

## Effects of Climate Change on Forest in Dumka District of Jharkhand

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### Abstract

*Forests are large areas covered with trees and shrubs. They are indispensable and have a multifaceted role in the global environment. Besides restoring some of the effects of climate change and natural disasters, they keep on providing oxygen, absorbing carbon dioxide, food, raw materials and livelihoods to the people. The district of Dumka alone covers 29.17% forest area of the state of Jharkhand. The area of study consists of protected forest, reserve forest, open mixed jungle and scrubs. The diversity of flora and fauna in this district is substantial and appreciable. However, this forest cover keeps changing over the course of time. The main objective of the present study is to highlight the cause of decreasing forest cover due to climatic impact. Global warming contributes heavily to climate change. The climatic situation of the region currently brings about sustained high temperatures and less rainfall. Dry climate, diminishing rainfall, pre-monsoon thunderstorms lead to higher numbers of forest fires. Lack of moisture in the soil and layer of dry leaves left during fall often result in fires, especially when the temperatures rise. As a result, Forest covers keep continuously changing as it is more influenced by temperature and rainfall variations. Furthermore, constant increase in population, urbanization, construction of new rail & roadways are factors that accelerate deforestation. With this present study we will try to highlight the predicament witnessed in the present situation and probable solutions in managing them, also simultaneously draw attention and create awareness among the general public & government bodies.*

**Key Words:** Fauna, Flora, forest fire, Rainfall, Temperature, Global Warming.

### Introduction

Forest plays a vital role in sustaining life on the planet Earth. A forest is a large area of land covered with trees or other woody vegetation. Hundreds of more precise definitions of forest are used throughout the world, incorporating factors such as tree density, tree height, land use, legal standing and ecological function.

Natural vegetation depends on the climatic conditions prevailing in the place. For example, evergreen forests grow in the region which experience heavy rainfall. Similarly at higher altitudes, where the climate is extremely cold lichens and mosses grow.

Forests also harbor the majority of species on Earth and provide valuable ecosystem goods and services to humanity, medicine, clean water, aesthetic and spiritual values and climate moderation (Jackson et al. 2005; McKinley et al. 2011). Forests provides us fodder, fuel wood, timber, leaf litter for manuring crop fields, construction, industrial raw material and several non-timber forests (Ram et al. 2004). The non-timber forest products include canes, gums, resins, tannins, lac, dyes, fibers, medicine, oil, honey, spices and several other produces (Ram et al. 2003).

Problem starts when Tropical forests has begun to vanish from the time when our understanding on their structure and dynamics is dolefully inadequate (Hubbel & Foster 1983).

In recent years, climate has been affecting forest ecosystems around the world. Over the last three decades in the earth forest cover is continuously affected by several climatological factors. The present study is concerned with determining the patterns of climate change and its impact on forests.

### Study Area

The study area, Dumka District lies between longitudes of 86°20' to 87°75' East and latitudes of 23°45' to 24°38' North in the state of Jharkhand of India. Dumka district is located in the North Eastern part of Jharkhand state. The district is situated in the Northern Plain of India and eastern plateau and hill region. The Dumka District is surrounded by Sahibganj, Godda and Banka of Bihar in the north, by Pakur (Jharkhand) and Birbhum (West Bengal) in the east, by Jamtara(Jharkhand) and Burdwan( West Bengal ) in the south and by Deoghar in the west. The total area covers 3761 Sq. Km. Dumka town is the divisional and district headquarter. Dumka forest division further subdivided into three ranges i.e., Hizla east, Hizla west and Dumka.

Dumka is covered by Lofty hills and forest. One can surely appreciate the diverse flora and fauna of this town.

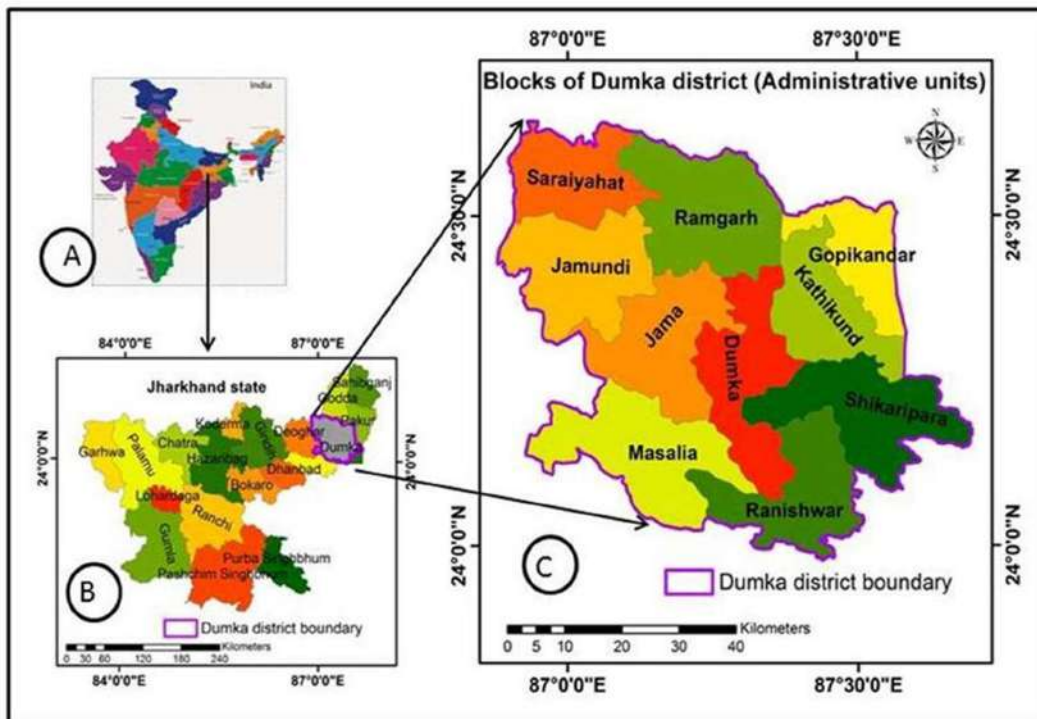


Fig 1: Study Area Map

### Objective

The main objectives of the study are the following –

- To make a study on the present forest scenario of dumka.
- To make an overview of changes aspects of forest land.
- To discuss the climatic impact on forest covers and its depleted state due to Variable Rainfall and Temperature.
- To raise awareness about the extreme climatic changes and its effect on degradation of forest in the region.

### Methodology

The present study is constructed on both spatial and non-spatial data consisting of the primary and secondary data.

- This paper comprises a review of literature regarding climate change effect on forest ecosystem.

- Metrological data is one of the key input parameters. Observe climate data were purchased from the India meteorological department (IMD), Pune. Some of the stations are slightly affected by data gaps and missing values.
- Recorded forest data were collected from the state of forest report (ISFR) published by forest survey of India an organization under the ministry of environment forest and climate change Government of India.

## Results and Discussion

### Recorded Forest Area

The total recorded forest area of the district is 120763 Acres or 48305.2 hectares which is 15.36% of the geographical area of the state. Of the total recorded forest area, Reserved Forests constitute 18.58%, Protected Forests 81.28%, and Unclassed Forests 0.14%.

Dumka forest series that starts from Sahibganj, continuing through Godda and Pakur divisions and ending in Dumka.

Sal trees dominate the natural forest along with a good presence of Mahua, Palash, Khajur and other species, while Kathikund has significant area under bamboo forests.

Table 1: Forest cover area of Dumka

Forest Cover	Area (in square km.)
Moderate Dense Forest	259.40
Open Forest	318.23
<b>Total</b>	<b>577.63</b>
Scrub	44.55

Source: ISFR 2021

### Forest Type

In dumka district we can see three types of forest i.e.

- Northern dry mixed forest:

Most of the forests of dumka district belong to the major group Northern dry mixed forest. The mean annual rainfall in these forests is 100-150 cm. The trees of these forests drop their leaves in the dry season. The major species found in such forests are amaltas, palas, common bamboo. In Dumka these kinds of mixed forests are found in Kathikund, Shikaripara, Dumka, Masalia, Ranishwar CD Blocks.

- Dry Sal Forest:

In dumka district Dry Sal Forest are seen in Gopikandar and Ramgarh CD Block. With moderate rainfall and fertile soil, the region is a natural habitat of a dense forest cover of sal and other species shishum, Jamun, mahua, ber etc.

- Dry deciduous scrub:

The remaining forest is mostly scrub. scrub forests consist of open, low vegetation with thorny trees with short trunks and low, branching crowns that rarely meet to form a closed canopy. These types of forests are seen throughout the district but mainly in Dumka, Masalia, and kathikund Block.

### Temporal Variation of Temperature and Rainfall

If we look at the temperature and rainfall data from 1992 to 2022, we can see that the temperature is increasing and the rainfall is decreasing day by day. The trend of temporal variation of Average temperature and annual rainfall is shown in the figure below.

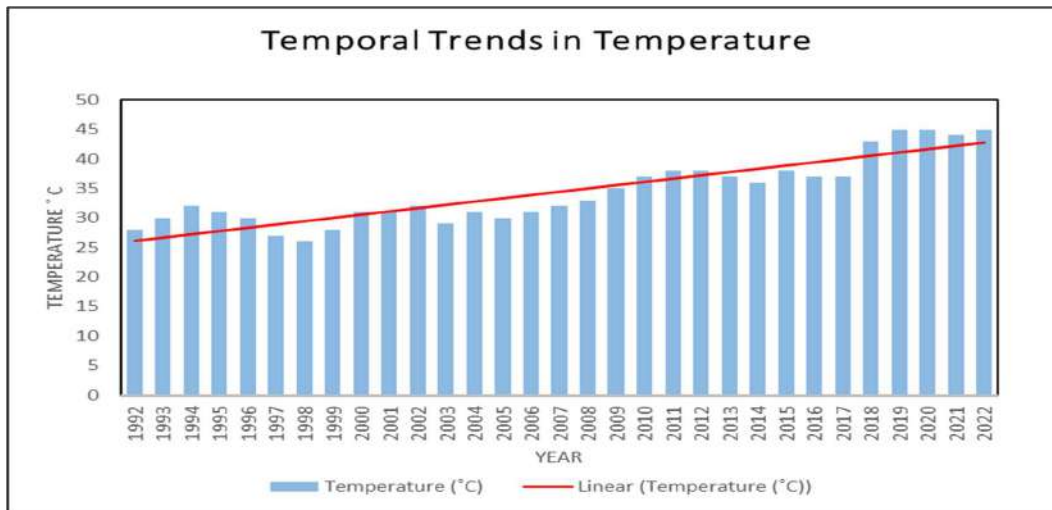


Fig 2: Temporal Variation of Average Temperature

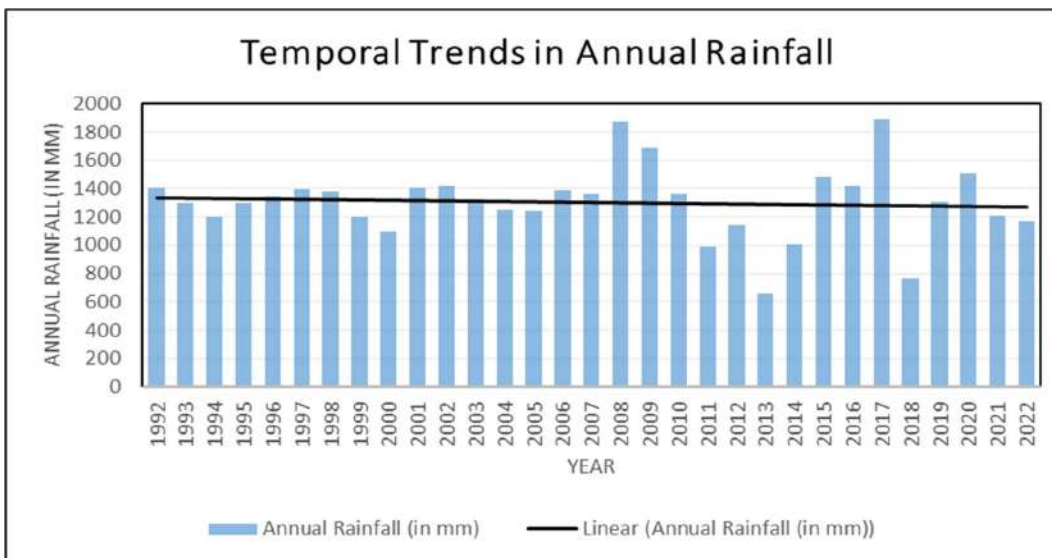


Fig 3: Temporal Variation of Annual Rainfall

**Climate Change Impacts on Forest**

Table 2: Impact of Climatic factor

Climatic Factor	Impact
Increase Temperature	Species change, Biodiversity change
Decrease Rainfall	Growth rate decrease, Mortality rate increase
Dry climate	Forest Fire

❖ **Less Growth Due to Inadequate Rainfall**

Forest growth is decreasing due to low rainfall. Plants need adequate water for growth. The main source of water in the forest is rain water which means monsoon. How will the trees grow every year if the rainfall decreases during the monsoon season. It is the main reason for less growth.

#### ❖ **Switching To Fast Growing Trees Has Led to Less Forest Density**

Since 1963, the government has increased plantations of eucalyptus and Akashmani trees. As these trees grow more swiftly it was a better option to meet the high demand of timber. To fight and reduce deforestation in the forest department had to introduce a fast-growing species in this area, it was a necessary step addressing the extensive depletion of forest covers in the area caused by illegal logging, harvesting and selling rampantly practiced by the local people and dishonest businessmen. The altering the plant species composition has caused a reduction in the density of the forest. This reduction of density may be attributed to the decrease in the number of sal trees which not only themselves are very thick and have a very compact, overgrown foliage, but also allows growing other undergrowth in their branches, trunks, roots etc. Thus, consequently the decrease of sal trees has a noteworthy implication in the forest ecosystem, more specifically in terms of both, species and interaction between them.

#### ❖ **Decreasing Forest Cover Due to Unfavorable Climatic Conditions**

Forest cover means a large area of land covered by trees and other woody vegetation, usually with close canopy. This area was previously covered by trees like Sal, Sishum, Palas, Jamun, Mahua, Ber, Amaltas, Bamboo etc. These trees are generally characterized by growing close together, forming a dense continuous canopy that limits the sunlight to reach through the different layers to the forest floors. These forests had multiple layers from the top, canopy, understory, shrub layer and forest floor. All these layers support a vast array of flora and fauna, contributing to the myriad overall complexity and richness of the ecosystem. The climatic changes leading to conditions like, very dry soil, high temperatures, variation in rainfall amount and human aided plundering has led to constant dwindling of such dense forests, which has caused immense losses in terms of species which grew and thrived in their shadow. The impediment is that these kinds of forests take many years to grow back in suitable conditions that they are comfortable in and reach the state where then they can become a support system for life systems. Unfortunately, the changing climate and unfavorable factors pose challenges and have made it almost impossible for these trees to grow back and assume their previous grand state. In addition to that the Forest Department of the area keeping in mind the climatic changes, unsuitable conditions of the environment and the time it would take those kinds of trees to grow back has decided to go with trees that have a much more survival and growth rate to add trees to the areas and manage the demand for timber too. Thus, we see that due to continuous decrease in rainfall and increased temperatures has not only adversely affected the dense forests cost us a multitude of living species which lived with the support from these.

#### ❖ **Forest Fire Due to High Temperature and Lack of Moisture**

Lack of moisture in the soil and layer of dry leaves left during fall often result in fires, especially when temperature rises. Recent Forest fire incidences was observed in forest of Gopikandor on 28th February, 2023(Tuesday) and Kadma village of Ranishwar block on 20th April, 2023(Thursday). All data based on the media reports and the reports from disaster management authorities of Government.

#### **Solution**

The study unfurls that accelerated deterioration of forest diversity had occurred due to climatic variables coupled with anthropogenic interferences and natural disaster like forest fire. The dual contribution of forest ecosystem in climate change mitigation as well as adaptation planning makes this system more significant.

- **Plantation:** Aggressive plantation has to be done. As more trees are planted it will increase the forest area. In such areas it will lead to more rainfall and therefore leading to climate change as the average temperature will gradually drop.
- **Stop deforestation:** Deforestation should be reduced which would result in increased forest area.
- **Awareness program:** Targeted awareness programs should be done for Local government bodies, businesses and communities to educate them about the detrimental effects.

- **Government Policies and Legal Measures:** Implement and enforce laws and policies aimed at prevention.
- **Reduce pollution:** Greenhouse gas emission has to be reduced.

### Conclusion

The conclusion we can draw from the above data and information presented before us is that the threat is real and not so distant any more. The forest covers and green corridors have been affected by climate change and it is hampering the biodiversity of the animal species, flora and fauna depending on it. Humans have denied their contribution in the constant exploitation of forests and the effects it has caused to the climate which forced the acceleration of drastic changes. But now we owe it to the planet, future generations and ourselves to decisively and compassionately take action against climate change threatening the planet's existence, together we can mitigate the dangers to create a more green, eco-friendly and sustainable environment.

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