed good sized forest loss between 1998-2008 because of illegal logging, charcoal manufacturing, and populace growth. Recent afforestation efforts have caused moderate restoration. Rainfall styles showed variability with lowering developments, whilst temperatures have steadily accelerated, affecting crop yields. Surveys found out that unpredictable weather, droughts, and land degradation are number one demanding situations to farming. Women dominate agriculture, and older farmers pronounced extra expertise on environmental changes over time.

**Table 2: Forest cover changes in the area over the years in hectares and percentages**

Serial No	Year	Year(Ha)	Years	Change in Ha	Change in (%)
1	2024	63643.674	2008 – 2024	22801.425	Increaseof55.83
2	2008	40842.249	1998-2008	-49405.916	Decreaseof54.7
3	1998	90248.165	1988-1998	73	0.80
4	1988	90321.165	-	-	-

**Table3:Land sat TM data with different bands and wavelength.**

Band	Wavelength (μm)	Resolution(M)	Nominal spectral location
Band1	0.45 -0.52	30 m	Blue
Band2	0.52 -0.60	30 m	Green
Band3	0.63 -0.69	30 m	Red
Band4	0.76 -0.90	30 m	Near IR

**Table 4: Responses on forest cover change from respondents in the study area**

Change Rate of forest cover	No of respondents	Percentage
Drastic reduction in Forest cover	79	47.3
Much reduced	54	32.3
Little reduction in Forest cover	25	15.0
No change	9	5.4
Total	167	100

**Table 5: Participants on the factors contributing to deforestation in the research area**

Main activities	No of respondents	Percentage of respondents
Population growth	31	18.6
Illegal logging	65	38.9
Charcoal burning	44	26.3
Agriculture expansion	17	10.2
Infrastructure development	7	4.2
Others	3	1.8
Total	167	100

**Declaration:-**

It has no longer been submitted somewhere else for any diploma or degree.



## **Acknowledgement:-**

I clearly thank the Almighty for His benefits. I am grateful to Shalini Singh, Head of Zoology, Dr. C.V. Raman University, for her steering. I appreciate the aid of university personnel and my own family for their encouragement, as well as all participants to my studies, at once or not directly.

## **References:-**

India's Hazaribagh Forest Complex holds ecological importance but increasingly at risk of deforestation and climate change. Gupta & Kumar (2018) and Sahu (2019) studies have associated the decline in forest cover with changed rainfall and low ecological resilience. Technical tools like GIS support forest monitoring (Roy & Joshi, 2002; NRSC, 2014), whereas policy implementation is poor. Participatory, local-level governance is recommended by experts to deal with ecological as well as food security issues of the region.