झारखण्ड वन

GOVERNMENT OF JHARKHAND

विज्ञान एवं प्रौद्योगिकी विभाग
DEPARTMENT OF
SCIENCE & TECHNOLOGY
सत्यमेव जयते

Mapping Jharkhand's Climate Vulnerability: "A District & Block Level Assessment"

Department of Forest, Environment & Climate Change
Government of Jharkhand

Image Credit : Vijay Shankar

Message from the PCCF & HoFF

Climate change risk has become one of the most critical factors expected to affect every aspect of the economy and life across the globe. Jharkhand, a mineral-rich state in India with its unique geographical and socio-economic conditions, is highly vulnerable to the impacts of a changing climate. "Mapping Jharkhand's Climate Vulnerability" is a comprehensive effort to understand the sectoral and regional vulnerabilities faced by the state, providing eye-opening insights for stakeholders at all levels.

While significant progress has been made on the mitigation front, risk assessment and adaptation planning remain at a very nascent stage. Given that temperatures across the state are projected to increase by at least 1.5°C by the end of this century, the focus must shift more towards adaptation rather than mitigation in addressing the challenges posed by climate change.

By examining climate vulnerability at both the district and block levels, this report offers a granular view of the risks and challenges that need to be addressed. The findings presented here highlight the critical sectors affected by climate change, including agriculture, mining, and forestry, and emphasize the importance of building resilience within these sectors.

I deeply appreciate the efforts made by the officers of the Forest, Environment & Climate Department of Jharkhand, Climate Risk Modellers, Researchers, and members of the State Climate Change Cell involved in this vulnerability study and the preparation of this insightful report.

Lastly, I express my hope that this initiative, undertaken by the Jharkhand State Forest, Environment & Climate Change Department with funding support from the Department of Science and Technology (DST), Government of India, under the National Mission on Strategic Knowledge for Climate Change (NMSKCC), will not only strengthen the capacities of the State Climate Change Cell in climate risk assessment and adaptation planning but also aid in policy formulation. I believe it will serve as a vital tool for the state government and officials to understand future climate risks, enabling informed decision-making on climate change and localized adaptation planning.

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Acknowledgement

The creation of this vulnerability study has been driven by extensive research, meticulous data collection, and consultations with experts across various fields. Our approach integrates socio-economic, biophysical, infrastructure, and health indicators into a comprehensive framework designed to inform targeted interventions. The data and insights derived from this analysis are crucial for formulating district-specific climate action plans and prioritizing resources and efforts where they are most needed.

The primary objective of this micro-level vulnerability analysis is to equip policymakers, local authorities, and community leaders with the knowledge and tools necessary to develop effective adaptation strategies. I hope the detailed assessments and recommendations provided in this report will serve as a valuable resource for enhancing climate resilience in Jharkhand.

As we move forward, it is imperative to continue monitoring, assessing, and adapting to the changing climate. This report represents a significant step toward fostering a more resilient Jharkhand, capable of withstanding and thriving amidst the challenges posed by climate change. We invite all stakeholders to utilize this report as a foundation for collaborative efforts to secure a sustainable future for Jharkhand and its people.

I would like to extend my deepest gratitude to the Principal Chief Conservator of Forests & Head of the Forest Force (HOFF), whose motivation and support have been a driving force behind this study, as well as the Department of Science & Technology, Government of India, for their funding support and valuable inputs in developing and improving this report. I am also immensely grateful to all senior forest officers, district-level officials, non-governmental organizations, and community representatives who participated in this study. Their local knowledge, insights, and cooperation have enriched this report, ensuring it reflects Jharkhand's ground realities and specific vulnerabilities.

Finally, I sincerely appreciate the efforts of Dr. Upendra Singh, Hemant Kumar, Vijay Shankar, Kunal Jain, and Manshi Lal for dedicating their time and expertise to prepare this report. Their hard work, dedication, and commitment have been the cornerstone of this comprehensive assessment.

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List of Abbreviations

AR6	Sixth Assessment Report (by the IPCC)
BPL	Below Poverty Level
CV	Climate Vulnerability
CVI	Composite Vulnerability Index
CMIP-6	Coupled Model Intercomparison Project Phase 6
DST	Department of Science & Technology
EMPRI	Environmental Management and Policy Research Institute
FSI	Forest Survey of India
GHG	Greenhouse Gas
IAM	Integrated Assessment Model
IAV	Impacts, Adaptation and Vulnerability (related to climate change)
IFR/CFR	Individual Forest Rights/Community Forest Rights
IISc	Indian Institute of Science
IIT	Indian Institute of Technology
IITM	Indian Institute of Tropical Metrology
IMR	Infant Mortality Rate
IPCC	Intergovernmental Panel on Climate Change
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MRI	Meteorological Research Institute
NAPCC	National Action Plan on Climate Change
NAPA	National Adaptation Programme of Action
NTFP	Non-Timber Forest Products
PCA	Principal Component Analysis
RCP	Representative Concentration Pathway
SAPCC	State Action Plan on Climate Change
SC	Scheduled Caste
SHG	Self-Help Group
SSP	Shared Socioeconomic Pathway
ST	Scheduled Tribe
AR6	Sixth Assessment Report (by the IPCC)
UNDP	United Nations Development Programme
VI	Vulnerability Index

1   Executive Summary

Climate change has become one of the most alarming global challenges for the 21st century. It refers to long term shifts in temperatures and weather patterns, primarily due to increased concentrations of GHG gases in the atmosphere. These changes are unprecedented in magnitude and speed, threatening ecosystems, economies and communities worldwide. Understanding climate change's causes, future projections and consequences is crucial for developing effective climate mitigation and adaptation strategies.

While the world is on a mission to reduce Greenhouse gas (GHG) emissions keeping its priority as economic development and trying to restrict the global temperature rise within **1.5^{0}C** by the end of the **21th century.** It is equally important to understand which sector of the economy and section of its population and society are more vulnerable to the impact of climate change events. The vulnerability level of each sector of the economy will vary across different regions depending on the geographical, socio-economic conditions and climate change impact. The impacts differ among the poor and marginalized women, men as well as children.

Figure 1: Picture: Heat Map of Jharkhand (Using GCM)

Keeping in mind the micro-level adaptation planning and climate budgeting, this study has been commissioned by the State Forest Department of Jharkhand. This study consists of spatial and temporal forecasting (short-term, midterm and long-term) of the climatic variables like temperature and rainfall pattern and conducting in-depth climate vulnerability of Jharkhand state's 14 most vulnerable districts (As per DST categorization). The spatial heat map generated by the climate model (GCM-CMPI6) shows that the expected rise in the temperature change is higher in the northeast and northern parts of the state.

In this study, Copernicus's climate model has been used for short-term, mid-term and long-term (2020-2100) climate change projections at the block level. On the trade-off between data and processing requirements and usefulness, the resolution of 2.5 minutes or ~20 sq. km (at the equator) has been chosen.

This draft report presents climate projections and a block-level assessment of the climate vulnerability assessment of all six blocks of the Ramgarh district. This study is focused on conducting block-level climate vulnerability assessment and preparing a ***Composite Vulnerability Index (CVI)*** for all six blocks of the Ramgarh district. Vulnerability indices have been derived using twelve indicator categories which

comes under into groups namely Socio-economic, Biophysical, Infrastructure and Health. Indicators are classified into adaptive capacity, sensitivity and exposure. Blocks are ranked based on the composite vulnerability indices and grouped into (1) Low (2) Moderate (3) High categories of vulnerability.

Assessment Approach

The study utilizes a comprehensive framework, considering socio-economic, biophysical, infrastructure and health indicators.

Broadly categorized into four categories, a total of 12 indicators have been used for block-level composite vulnerability analysis.

Vulnerability indices have been derived using an integrated vulnerability assessment approach.

The Tire-2 approaches which include data from secondary as well as primary sources (Field survey)

The statistical method of Principal Component Analysis (PCA) has been used to calculate the weight for the indicators before arriving at the indices.

Districts and blocks have been ranked based on the composite vulnerability indices and have been grouped into three main categories based on vulnerability score. (1) High, (2) Moderate (3), and Low (4)

Outcome of Composite Vulnerability

Block-level vulnerability assessment based on Eleven indicators has been conducted for All 24 districts the Ramgarh, Chatra, Gumla, Pakur, Deoghar, Dumka, Bokaro, Koderma, Godda, Dhanbad, Garwha, East Singhbhum, Hazaribhag, Jamtara, Khunti, Lohardaga, Palamu, Ranchi, Sahibganj, Saraikela, Simdega, West Singhbhum district following Tire- 1 approach. A relative index for all blocks of these districts is given below.

Table 1 : District Most Vulnerable Block

S.NO	DISTRICT	MOST VULNERABLE BLOCK
1	Ramghar	Chitarpur
2	Chatra	Iktori
3	Gumla	Basai
4	Latehar	Garu
5	Giridhi	Sariya
6	Pakur	Amrapara
7	Deoghar	Sona Rai Thari
8	Dumka	Gopikandar
9	Bokoro	Peterwar
10	Koderma	Chandwara
11	Godda	Sundar Pahari
12	Dhanbad	Purvi Tundi
13	Garwha	Dhurki
14	East Singhbhum	Dumaria

15	Hazaribagh	Padma
16	Jamtara	Kamar Tanr Vidyasagar
17	Khunti	Murhu
18	Lohardaga	Peshrar
19	Palamu	Untari road
20	Ranchi	Bundu
21	Sahibganj	Pathna
22	Saraikela	Kuchai
23	Simdega	Jaldega
24	West Singhbhum	Untari

The percentage of the urban population, households with government jobs, households having Kisan credit cards and households owning irrigated lands play a vital role in the determination of vulnerability of the area. Blocks with higher percentage of these indicators are less vulnerable to the climate change.

The vulnerability pattern of different blocks shows significant variation in the score and infers that All districts need micro-level climate mitigation and adaptation planning.

A single state-level climate adaptation program for all the districts would not be appropriate. Rather, different judicious combinations of measures for different districts could help the state move closer to achieving sustainability and climate resilience.

The findings of this study can be regarded as an important step to awaken and enable the policymakers of the state of Jharkhand to include both aspects of climate change, i.e. mitigation and adaptation, in short-term, long-term and micro-level development planning for building a climate-resilient future for the state.

2 Introduction

Various climate models and research have indicated that global temperatures have risen by approximately 1.10°C since the pre-industrial era. Trends in change of precipitation and temperature are already at an alarming level and there are concerns that further warming of the planet may increase extreme weather events such as frequent cyclones, heatwaves and concentrated rainfall and these will further affect freshwater availability, agricultural productivity, food security, energy security, land use change, livestock, biodiversity, forest cover as well as human health and may even disrupt the entire economy.

Figure 2: Major Impact of Climate Change
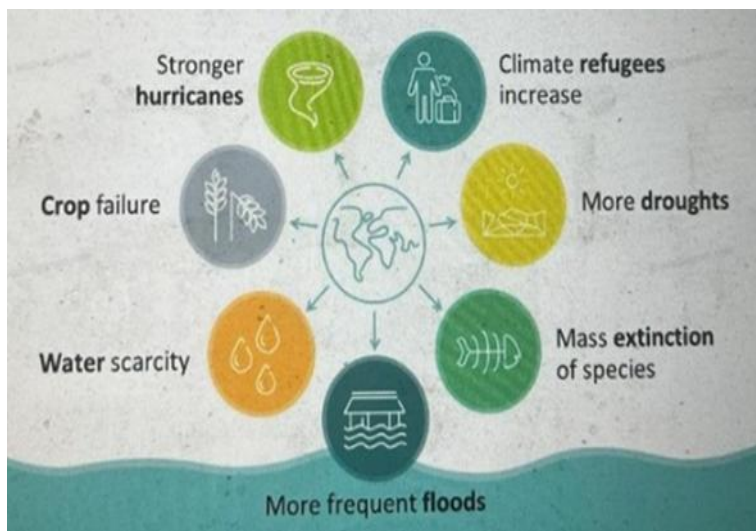
Furthermore, climate change poses a significant threat, particularly to developing economies like India which needs rapid economic growth to support and ensure social security to its large population base. India and its many states are critically vulnerable to climate change due to its large and growing population, long and low-lying coastline and state's economy closely tied to the agricultural sector. Changes in monsoon dynamics due to global warming could significantly affect India's agriculture-based population, as 60% of the country's farmland relies on rain.

Key Drivers

- **Greenhouse Gas Emissions**: Greenhouse gas emission due to the burning of fossil fuels (coal, oil and natural gas) for energy production, transportation and industrial production are the main drivers of climate change.

- **Land Use Changes**: Deforestation for agriculture, urbanization and other purposes reduces the Earth's capacity to absorb CO_2 contributing to climate change.

Key Impacts

- **Rising temperatures:** Increased concentrations in greenhouse gas in the atmosphere has led to the rise in global surface temperature of our planet Earth. The decade of (2011-2020), was on record the hottest, with each successive decade since the 1980s being warmer than the last. Nearly all land areas are experiencing hotter days and heat waves. Higher temperatures lead to heat-related illnesses and make working outdoors more difficult. Wildfires start more easily and spread more rapidly when conditions are hotter. Temperatures in the Arctic region has risen at least twice as fast as the global average. What was once a 1-in-50-year extreme heatwave, with only a 2% chance of annual occurrence, is now expected to happen far more frequently as the climate continues to warm.

- **Extreme Weather Events**: Climate change has led to more frequent and intense extreme weather events, such as hurricanes, typhoons, floods and droughts. Storms are becoming more intense and frequent in many regions. Rising temperatures causes, more moisture to evaporate, intensifying the occurrence of rainfall and flooding, which in turn causes more destructive storms. These storms often destroy homes and communities, leading to the loss of lives and significant economic damage.

- **Increased Droughts:** The rise in temperature has changed water availability, making it scarce in many regions. Global warming exacerbates water shortages in already water-scarce regions and thus leading to an increased risk of agricultural droughts which affects crop production. Ecological droughts which also threatens the vulnerability of ecosystems are becoming a reality now. Deserts are expanding, reducing land for food production. Many communities are now facing the threats of water shortages.

- **Warming & Rising Ocean:** An ocean, is the planet's largest sink, which absorbs much of the heat caused by global warming. Ocean temperatures have risen across all depths in the recent decades. Additionally, melting ice sheets are also causing sea levels to rise, threatening coastal and island communities. The ocean also absorbs carbon dioxide, which helps reduce atmospheric levels, but higher carbon dioxide levels make the ocean more acidic, which threatens marine life and coral reefs.

- **Biodiversity Loss**: Climate change disrupts habitats and poses significant risks to the survival of millions of species on both land and ocean. These risks increase as temperatures rise. An average of 1 million species is at risk of becoming extinct within the next few decades. Forest fires, extreme weather conditions, invasive pests and diseases are among the many threats related to climate change. Some species will be able to relocate and survive, but others may not. The loss of biodiversity also affects ecosystem services, such as pollination and water purification, which are essential for the well-being of humans and the survival of millions of other species.

- **Crop Failure & Food Security:** Altered weather patterns are negatively affecting crop yields, leading to global food insecurity. Changes in climate and increase in extreme weather patterns and events are among the main factors behind the rise of hunger and poor nutritional health worldwide. Fisheries, crops and livestock are increasingly vulnerable to damage or face a reduce in productivity. Heat stress also diminishes water resources and grasslands for grazing, which declines crop yields and affects livestock.

- **More Health Risks:** Climate change is a major threat to global health with an increase in heat-related illnesses and the spread of vector-borne diseases. The impacts of climate change are already taking a toll on human health. The rise in air pollution, outbreaks of new diseases, displacement, mental health strain and rising hunger and malnutrition in areas where food is scarce are some of the examples of negative impacts of climate change. Environmental factors are responsible for approximately 13 million deaths annually and it is somewhat overwhelming for the healthcare systems too.

- **Poverty & Displacement:** Climate change increases the factors that devastate urban slums, destroying homes and livelihoods, while extreme heat makes outdoor work increasingly difficult and so people face hardships which leads to poverty. In the past decade (2010–2019), weather-related events displaced an estimated of 23.1 million people annually, leaving many more at the risk of being vulnerable to poverty. The majority of refugees come from countries that are most vulnerable and least equipped to adapt to these impacts of climate change.

Figure 3 : Frequency of Heat Wave Under the Different Temperature Increase Scenario
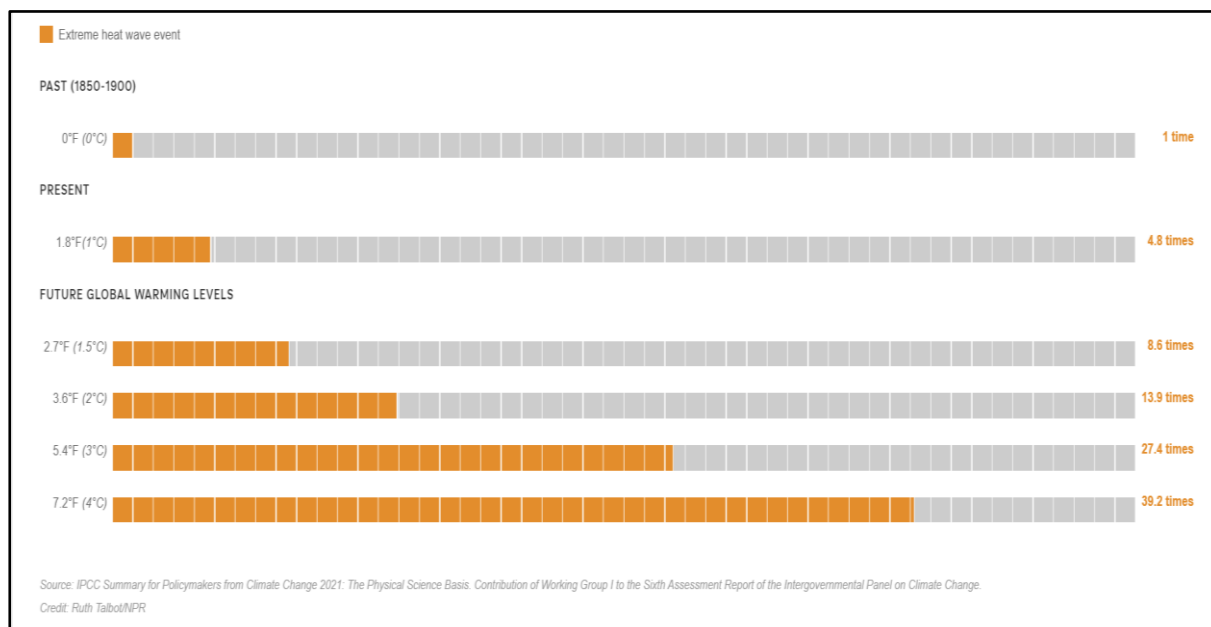
Given the severity of the risk that poses a threat to every sector of the economy, every country of the world needs national-level and sub-national-level climate impact assessment and planning. These can be of various aspects of climate change such as vulnerability assessment of various ecosystems, sectoral adaptation strategy, budget allocation and climate-resilient economic planning.

2.1   Project Background

Observing the threats of climate change on the various sectors of the economy, region and population, India came up with an ambitious and comprehensive policy and planning level vision document called **"National Action Plan on Climate Change (NAPCC)"** in the year 2008. **The National Action Plan on Climate Change was launched by the Government of India on June 30th June 2008"**, under the guidance of the Prime Minister's Council on Climate Change (PMCCC). The plan was designed to help India adapt to and mitigate the effects of climate change. The NAPCC includes eight national missions, which are mentioned below:

| National Solar Mission |
| National Mission for Enhanced Energy Efficiency |
| National Mission on Sustainable Habitat |
| National Water Mission |
| National Mission for Sustaining Himalayan Ecosystem |
| Green India Mission |
| National Mission for Sustainable Agriculture |
| National Mission on Strategic Knowledge for Climate Change |
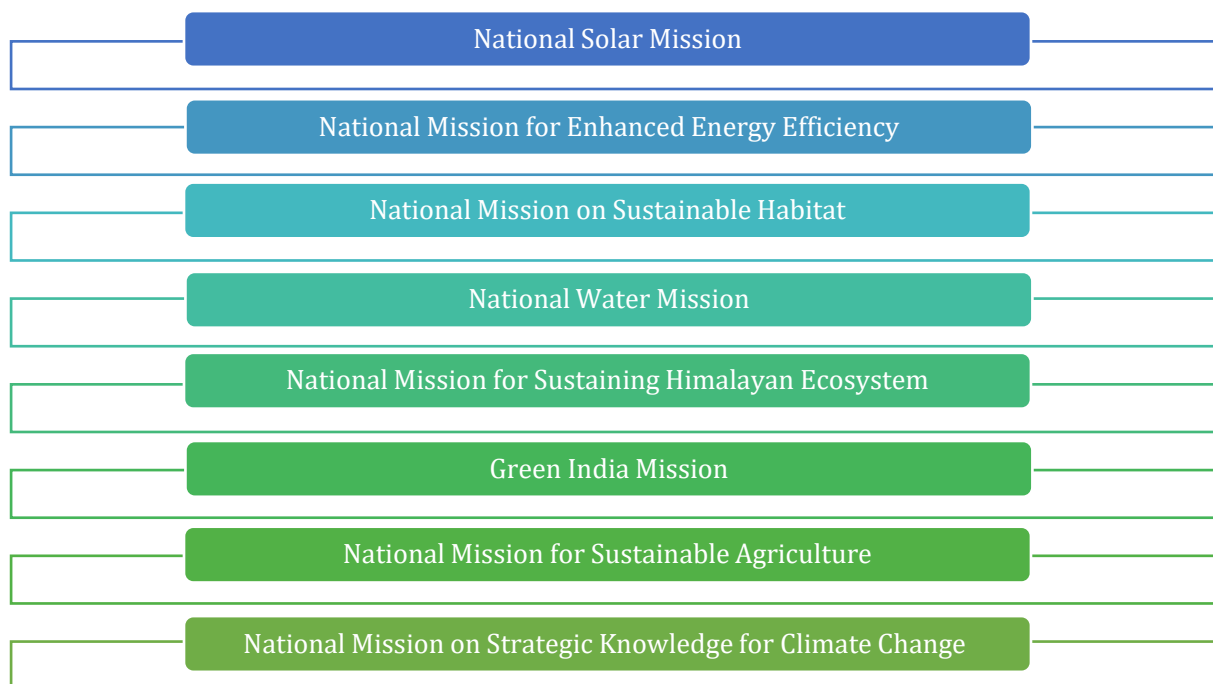
Various missions were delegated to different departments for preparing the sector specific policy, action/implementation plan, setting the goal and starting the implementation work. **The Department of Science & Technology under the Ministry of Science & Technology** was entrusted with the responsibility of coordinating two out of these eight national missions on climate change. These are:

1) National Mission for Sustaining Himalayan Ecosystem (NMSHE)

2) National Mission on Strategic Knowledge for Climate Change (NMSKCC)

The objectives of both the NMSHE and NMSKCC missions were centred on strengthening National Science & Technology capacities in the field of climate change. The primary goal of NMSHE is to build the ability to scientifically assess the vulnerability of the Himalayan region to climate change and to continuously monitor the health of the Himalayan ecosystem. In contrast, NMSKCC focuses on enhancing human and institutional capacities in climate change Science & Technology, while also developing strategic knowledge in key areas such as climate change science, adaptation and mitigation.

The current study is a part of the **"National Mission on Strategic Knowledge for Climate Change (NMSKCC)"** and its primary objective is to conduct micro-level vulnerability assessments in Jharkhand and develop a deep understanding of short-term, mid-term and long-term physical and transitional risks of climate change to which a particular geography, sector of economy and population is exposed. The study has been funded by the **Department of Science and Technology** and is being executed by the **State Forest Department.**

This study has various important components which include block-level projection of various climatic variables such as temperature and precipitation under various scenarios, ranking of all districts and

blocks based on their vulnerability indices and preparing adaptation planning. The main objectives of the study are described below.

Short term, Mid-term and Long-term Climate Projections
To get Short term, Mid-term and Long-Term trend of and projection of vital climatic variables like temperature, rainfall and vegetation cover.

Decentralized Climate Planning
Conduct block-level vulnerability assessments for detailed insights and targeted interventions. Develop district-specific climate action plans focusing on key vulnerable sectors.

Policy and Institutional Strengthening
Strengthen policies to promote green finance and climate risk management. Enhance effective implementation coordination among state agencies, NGOs, and local communities.

Data and Research
Invest in robust data collection and monitoring systems to track climate impacts and adaptation progress. Encourage research on local climate impacts and innovative adaptation solutions.

Capacity Building
Conduct training programs for local officials and communities on climate adaptation and resilience. Promote public awareness campaigns to engage communities in climate action initiatives.

2.2   Need for the Study

Although Jharkhand is rich in valuable ores and minerals, the state faces numerous developmental challenges, including low per capita income, low irrigation coverage, a higher rate of vector-borne diseases and a high proportion of marginalised farmers. Furthermore, according to the DST report, Jharkhand is the most climate-vulnerable state in India and further changes in climatic conditions may actuate the problem for farmers, women, the poor, middle class, tribal communities and the entire biotic and physical ecosystem of the state.   The state requires to focus and pay attention to prepare itself for future climate action plans to mitigate the negative climatic impacts.

Given the high susceptibility and climatic variability across different parts of the state, it is important to necessitate micro-level vulnerability assessment. Studies at district and block-level vulnerability will provide a clear understanding of the various climate risks enabling to customize resource allocation, adaptation planning, development plans and budget allocation for managing developmental projects and climate hazards. These findings will contribute in formulating a climate adaptive strategy, including district and block-level climate action plans for sectors like agriculture, health, forest and rural development.

2.3   Study Area

The area of this study is the entire state of Jharkhand. The state boundary lies between 22°N to 25°30'N latitude and 83°E to 88°E longitude, covering an area of 79,714 km² which is spread across three agro-climatic zones of the state which comes under the Agro-climatic region VII of India. This is also known as the 'Eastern Plateau and Hill Region' which will be covered in this particular study.

Figure 4: Jharkhand State Map and Different Agroclimatic Zones of Jharkhand
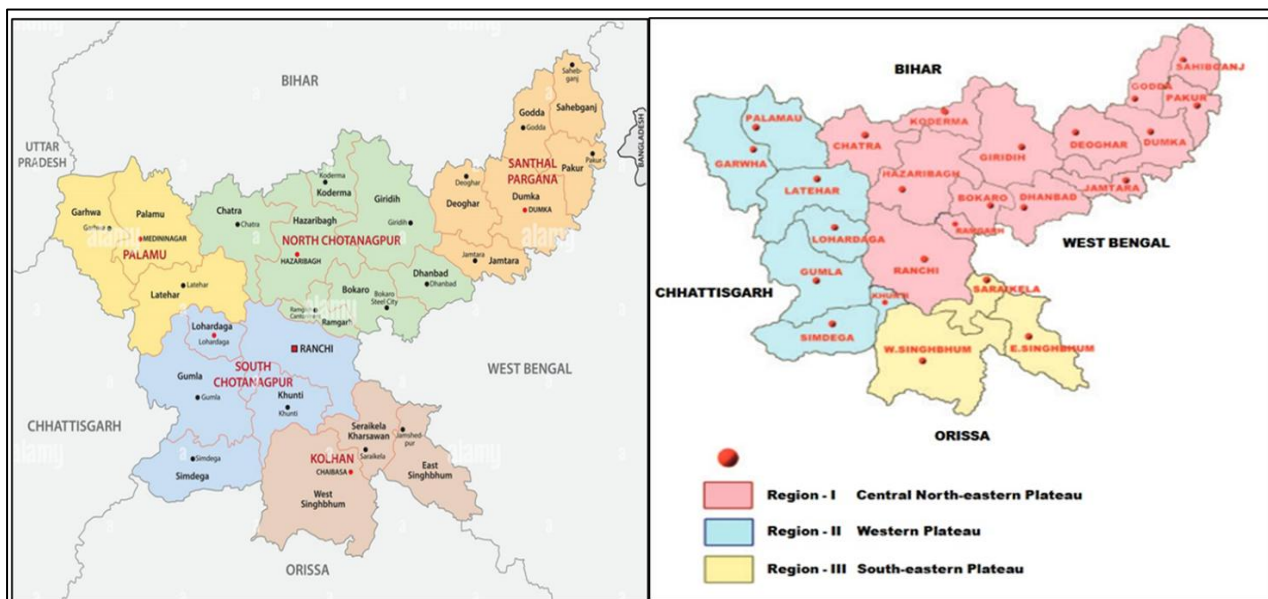
Table 2 : Agro-Climatic Zone in Jharkhand

Zone	Districts	Geographical Area (m ha)	Annual Rainfall (mm)	Forest Area in %
Central and North Eastern Plateau Zone	Sahibganj, Pakur, Godda, Dumka, Jamtara, Deoghar, Hazaribagh, Bokaro, Koderma, Giridih, Dhanbad, Chatra, Ramgarh and Ranchi District.	4.1	1320	13
Western plateau	Palamu, Garhwa, Latehar, Lohardaga, Gumla, Simdega and Khunti.	2.5	1246	33
South Eastern Plateau	Saraikela-Kharsawan, West-Singhbhum, East-Singhbhum,	1.3	1400	24

2.4   Objective & Goal

Vulnerability assessments are mainly designed to support and improve adaptation planning. These assessments aim to reduce vulnerability in the region or sector which falls or may fall under future climatic stress. These helps to substantiate policy-level decision-making process in selecting adaptation measures based on the valuation of drivers of vulnerability with their index value. Thus, these vulnerability assessments can be designed to develop targeted adaptation planning in a particular geography or sector to reduce such climate vulnerability and improve climate resiliency.

Jharkhand's climate is changing rapidly and climate mitigation actions alone cannot address the immediate impacts. To cope up with these changes, state agencies need better planning and understanding of various climatic parameters, their correlations and the overall vulnerability of the entire ecosystem, including agriculture, forest, health, energy, rural development, industries and water resources.

Understanding vulnerability and quantifying climate risks on biotic and abiotic systems will help the state government and its various departments, agencies and institutions to prepare better adaptation plans, mitigate climate risks and develop a climate-resilient future economic plan. The primary objective of this study is to conduct district and block-level climate vulnerability assessment and adaptation planning for the entire state. District and block-level vulnerability maps will be prepared and districts and blocks will be ranked based on a common set of indicators and sub-indicators. The specific objectives of the study are:
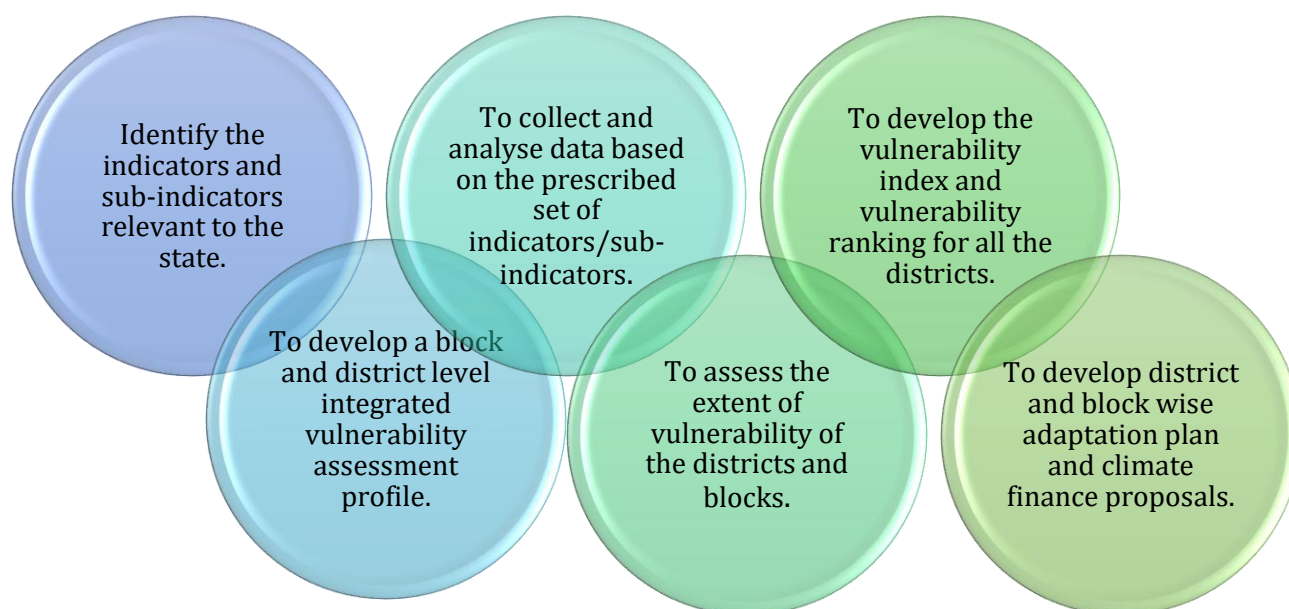
3 Approach & Methodology

Vulnerability refers to the degree to which resources (such as assets, sectors or communities) are susceptible to and at risk from the impacts of climate change (Intergovernmental Panel on Climate Change [IPCC], 2007).

When combined, exposure and sensitivity summarize the potential impact posed by climate change on a resource, while adaptive capacity can either mitigate or amplify those impacts. A sector, asset, or community is more vulnerable to climate change if it is exposed to changes (e.g., sea level rise, extreme heat), if it is sensitive to those changes (like plants that cannot withstand prolonged periods of heat or individuals with pre-existing health conditions), and if it has low adaptive capacity (such as inability to cope with or recover from flooding and heatwaves). Understanding how and why a particular resource is vulnerable to climate change, decision-makers can more effectively identify and implement strategies to reduce vulnerability—an effort known as *adaptation*. Adaptation strategies, involve preparing for, responding to, recovering from the negative impacts of climate change by reducing potential harms and enhancing adaptive capacity.

Vulnerability is evaluated by assessing climate change impacts and the adaptive capacity on a particular asset or community. These assessments can be qualitative or quantitative, ranging from simple indicator-based approaches to sophisticated models.

The diagram below illustrates the key components of vulnerability—exposure, sensitivity, and adaptive capacity.

Figure 5 : Functional Co-Relation of Vulnerability
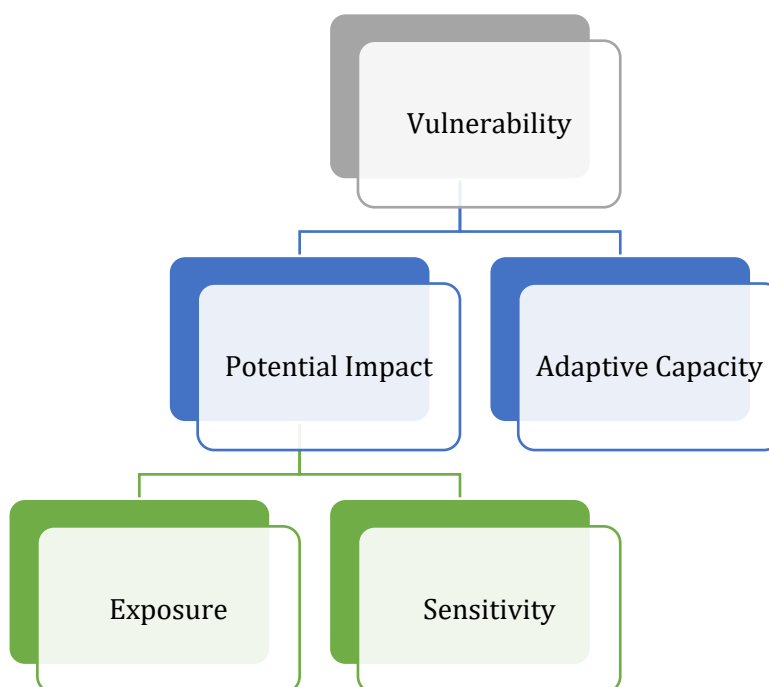
Vulnerability
The extent to which resources (e.g., assets, sectors, communities) are susceptible to and at risk from the impacts of climate change is described as vulnerability (Intergovernmental Panel on Climate Change [IPCC] 2007).

Adaptive capacity
It refers to the ability of a system to change in a way that makes it better equipped to manage its exposure and/or sensitivity to climatic influences.

Sensitivity
It refers to the responsiveness of a system to climate hazards. This is often represented conceptually as a dose-response model – the more sensitive a system, the larger the rate or magnitude of an adverse response to a given hazard. Sensitivity may vary considerably from one system, sector or population to another.

Exposure
It refers to the exposure of a system of interest to stimuli that act on that system. This can be readily conceptualised as climate variability and/or the various changes in the climate system that are often of concern to stakeholders: temperature increases, rainfall variability refers to the exposure of a system of interest to stimuli that act on that system.

This study uses a standardized framework developed by *IIT Mandi, IIT Guwahati and IISc Bengaluru* to assess the vulnerability of various districts of the state, considering socio-economic conditions, biophysical attributes and institutional capacities. It highlights the variability in climate change impacts due to regional differences in exposure and vulnerability, reinforcing the importance of localized assessments.

The integrated vulnerability assessment approach has been adopted for the current study which combines biophysical and social dimensions. This study highlights the importance of using indicators and sub-indicators to assess vulnerability at the district and block level, enabling the development of a comprehensive vulnerability index. This method allows for identifying vulnerable districts and block and helping stakeholders plan and implement effective adaptation strategies. By adopting an integrated framework, the study provides a holistic view of vulnerability, which is crucial for informed decision-making in climate change adaptation efforts.

Figure 6: Approach Followed in the Current Assessment

| Scope & Objective of Assessment |
| Selection of Type of Assessment |
| Selection of Tire Method |
| Selection of Indicators |
| Finalizing Index /Score |
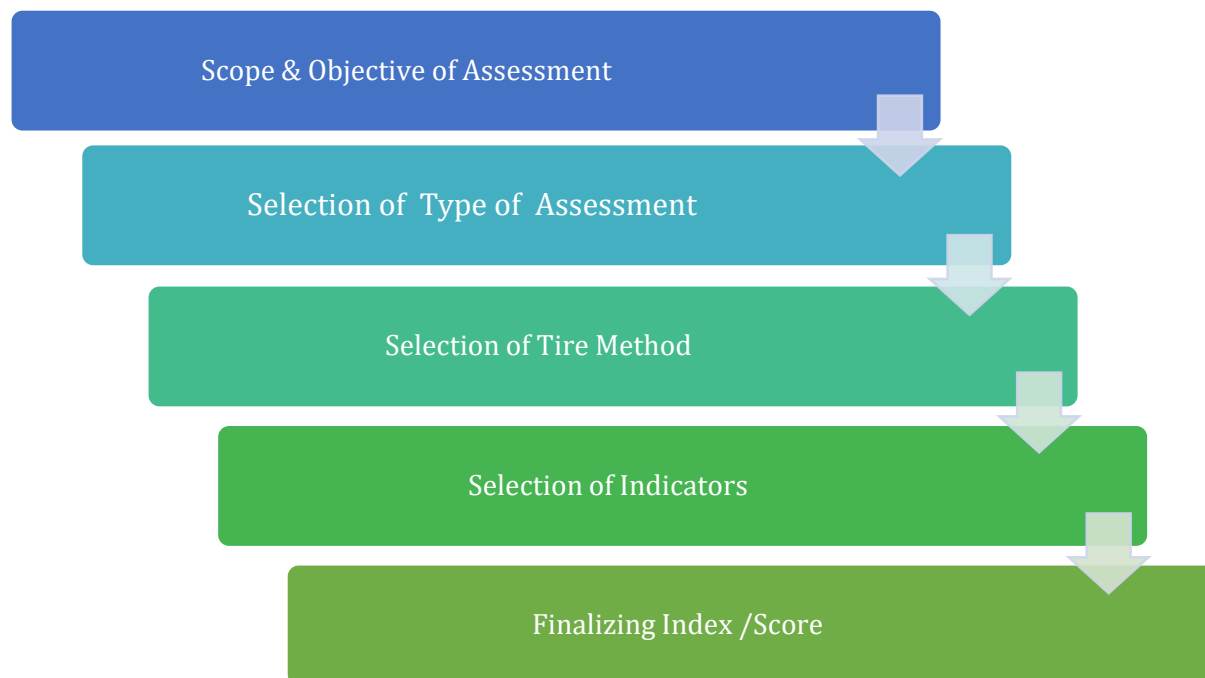
3.1   Scope & Objective of Assessment

The first step in vulnerability assessment is scoping and thereby, to identify the objective of the assessment and the target groups for whom the vulnerability assessment is being carried out (Sharma et.al, 2018[1]). Scoping involves the following three steps:

| Identification of the need | Defining the specific objectives | Identification of the stakeholders and target groups |
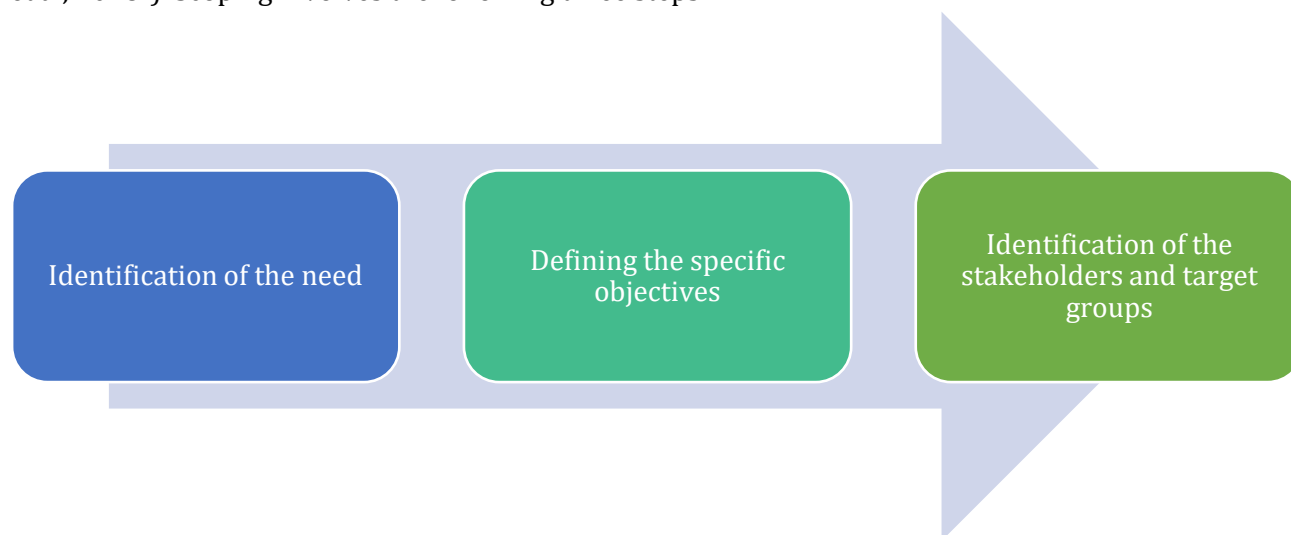
Jharkhand has been declared as the most vulnerable state in the country owing to the impact of climate change and climate variability. This necessitates a micro level vulnerability assessment in the state. 14

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[1] https://www.researchgate.net/publication/333442235_Applying_IPCC_2014_framework_for_hazard-specific_vulnerability_assessment_under_climate_change

most vulnerable out of 24 districts of the state have been considered for this study. The objective of the study and research thereafter is to prepare a district and block level vulnerability map for Jharkhand. This study would also provide as a useful guidance for efficient adaptation/mitigation planning. The stakeholders considered for the study are state government, district level administrative bodies, farmers, non-governmental organizations.

3.2   Selection of the Type of Assessment

Vulnerability assessment studies broadly come's under one of the following four categories namely-Biophysical vulnerability assessment, Socio-economic vulnerability assessment, Hazard-specific vulnerability assessment and Integrated vulnerability assessment:

For this study, Integrated vulnerability assessment (biophysical + socio-economic/institutional) has been chosen. The reason being the overall risk of climate change considering various indicators as inputs and to know which inputs and indicators are more impactful on the overall economy of the state.

Figure 7: Type of Vulnerability Assessment
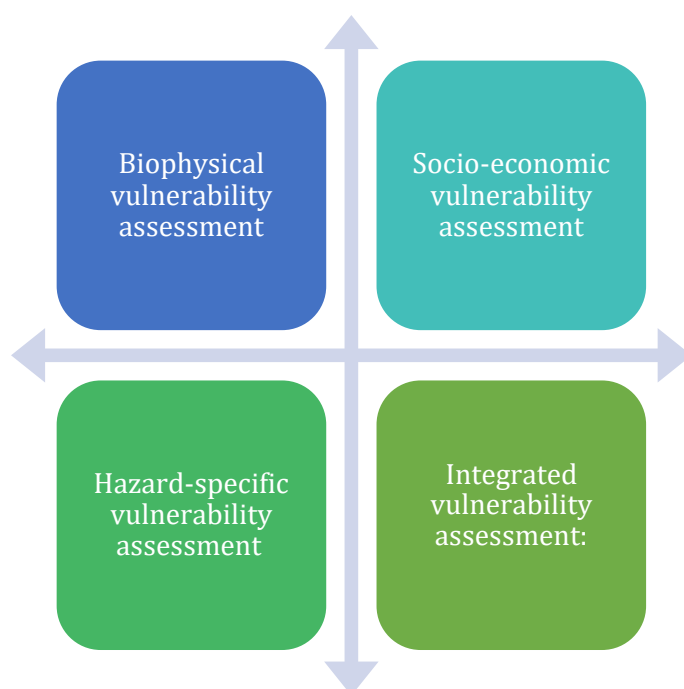
3.3   Selection of Tier Methods

Vulnerability assessments can be conducted using a variety of data sources, including secondary and primary data, GIS techniques and climate model outputs. The methods are categorized into three tiers based on the type of data utilized:

Tier 1	• A top-down approach that primarily relies on secondary data.
Tier 2	• A mixed-method approach that combines both top-down and bottom-up data.
Tier 3	• A bottom-up approach that incorporates spatial remote sensing and GIS data.
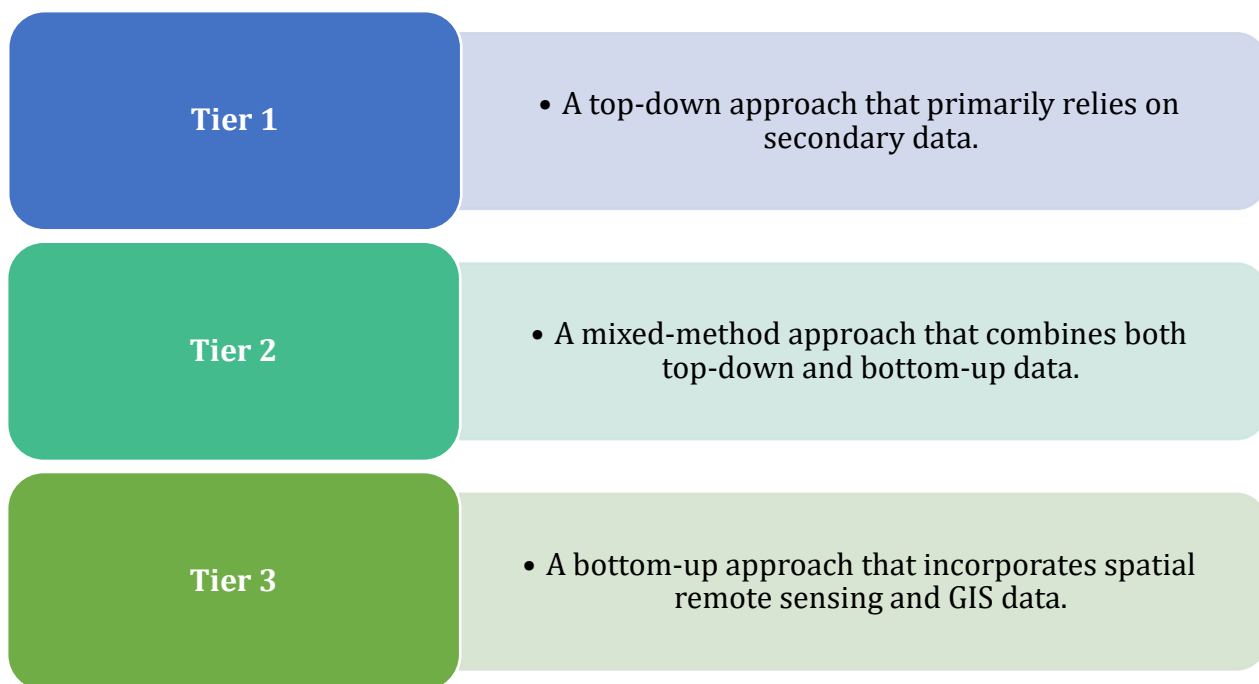
For this study, the Tier-2 method has been chosen, which combines primary data collected through field studies and secondary data obtained from relevant departments and sources. Both approaches were chosen to ensure the accuracy and validation of the data. One objective was to conduct a comparative analysis between the indicator data from secondary sources and primary survey results. Since some of the secondary data were outdated, this approach allowed for the comparison and assessment of trends for key indicators.

3.4   Selection of Indicators

The selection of indicators and their weightage play a vital role in because the outcome relies heavily on indicator choice. In the first stakeholder meeting with the **State Forest Department**, it was decided to follow the **Department of Science and Technology** approach for indicator selections and its grouping. Although at the draft stage, twelve indicators have been selected for this study, however additional indicators can be used for further analysis and improvement of the draft report.

Figure 8: Selection of Indicators
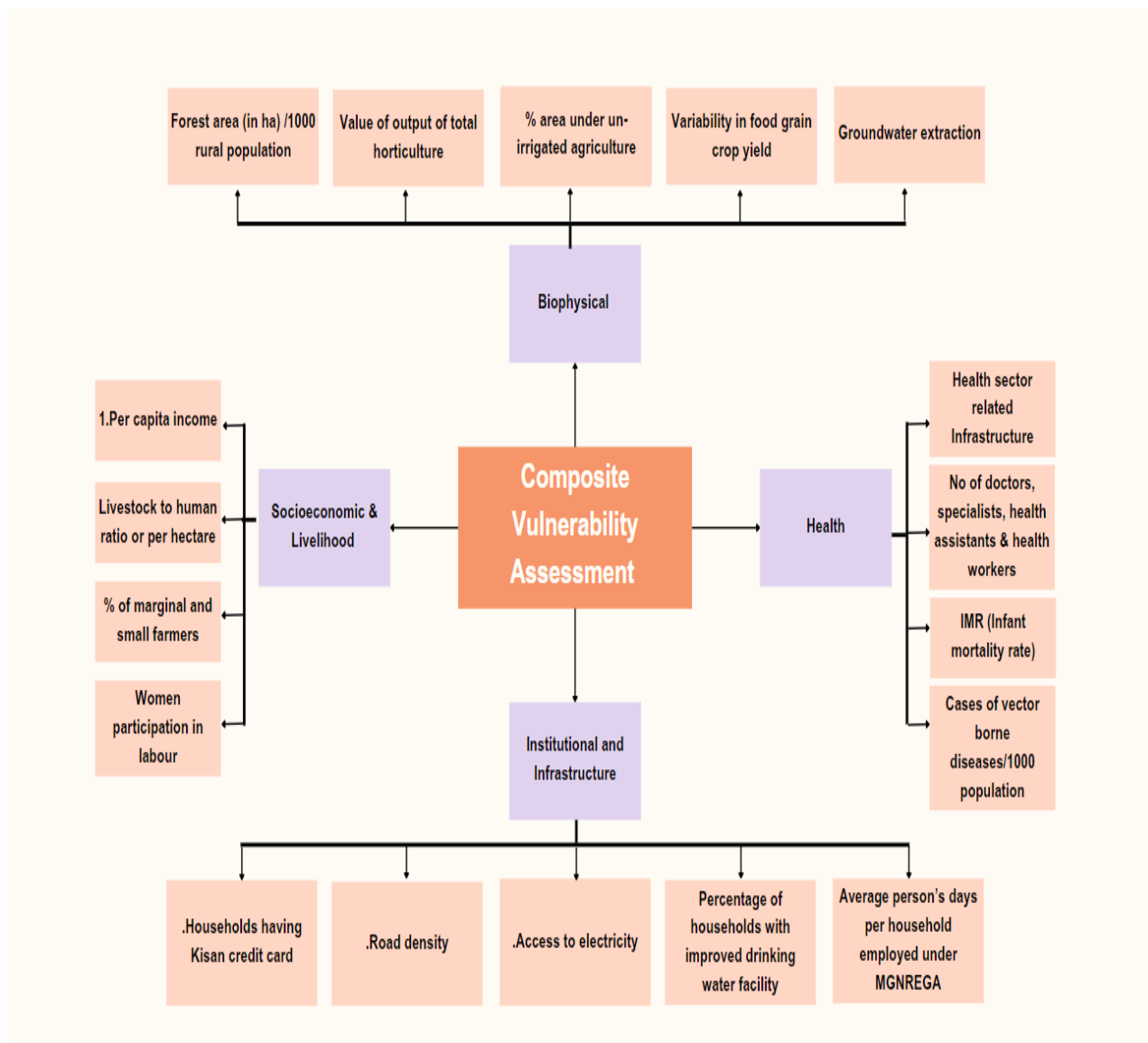
3.5   Finalizing Index /Score

After assigning the value and the normalized value of indicators and components of vulnerability, we calculate the vulnerability score for different regions and sectors.

Figure 9: Scoring Methodology
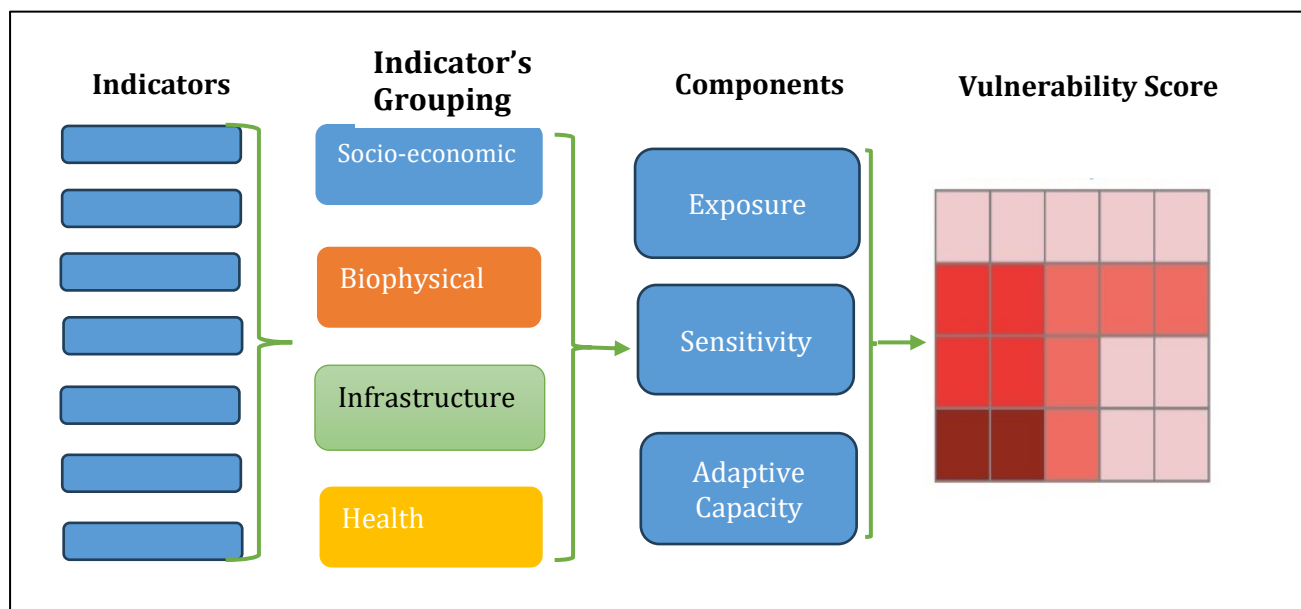
4   Steps followed in the Assessment
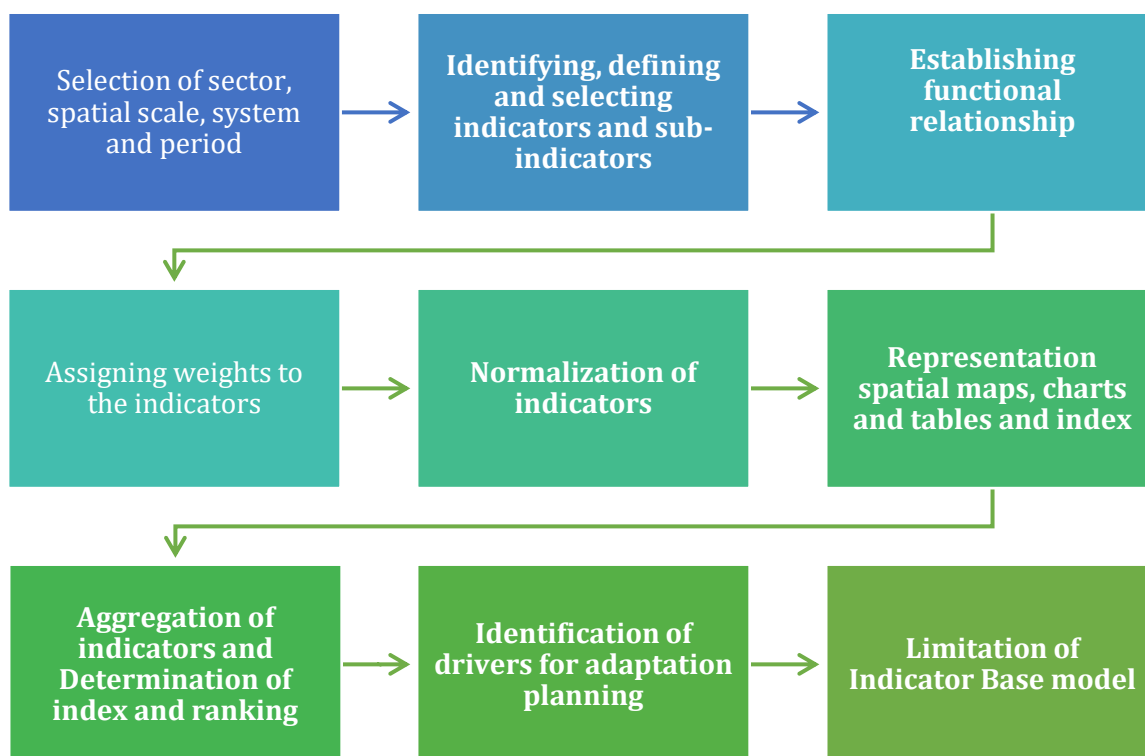
4.1　Selection of spatial scale and period
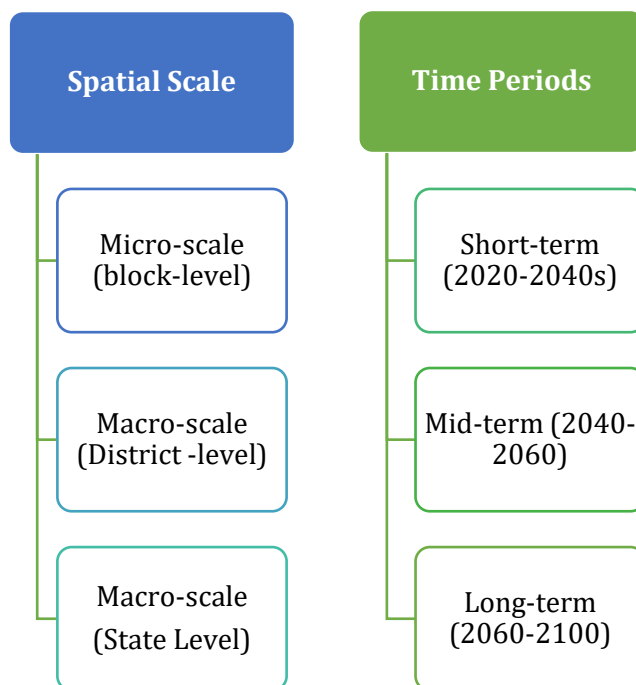
4.2　Identifying, Selecting and Defining Indicators

Based on the availability of data at the block level, total of twelve indicators has been chosen for analysis and finalizing Index.

Table 3 : List of Indicators Used for Assessment and Scoring Used

S. No.	Indicators
1	SC and ST population (% of Total)
2	Informal labour (%)
3	% of households in govt. job
4	% of households with motor vehicle
5	Households having Kisan credit card
6	Total Households owning irrigated land
7	Forest area (in ha/1000 rural population)
8	Household water supply
9	Numbers of SHGs
10	Person -days of employment under MGNERGA
11	Urban population (% of Total)

4.3   Establishing functional relationship

It is important to identify the functional relationship between the indicators and vulnerability. Two types of functional relationships are possible:

- **Positive relationship with vulnerability** - vulnerability increases with an increase in the value of the indicator.

- **Negative relationship with vulnerability** - vulnerability increases with a decrease in the value of the indicator.

Functional relationships for all selected indicators have been established and used for the analysis.

Indicator	Rationale for Selection	Adaptive Capacity or Sensitivity	Functional Relationship with Vulnerability	Description
Urban population (% of Total)	Urbanization led to less dependency on natural resources and less sensitive to climate change	Sensitivity	Negative	This measures the % dependency of population on traditional income source and natural disasters
SC and ST population (% of Total)	SC and ST population is more vulnerable to climate disasters	Sensitivity	Positive	SC and ST population is more dependent on traditional resources of income like NTFP and agriculture and more sensitive towards climate change impacts. This measures the sensitivity of SC/ST population towards

				climate disaster.
Informal labour (%)	Population without assured income are more vulnerable towards climate change impacts	Sensitivity	Positive	This measures the percentage work force with no assured income and make them more vulnerable to the impacts of climate change
% of households in govt. job	Government job relates to secure income and other facilities	Adaptive Capacity	Negative	This measures the adaptive capacity of population with the secured income
% of households with motor vehicle	High access to assured mean to transport means quick access to critical infrastructure	Sensitivity	Negative	This measures the quick access to critical infrastructure in case of climate hazard
Households having Kisan credit card	Increased percentage of households with Kisan Credit Cards indicates less vulnerability	Adaptive Capacity	Negative	This measures the percentage of households with access to substantial agricultural credit. Greater access to credit can enhance

				financial resilience.
Total Households owning irrigated land	Area Under Irrigated Agriculture	Sensitivity	Negative	This measures the percentage of family that does not relies on rainwater. Less reliance on rainfed agriculture decrease the sensitivity to climate variability
Forest area (in ha/1000 rural population)	Larger forest areas are less vulnerable to climate disasters	Adaptive Capacity	Negative	This indicator measures the extent of forest area per 1000 rural inhabitants. Larger forest areas can act as buffers against climate impacts, enhancing adaptive capacity.
Household water supply	Increased percentage of households with improved drinking water indicates less vulnerability	Adaptive Capacity	Negative	This measures the percentage of households with access to safe drinking water. Improved water facilities reduce health risks during disasters.

Numbers of SHGs	Increased number of self-help groups (SHGs) indicates less vulnerability	Adaptive Capacity	Negative	This measures the number of self-help groups per 1000 population. More SHGs can enhance social capital and collective resilience.
Person -days of employment under MGNERGA	Increased employment under MGNREGA indicates less vulnerability	Adaptive Capacity	Negative	This measures the average number of person-days employed per household under the MGNREGA scheme. Higher employment indicates better economic resilience.

Normalization of indicators

Purpose: Indicators selected for vulnerability assessment have different units of measurement. Indicators with different units cannot be added or aggregated without normalization.

The normalization procedure enables aggregation of indicators with different units, by removing the units and converting all the values into dimensionless units. The normalized values of indicators lie between 0 and 1 and thus could be aggregated (Sharma et.al, 2018).

- o Normalise indicators with different units to enable aggregation
- o Convert values to dimensionless units
- o Normalised values range between 0 and 1 hc

Case I: Positive relationship with vulnerability: In positive relationship cases, higher the value of the indicator, higher will be the vulnerability. The variables have direct and positive functional relationship with vulnerability and the normalization will be done using the formula given below:

$$X \text{ positive} = \frac{ACTUAL\ INDICAT0R\ VALUE - MINIMUM\ INDICAT0R\ VALUE}{MAXIMUM\ INDICAT0R\ VALUE - MINIMUM\ INDICAT0R\ VALUE}$$

Case II: Negative relationship with vulnerability: In negative relationship cases, lower the value of the indicator higher will be the vulnerability and the variables have a negative or inverse functional relationship with vulnerability and the normalization is done using the formula given below:

$$X \text{ negative} = \frac{MAXIMUM\ DICAT0R\ VALUE - ACTUAL\ INDICAT0R\ VALUE}{MAXIMUM\ INDICAT0R\ VALUE - MINIMUM\ INDICAT0R\ VALUE}$$

4.4   Assigning weights to the indicators

To get reliable results, we need to assign appropriate weights to each indicator. A round of discussion and consultation was conducted with experts from different sectors about the nature and importance of each indicator and thus the decision was taken to assign weight to each indicator. Weights were assigned to each indicator according to their importance in determining vulnerability of a system. While assigning the weight, it was ensured that the weight assigned to all the indicators should add up to 100.

Equal weights – Equal weights are given if there are many indicators or if there are difficulties in obtaining weights for the different indicators.

$$EQUAL\ WEIGHTS = \frac{1}{NUMBER\ OF\ INDICATORS\ (12)} = 0.083$$

Unequal weights – Unequal weights are given to indicators based on their contribution to vulnerability. There are several methods for assigning unequal weight.

In the present study, PCA (Principal Component Analysis) has been applied for assigning the unequal weights. In the present study, it was found that as there is a small difference between equal and unequal weights, so equal weight has been considered

Table 4: Weight of Indicators

S. No	Indicators	Equal Weight
1	Urban population (% of Total)	0.083
2	SC and ST population (% of Total)	0.083
3	Casual labour (%)	0.083
4	% of households in govt. job	0.083
5	% of households with motor vehicle	0.083
6	Households having Kisan credit cards	0.083
7	Total households owning irrigated land	0.083
8	Forest area (in ha/1000 rural population)	0.083
9	Households' water supply	0.083
10	Number of SHGs	0.083
11	Person-days of employment per household under MGNERGA	0.083

4.5   Aggregation of indicators and Determination of index and ranking

Aggregation of different indicators with appropriate weights is necessary to obtain a composite aggregated index or value. The weights were multiplied with the normalized indicator value and combined. The normalized and weighted values of indicators were combined to obtain the vulnerability Index or the ranking of the systems.

Vulnerability ranking or comparative vulnerability index values could be presented in a tabular form. The districts of Jharkhand are categorized based on the vulnerability index as having low, high and very high vulnerability.

The calculations for this categorization are as follows:

Maximum Vulnerability index value = X

Minimum Vulnerability index value = Y

Range = X-Y= Z

We separate the districts into three categories. Z/3

Category	Range
High Vulnerability	X_1-X_2
Moderate Vulnerability	X_3-X_4
Low Vulnerability	X_4-X_5

4.6   Representation of spatial maps, charts, tables and index

The vulnerability profiles or indices are represented as spatial maps with a gradient of colours indicating the level of vulnerability. Maps may be created using computer programs such as geographic information systems (GIS) - specialist software for managing, analysing and presenting geographical data.

4.7 Identification of drivers for adaptation planning

A critical utility of vulnerability assessment is the identification of the drivers or causes of vulnerability along with their proportional contribution to vulnerability. Information about the indictors or factors that contribute most to the aggregate vulnerability is useful in prioritizing the development and implementation of adaptation interventions (Sharma et.al, 2018).

4.8 Limitation of Indicator Based Model

The current study was based on a common framework consisting of a set of indicators for which the data is commonly available and hence may not fully illustrate the state-specific conditions. It was difficult to ensure the availability of uniform data on all districts and blocks and accessibility from the concerned departments. The data collected for this report are from different sources over different periods which might have caused slight discrepancies in the results.

5 Vulnerability Mapping of Districts and Blocks

5.1 State Profile

Jharkhand is the 14th most populated state in India, with a significant tribal population (26.3%). The state's socio-economic profile is marked by an unstable macroeconomic environment and lower economic growth.

The real GSDP increased at an average annual growth rate of 8.8% between 2020-21 and 2022-23. Despite an average annual growth rate of 7.2% in per-capita income during the same period, Jharkhand's per-capita income was only 61.03% of the national average in 2022-23.

According to the Economic Survey conducted in the year, 2023 for Jharkhand, it has been seen that the state continues to grapple with high levels of poverty. Approximately 36.51% of the population lives below the poverty line, with a significant portion (around 40%) residing in rural areas. Furthermore, 46% of Jharkhand's population is classified as multidimensionally poor, indicating various deprivations beyond mere income poverty, such as lack of education, inadequate living standards and poor health.

Jharkhand's terrain is predominantly a part of the Chotanagpur Plateau, characterized by its hilly landscape, dense forests and significant tribal population. Jharkhand's climate varies significantly, with the northwest and west-central regions being hot and receiving less rainfall, while the southwest receives more rainfall.

From the climate variation perspective, the state has been divided into three main climatic zones. The **Central and North-eastern Plateau (Region-I)** has tropical monsoons, **Western Plateau (Region-II), and South-eastern Plateau (Region-III)** have humid to subtropical monsoons. The state experiences three main seasons: *summer, winter* and the *rainy* season. Summer spans from March to June, with May being the hottest month. Winter, the most pleasant season, lasts from November to February. The

southwest monsoon, from mid-June to October, accounts for most of the state's annual rainfall, with July and August receiving the heaviest precipitation. Annual precipitation ranges from about 1000 mm in the west-central region to over 1500 mm in the southwest. Agricultural lands and forests cover 49% and 30% of Jharkhand's total geographical area, respectively.

Figure 10: Jharkhand State Administrative and Digital Elevation Map
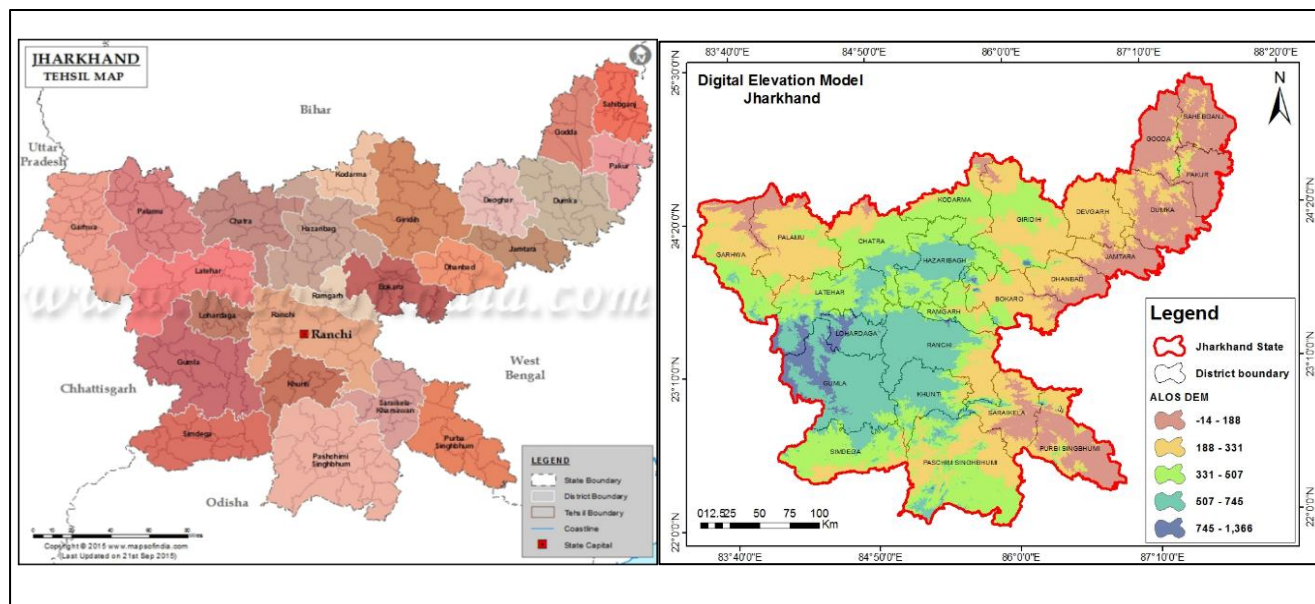
Table 5: Climatic Zone distribution

S.NO.	AGRO CLIMATIC ZONE	DISTRICT INCLUDED
1	Central and North Eastern Plateau zone	Jamtara, Koderma, Pakur, Giridih, Godda, Deoghar, Dhanbad, Dumka, Sahebganj, Chatra, Bokaro
2	Western Plateau Zone	Latehar, Lohardaga, Gumla, Hazaribhag, Palamu, Ranchi, Simdega, Garhwa
3	South- Eastern plateau Zone	East- Singhbhum, Saraikela, West- Singhbhum

Table 6: State at a Glance

S. No.	Indicators	Value
1	Total Geographical Area	79.70
2	Cultivatable Land (Lakh ha)	38.00
3	Net sown Area (Lakh ha)	22.38
4	Irrigated Area (Lakh ha)	01.57
5	Forest Cover (%)	29.62%
6	Total Population (crores; Year-2011)	3.3
7	Sex Ratio (Female per 1000 male)	947
8	Tribal Population (crores; Year-2011)	0.70
9	Language	Hindi, Khortha
10	Literacy Rate %	67.63%
11	Number of districts	24
12	Number of Blocks	260

5.2   Brief Profile of the Ramgarh District

This District consists of six blocks: Ramgarh, Gola, Chitarpur, Mandu, Patratu, and Dulmi. Mineral resources, so vital to industry, are abundant in the Ramgarh district. A substantial portion of the district's industrial workforce is employed in the mining of coal, limestone, fire clay and China clay. Additionally, Ramgarh district has a good forest cover, which has contributed significantly to the expansion of the region's small- and medium-scale industries.

All these statistics highlight that forestry is the dominant ecosystem of the district. A diversity of landscapes characterizes the district of Ramgarh. As it has vast tracts of cultivable land, agriculture is the primary source of livelihood in the district with more than 75% of workers engaged in agriculture either as cultivators or agricultural labourers. This District falls under Central and North Eastern Plateau Zone.

Figure 11: Block Map Ramgarh District
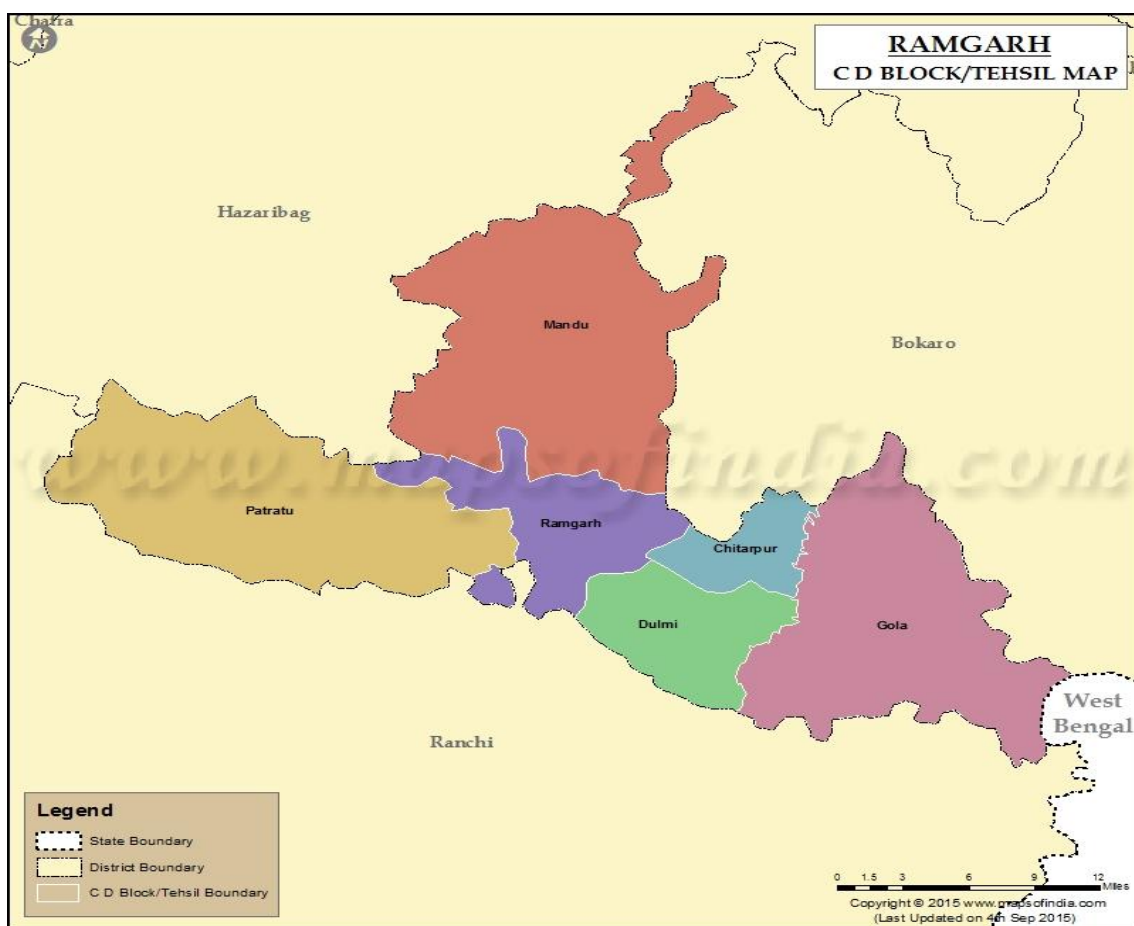
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Shri Faiz Aq Ahmed Mumtaz
b.	Lok Sabha Constituencies	Hazaribagh
c.	Vidhan Sabha Constituencies	Ramgarh, Mandu and Barkagaon
B)	POPULATION	
d.	Total	949,443
e.	Male	494,037
f.	Female	455,122
C)	AREA	
g.	Total Geographical Area	1360 sq. km
h.	Number of sub-divisions	1
i.	Number of blocks	6
	No. of Panchayats	125
	No. of Villages	361
D)	DEMOGRAPHICS	

j.	Literacy Rate	74%
k.	Sex Ratio	921/1000

Land Use Pattern District Profile

II. Land		
Total Geographical Area	1,360	sq km
Total Area Reported	1,34,008	Ha
Forest Land	42,698	Ha
% Forest Land	31.86%	*Indicates quantum of potential for NTFP & IFR/CFR livelihoods*
GPs with availability of community forest	38.00%	
GPs with availability of minor forest produce	27.00%	

Climatic and Other Parameters

III. Characteristics		
Agro-climatic zone	Eastern plateau & hills- Eastern plateau (Zone 7)	
Climate	From moist sub-humid to dry sub- humid	
Soil Type	red laterite & clay loam, red loamy, red and yellow	
Rainfall 2020 (in mm)	917.3	mm
% of NRM Expenditure (Public + Individual)	77.09	*MGNREGS 2021-22. Potential for increase.*
GPs having a watershed project in at-least 20% villages	26.00%	*Scope to strengthen INRM approach*
GPs with community rainwater harvesting / pond etc. in >60% of villages	57.00%	

Population Profile

IV. People & their Work		Male	Female
Total			
Population (in '000)	94,91,59	4,94,037	4,55,122
SC	93,073	0	0
ST	1,70,387	0	0

Total Households (in '000)	1,77,197

Agriculture profile

Net Sown Area (ha)	20,667
Gross Cropped Area(ha)	11,993
Cropping Intensity(ha)	58.03%
Net Irrigated Area	7,993
% Net Sown Area is Irrigated	38.68%
% of Expenditure on Agriculture & Agriculture Allied Works	93.59
GPs having more than 20% farmers using drip / sprinkler irrigation	6.00%
GPs having >80% area irrigated	0.00%
GPs having 20-80% area irrigated	0.00%

Figure 12: LULC/ Forest Cover Map- Ramgarh (All Blocks)

Land Cover (ESA WorldCover 2021)
Ramgarh District

Legend
Tree cover (35.1%)
Shrubland (0.4%)
Grassland (17.9%)
Cropland (40.0%)
Built-up (4.0%)
Bare / sparse vegetation (1.1%)
Permanent water bodies (1.5%)
District Boundary
Block boundary

10 km
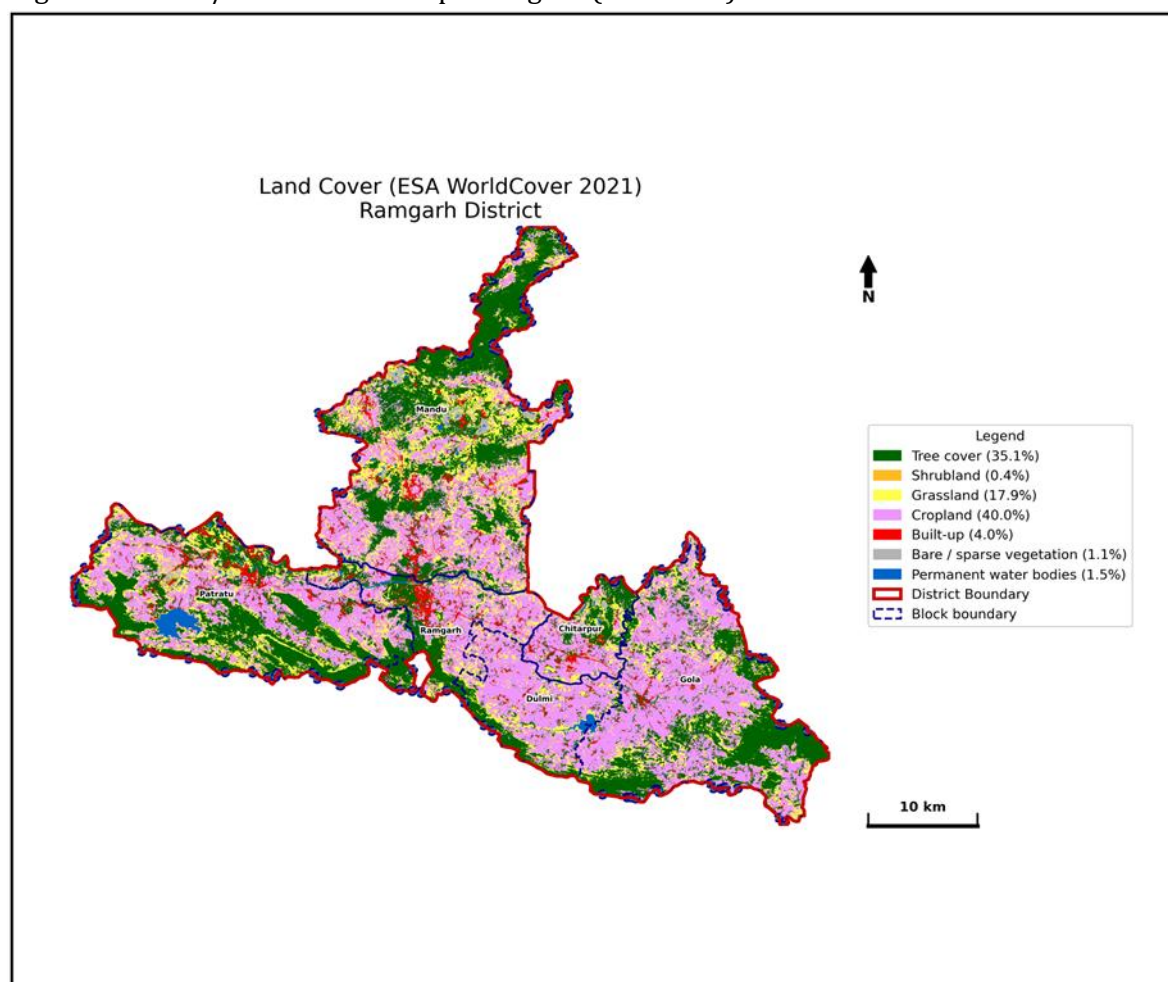
5.2.1   Vulnerability Mapping of Ramgarh District.

Table 7 : Vulnerability Index of all Six Blocks in Ramgarh

Sl. No	BLOCK	Equal weights	
		Vulnerability index	Ranking
1	Chitarpur	0.63	1
2	Gola	0.59	2
3	Dulmi	0.51	3
4	Mandu	0.48	4
5	Patratu	0.40	5
6	Ramgarh	0.30	6

Figure 13 : Ranking of Blocks in Ramgarh
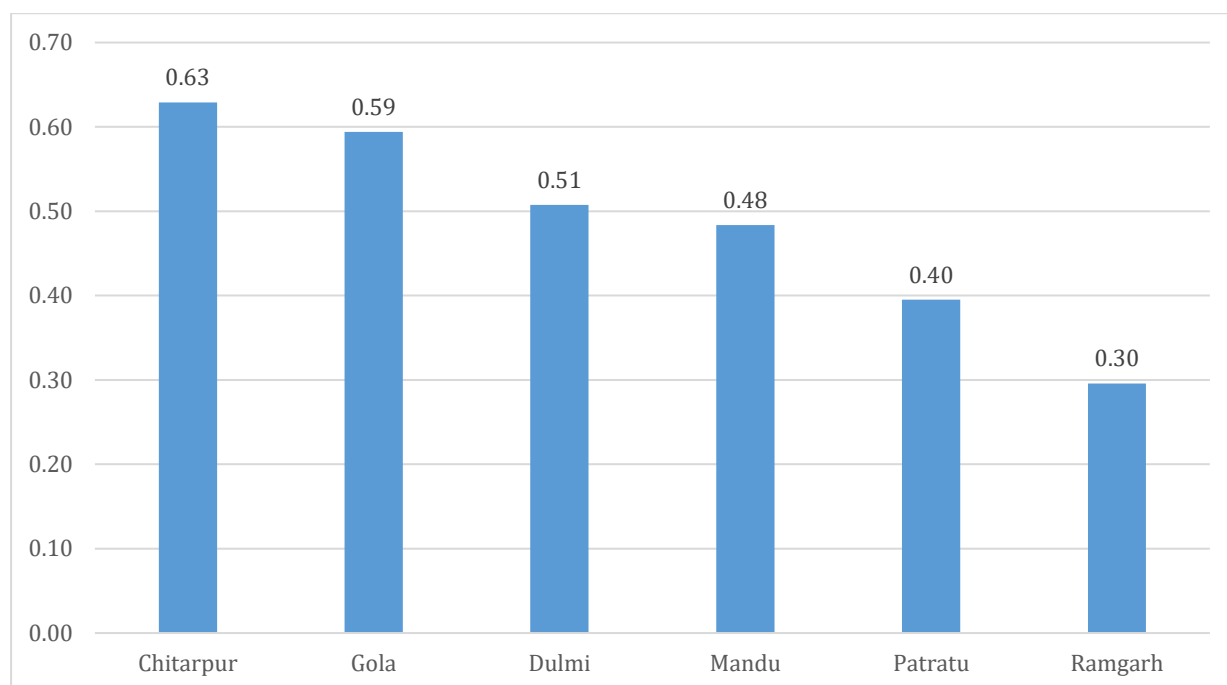
Table 8 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Chitarpur	Dulmi	Patratu
Gola	Mandu	Ramgarh

5.2.2   Identification of main drivers

Ramgarh has six blocks within the jurisdiction of its district. Chitarpur is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land play a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 14: Percentage Contribution of Different Indicators
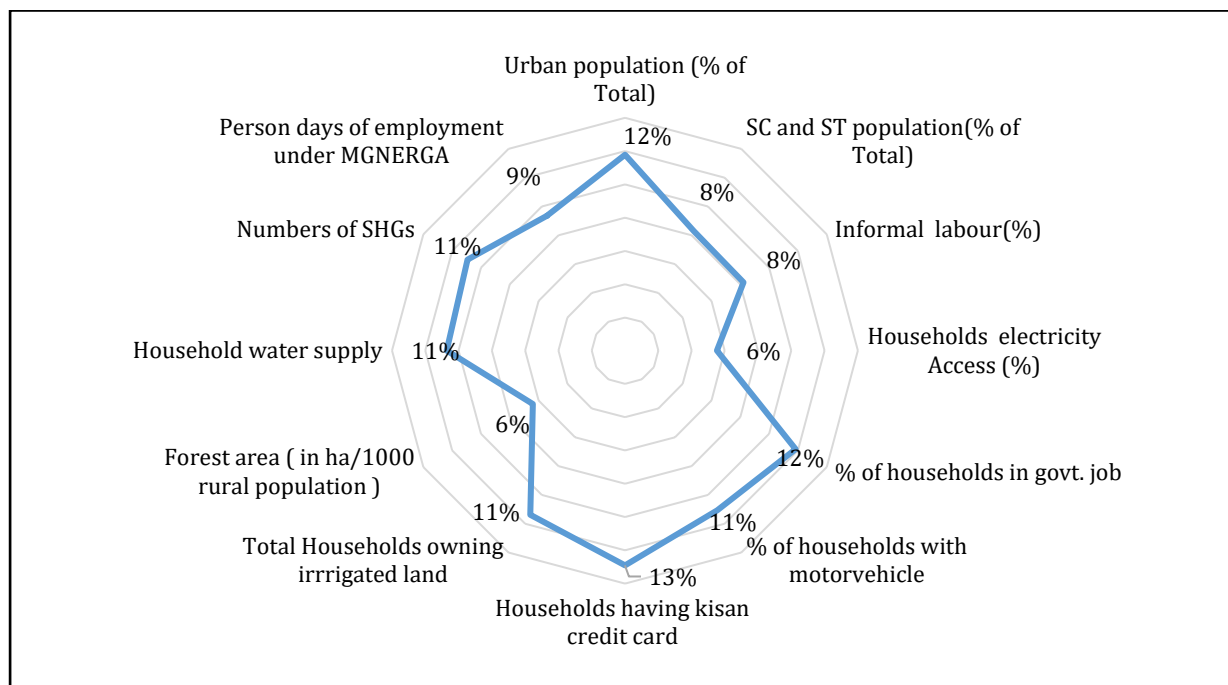
5.3 Brief Profile of the Chatra District

This District consists of 12 blocks: Huntergunj, Chatra, Tandawa, Pratappur, Simaria, Itkhori, kanhachatti, Mayurhund, Lawalaung, Gidhaur, Pathalgora and Kunda. Chatra is a mineral rich district. A substantial portion of the district›s industrial workforce is employed in the mining of coal, limestone, fire clay and China clay. Additionally, Chatra district has a good forest cover, which has contributed significantly to the expansion of the region's small- and medium-scale industries.

It spans an area of 3,706 square kilometres. Approximately 60.4% of this area is covered by forests, underscoring forestry as the district's dominant ecosystem. The remaining 39.6% comprises both rocky and alluvial soils, with alluvial soil predominantly found near river valleys. This District falls under Central and North Eastern Plateau Zone.

Figure 15: Block Map of Chatra District

District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Smt. Keerthishree G (I.A.S.)
b.	Lok Sabha Constituencies	Hazaribagh
c.	Vidhan Sabha Constituencies	Simaria, chatra, latehar, manika and panki
B)	POPULATION	
d.	Total	10,42,886
e.	Male	5,33,935
f.	Female	5,08,951
C)	AREA	
g.	Total Geographical Area	3706 sq. km
h.	Number of sub-divisions	2

i.	Number of blocks	12
	No. of Panchayats	154
	No. of Villages	1474
D)	**DEMOGRAPHICS**	
j.	Literacy Rate	60.18%
k.	Sex Ratio	951/1000

Land Use Pattern

II. Land	
Total Geographical Area	3,706 sq km
Total Area Reported	3,70,600 Ha
Forest Land	2,01,370 Ha
% Forest Land	54.33%

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Central and North Western Plateau Zone
Climate	Humid to Sub-humid tropical monsoon.
Soil Type	Entisols, Inceptisols and Alfisols, Deep sandy loam to shallow infertile coarse sandy murram.
Rainfall 2020 (in mm)	1250 mm

Population Profile

IV. People & their Work			
Total		Male	Female
Population (in '000)	10,42,886	5,33,935	5,08,951
SC	3,40,553	1,72,668	1,67,885
ST	45,563	23,141	22,422
Total Households (in '000)	1,82,271		

Agriculture profile

Agriculture Profile	
Net Sown Area (ha)	14,554
Gross Cropped Area(ha)	26,729
Cropping Intensity(ha)	183.65%
Net Irrigated Area	16,367
% Net Sown Area is Irrigated	88.92%

Figure 16 : LULC/ Forest Cover Map-Chatra
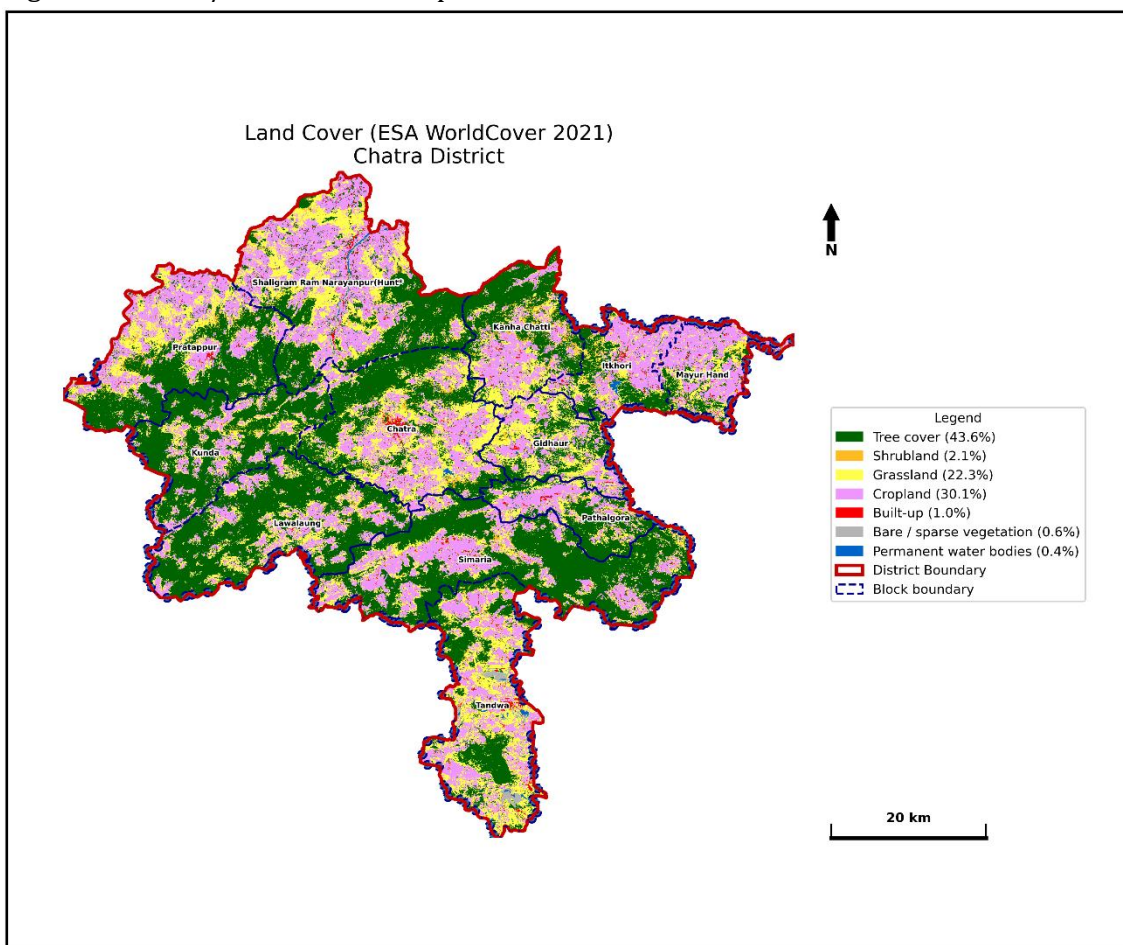
5.3.1 Vulnerability Mapping of Chatra District

Table 9 : Vulnerability Index of all Twelve Blocks – Chatra District

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Itkhori	0.66	12
2	Pratappur	0.58	11
3	Simaria	0.58	10
4	Mayurhand	0.56	9
5	Lawalong	0.55	8
6	Pathalgada	0.52	7
7	Gidhur	0.52	6
8	Kanhachatti	0.49	5
9	Hunterganj	0.44	4

10	Tandwa	0.43	3
11	Kunda	0.42	2
12	Chatra	0.41	1

Figure 17: Ranking of Blocks in Chatra District
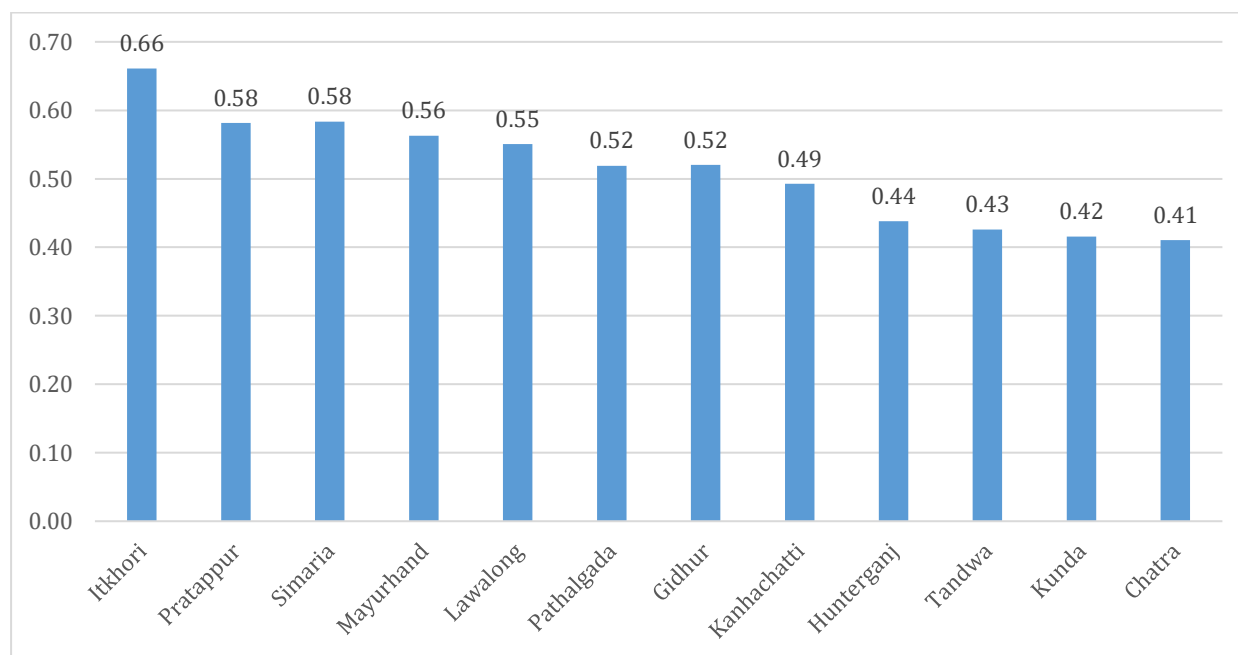
Table 10: Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Itkhori	Lawalong	Hunterganj
Pratappur	Pathalgada	Tandwa
Simarai	Gidhur	Kunda
mayurhand	Kanhachatti	Chatra

5.3.2 Identification of main drivers

Chatra has twelve blocks within the jurisdiction of its district. Tandwa is the most vulnerable one among twelve blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land play a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 18: Percentage Contribution of Different Indicators
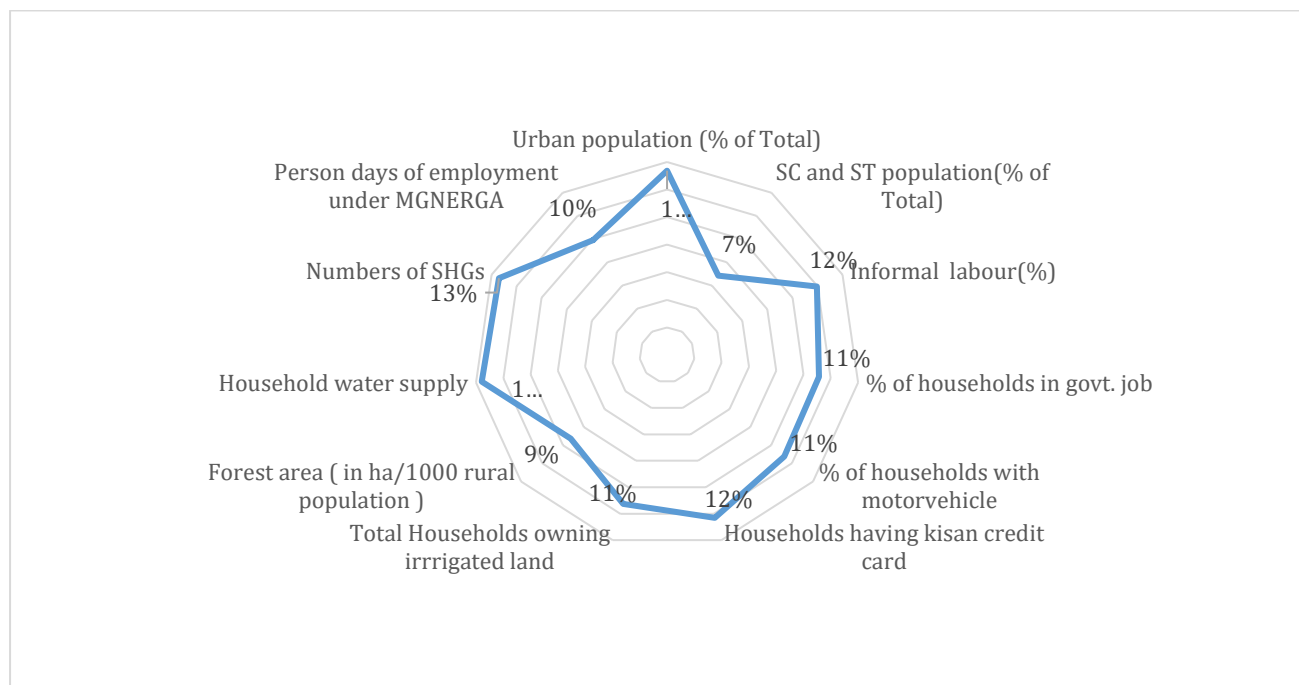
5.4 Brief Profile of the Gumla District

This District consists of 12 blocks: Gumla, Ghaghra, Bharno, Bishunpur, Raidih, Sisai, Basia, Kamdara, Palkot, Chainpur, Albert Ekka (Jari), Dumri.

Gumla district in Jharkhand is rich in mineral resources, including bauxite, limestone, coal, and fire clay, which are vital for the region's industrial activities. A diversity of landscapes characterizes the district of Gumla. It consists of hills and forested uplands (~35%), plateau plains (~45%), river valleys/ lowlands (~20%) and forest cover (~27%).

This District falls under Central and Western Plateau Zone.

Figure 19: Block Map of Gumla District

District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Smt. Prerna Dixit (IAS)
b.	Lok Sabha Constituencies	Lohardaga
c.	Vidhan Sabha Constituencies	Gumla, Sisai and Bishnupur
B)	POPULATION	
d.	Total	10,25,213
e.	Male	5,14,390
f.	Female	5,10,823
C)	AREA	
g.	Total Geographical Area	5327 sq. km
h.	Number of sub-divisions	3
i.	Number of blocks	12
	No. of Panchayats	159

	No. of Villages	952
D)	**DEMOGRAPHICS**	
j.	Literacy Rate	69.73%
k.	Sex Ratio	993/1000

Land Use Pattern

II. Land	
Total Geographical Area	5,327 Sq km
Total Area Reported	5,32,700 Ha
Forest Land	1,35,600 Ha
%Forest Land	27%

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	South western plateau (Zone5)
Climate	hot sub humid eco-region
Soil Type	Red laterite to sandy clay and clay loam
Rainfall2020(in mm)	1100 mm

Population profile

IV. People & their Work			
Total		Male	Female
Population (in '000)	10,25,213	5,14,390	5,10,823
SC	32,429	16,446	16,013
ST	7,06,754	3,52,514	3,54,240
Total Households (in '000)	1,88,988		

Agriculture Profile

Net Sown Area(ha)	259419.1
Gross Cropped Area(ha)	161411
Cropping Intensity(ha)	62.22%
Net Irrigated Area	67760 ha
%Net Sown Area is Irrigated	26.12%

Figure 20: LULC/ Forest Cover Map- Gumla
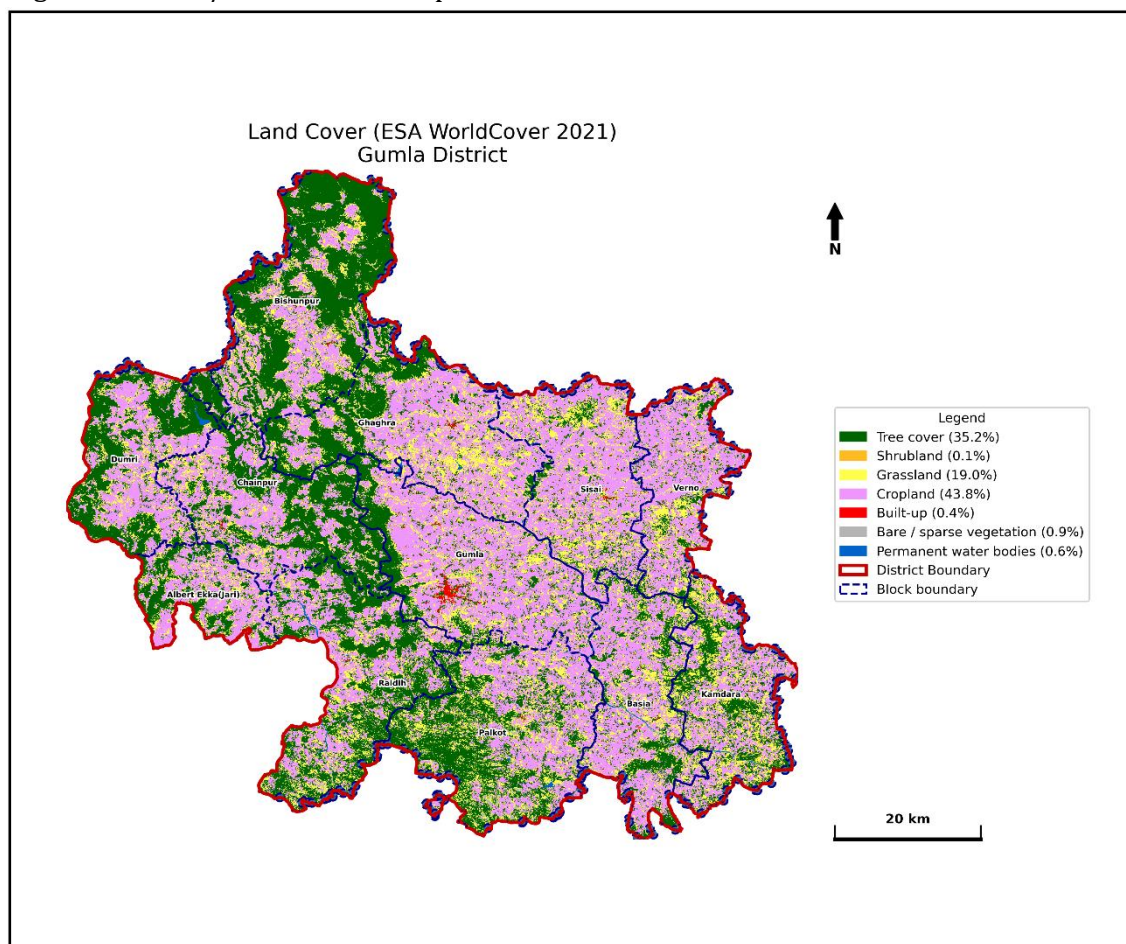
5.4.1 Vulnerability Mapping of Gumla District

Table 11: Vulnerability Index of all Twelve Blocks – Gumla District

Sl. No	Blocks	Equal weights	
		Vulnerability Index	Ranking
1	Basia	0.64	12
2	Palkot	0.63	11
3	Raidih	0.62	10
4	Verno	0.60	9
5	Kamdara	0.54	8
6	Gumla	0.53	7
7	Albert Ekka (Jari)	0.49	6
8	Chainpur	0.48	5
9	Dumri	0.44	4
10	Bishunpur	0.39	3

| 11 | Sisai | 0.37 | 2 |
| 12 | Ghaghra | 0.29 | 1 |

Figure 21 : Ranking of Blocks in Gumla District
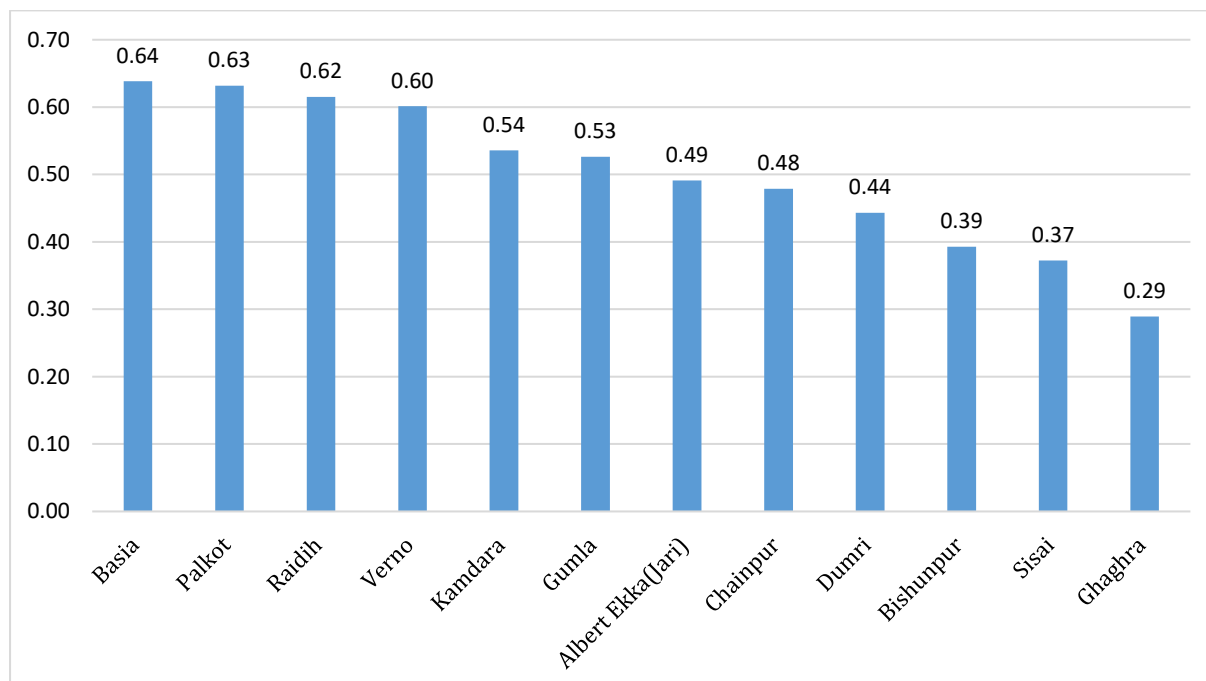
Table 12 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Basia	Kamdara	Basia
Palkot	Gumla	Palkot
Raidih	Albert Ekka (Jari)	Raidih
Verno	Chainpur	Verno

5.4.2   Identification of main drivers

Gumla has twelve blocks within the jurisdiction of its district. Ghaghra is the most vulnerable one among the twelve blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land play a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 22: Percentage Contribution of Different Indicators
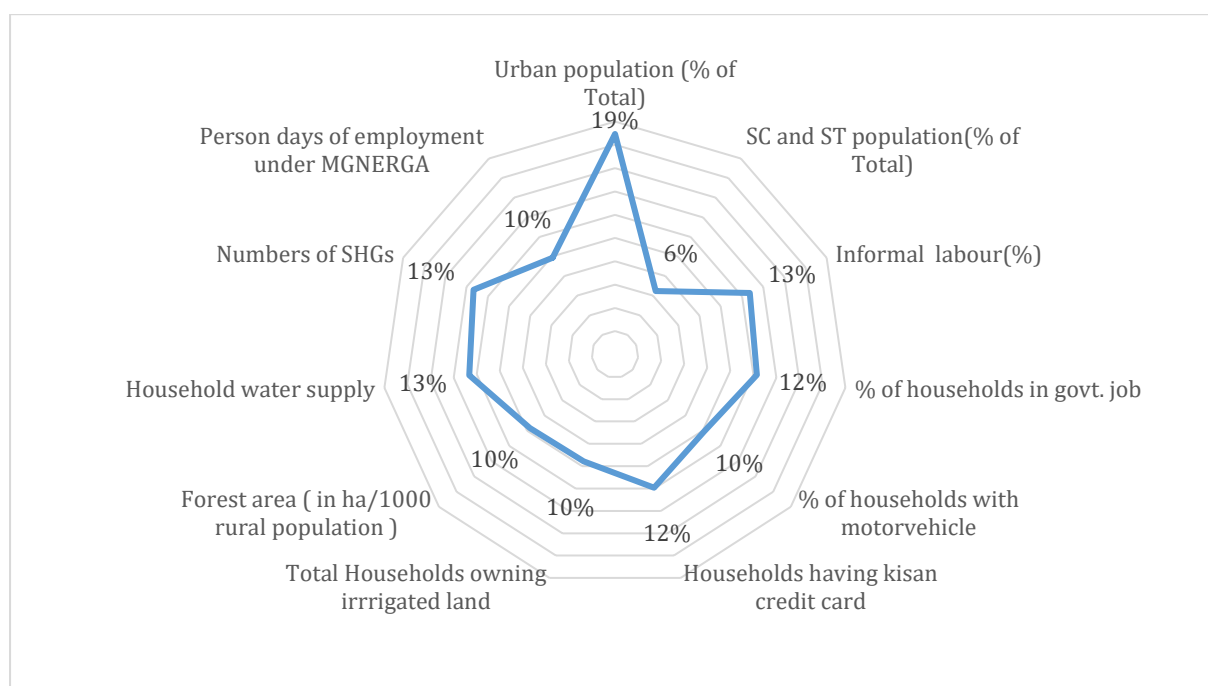
5.5 Brief Profile of the Latehar District

This District consists of nine blocks: Latehar, Chandwa, Balumath, Manika, Barwadih, Garu, Mahuadanr, Bariyatu, Herhanj. Latehar is one of the richest districts of Jharkhand in forest resources. About 43 percent of the total area of district is covered by forests. The elevation of the hills ranges from 300 to 1100 m above msl. The principal rivers of the district are the North Koel, Auranga and their tributaries.

The district is very rich in mineral resources. There is abundance of deposit of Coal, Bauxite, Dolomite, Graphite, Granite, Quartz, Fireclay, Felspar, etc. The important minerals which are commercially mined are coal, limestone and dolomite. Agriculture is the primary source of livelihood in the district. This District falls under Central and Western Plateau Zone.

Figure 23: Block Map of Latehar District

District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Utkarsh Gupta (I.A.S)
b.	Lok Sabha Constituencies	Chatra
c.	Vidhan Sabha Constituencies	Latehar, Manika
B)	POPULATION	
d.	Total	7,26,978
e.	Male	3,69,666
f.	Female	3,57,312
C)	AREA	
g.	Total Geographical Area	3,622.50 sq. km
h.	Number of sub-divisions	2
i.	Number of blocks	9
	No. of Panchayats	115
	No. of Villages	772
D)	DEMOGRAPHICS	
j.	Literacy Rate	59.51%
k.	Sex Ratio	964/1000

Land Use Pattern

II. Land	
Total Geographical Area	3,622.5 sq km
Total Area Reported	3,79,068 Ha
Forest Land	1,62,745 Ha
% Forest Land	42%

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Eastern plateau & hills (Zone 7)
Climate	Humid to Sub humid
Soil Type	Laterite, Red sandy, Red and Yellow
Rainfall 2020 (in mm)	1371 mm

Population Profile

IV. People & their Work			
Total		**Male**	**Female**
Population (in '000)	7,26,978	3,69,666	3,57,312
SC	1,54,910	78,266	76,644
ST	3,31,096	1,66,427	1,64,669
Total Households (in '000)	1,33,381		

Agriculture profile

Agriculture Profile	
Net Sown Area (ha)	30,953
Gross Cropped Area(ha)	37,819
Cropping Intensity(ha)	122.18%
Net Irrigated Area	247
% Net Sown Area is Irrigated	0.79%

Figure 24: LULC/ Forest Cover Map- Latehar
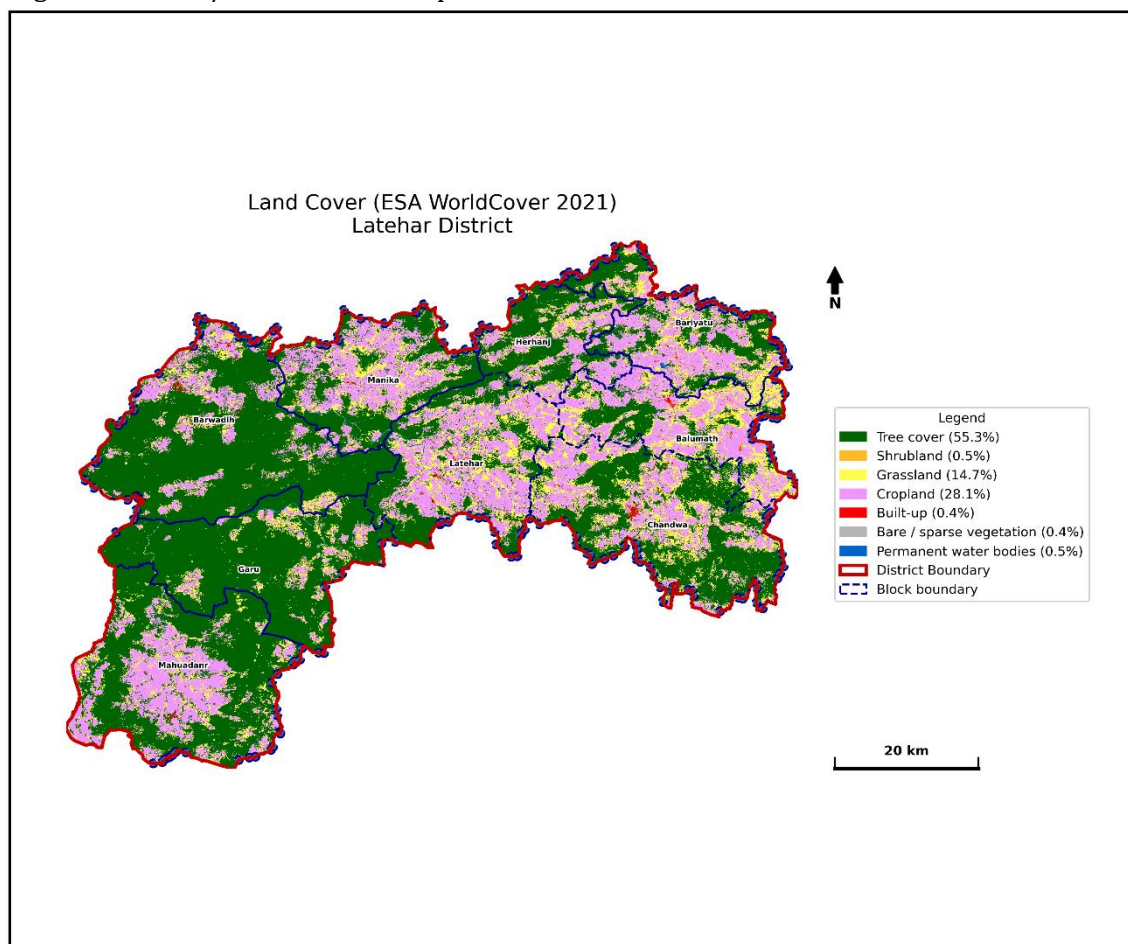
5.5.1   Vulnerability Mapping of Latehar District

Table 13: Vulnerability Index of all Nine Blocks – Latehar District

Sl. No	Blocks	Equal weights	
		Vulnerability Index	Ranking
1	Garu	0.63	9
2	Balumath	0.59	8
3	Barwadih	0.53	7
4	Mahuadanr	0.52	6
5	Herhanj	0.50	5
6	Latehar	0.49	4
7	Chandwa	0.42	3
8	Manika	0.38	2
9	Bariyatu	0.29	1

Figure 25: Ranking of Blocks in Latehar District
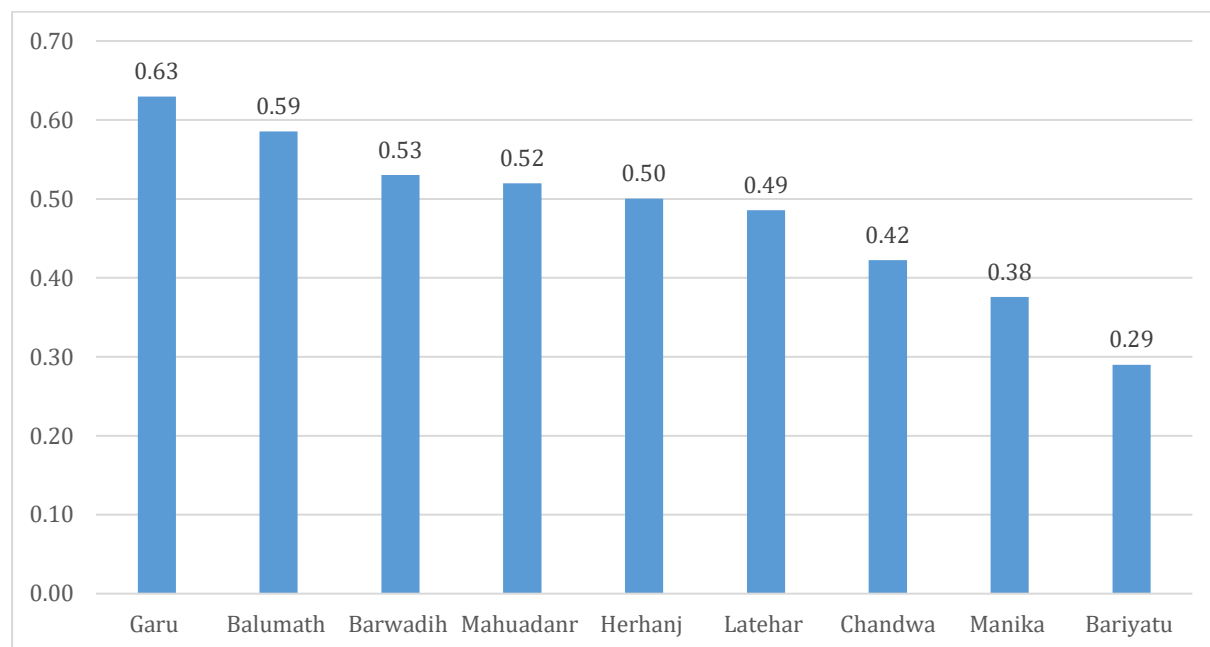
Table 14 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Garu	Mahuadanr	Chandwa
Balumath	Herhanj	Manika
Barwadih	Latehar	Bariyatu

5.5.2   Identification of main drivers

Latehar has nine blocks within the jurisdiction of its district. Garu the most vulnerable one among the nine blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land play a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 26: Percentage Contribution of Different Indicators
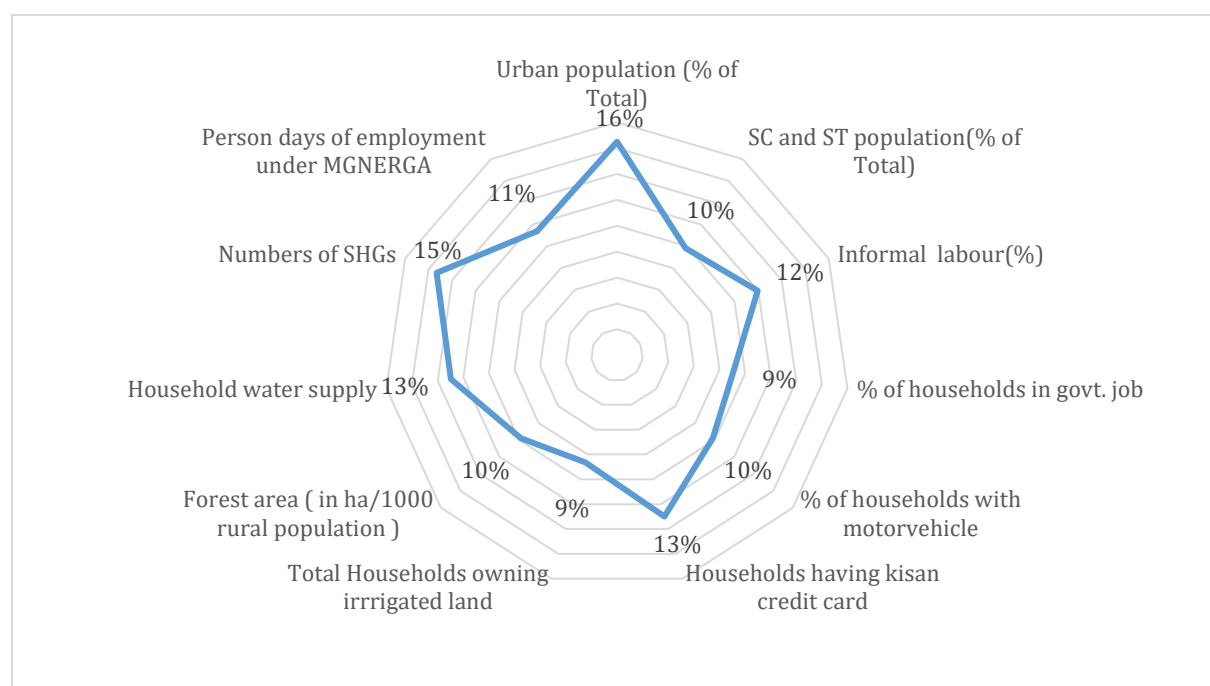
5.6   Brief Profile of the Giridih District

This District consists of Thirteen blocks: Gawan, Tisri, Deori, Dhanwar, Jamua, Bengabad, Gandey, Giridih, Birni, Bagodar, Suriya, Dumri, and Pirtand. The majority of Giridih population resides in rural areas, with 91.5% living in rural regions and 8.5% in urban areas.

The district is famous for its well-known ruby mica mines and several large coal fields which contain one of the best qualities of metallurgical coal in India. The principal rivers of the district are the Barakar and Sakri rivers. Other smaller important rivers are also present one of which is the Usri River. Agriculture is the primary source of livelihood in the district. This District falls under Central and North- Eastern Plateau.

Figure 27: Block Map of Giridih District
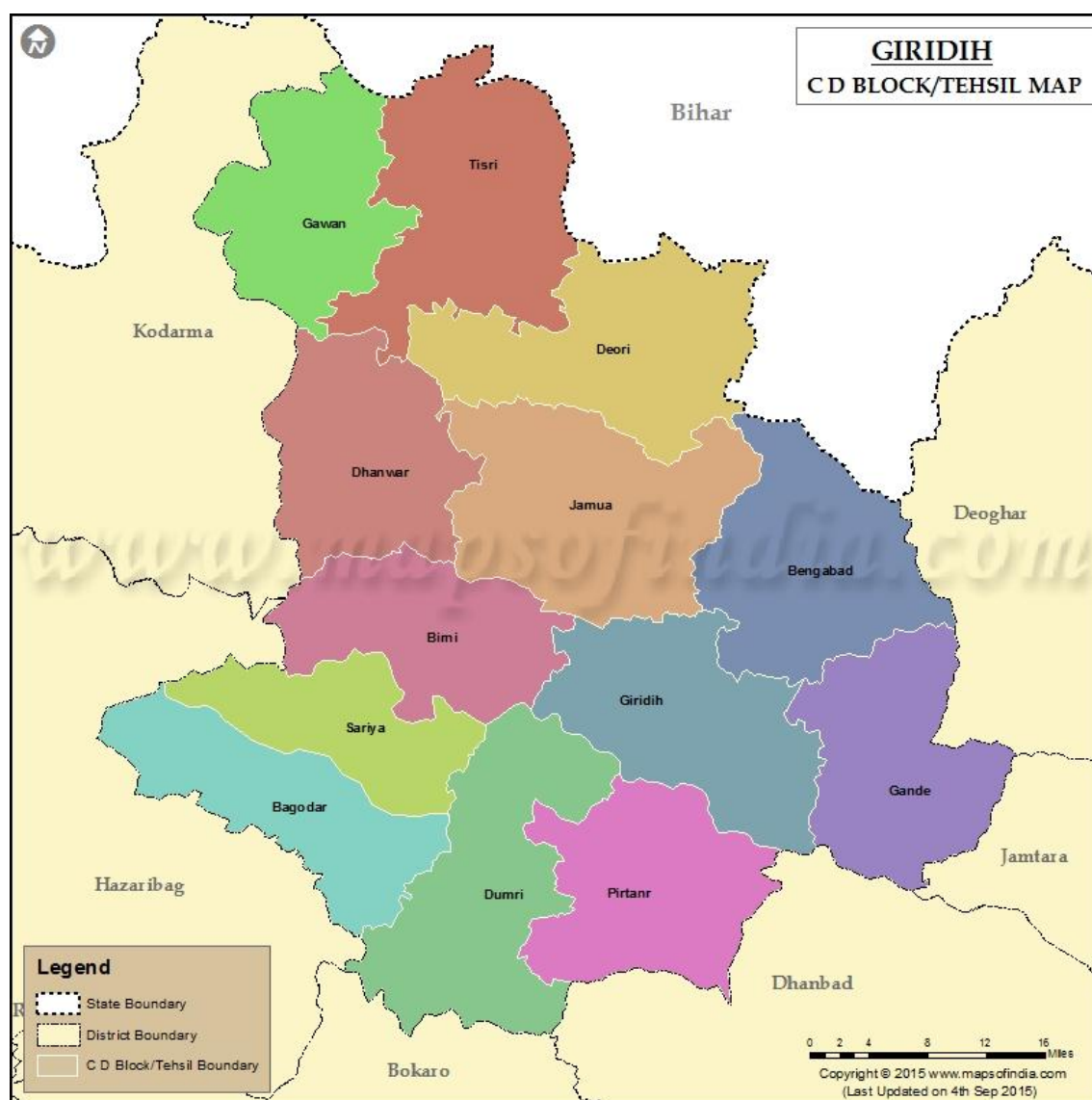
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Mr. Ramniwas Yadav (I.A.S)
b.	Lok Sabha Constituencies	Koderma, Giridih
c.	Vidhan Sabha Constituencies	Giridih, Dhanwar, Bagodar, Jamua, Gandey and Dumri
B)	POPULATION	
d.	Total	24,45,474
e.	Male	12,58,098
f.	Female	11,87,376
C)	AREA	
g.	Total Geographical Area	4,853.56 sq. km
h.	Number of sub-divisions	4
i.	Number of blocks	13
	No. of Panchayats	358

	No. of Villages	2749
D)	**DEMOGRAPHICS**	
j.	Literacy Rate	63.14%
k.	Sex Ratio	944/1000

Land Use Pattern

II. Land		
Total Geographical Area	4,962.00 sq km	
Total Area Reported	4,96,200 Ha	
Forest Land	90,124 Ha	

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Central and North Eastern Plateau (Zone IV)
Climate	Moist sub humid to dry sub humid
Soil Type	Alluvial, Red sandy, Red loamy, Red and yellow
Rainfall 2020	1350mm

Population Profile

IV. People & their Work			
Total		Male	Female
Population (in '000)	24,45,474	12,58,098	11,87,376
SC	3,25,493	1,66,447	1,59,046
ST	2,38,188	1,20,646	1,17,542
Total Households (in '000)	3,96,521		

Agriculture profile

Net Sown Area (ha)	13,840
Gross Cropped Area(ha)	15,080
Cropping Intensity(ha)	91.77%
Net Irrigated Area	12,400
% Net Sown Area is Irrigated	89.59%

Figure 28: LULC/ Forest Cover Map- Giridih
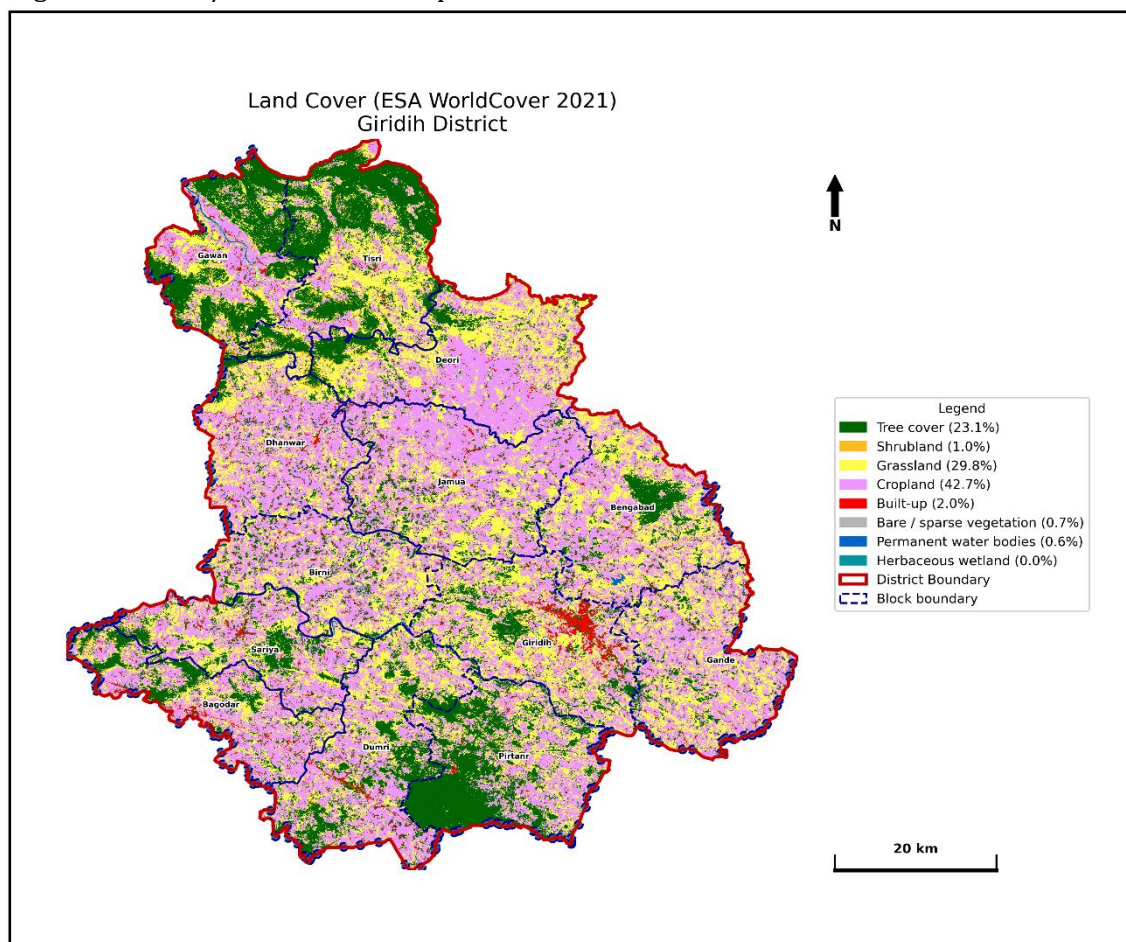
5.6.1 Vulnerability Mapping of Giridih District

Table 15: Vulnerability Index of all Thirteen Blocks – Giridih

Sl. No	Blocks	Equal weights	
		Vulnerability Index	Ranking
1	Sariya	0.63	13
2	Pirtanr	0.60	12
3	Bengabad	0.59	11
4	Dumri	0.57	10
5	Bagodar	0.57	9
6	Deori	0.57	8
7	Birni	0.52	7
8	Tisri	0.50	6
9	Dhanwar	0.50	5
10	Gande	0.49	4

11	Jamua	0.44	3
12	Giridih	0.40	2
13	Gawan	0.38	1

Figure 29: Ranking of Blocks in Giridih
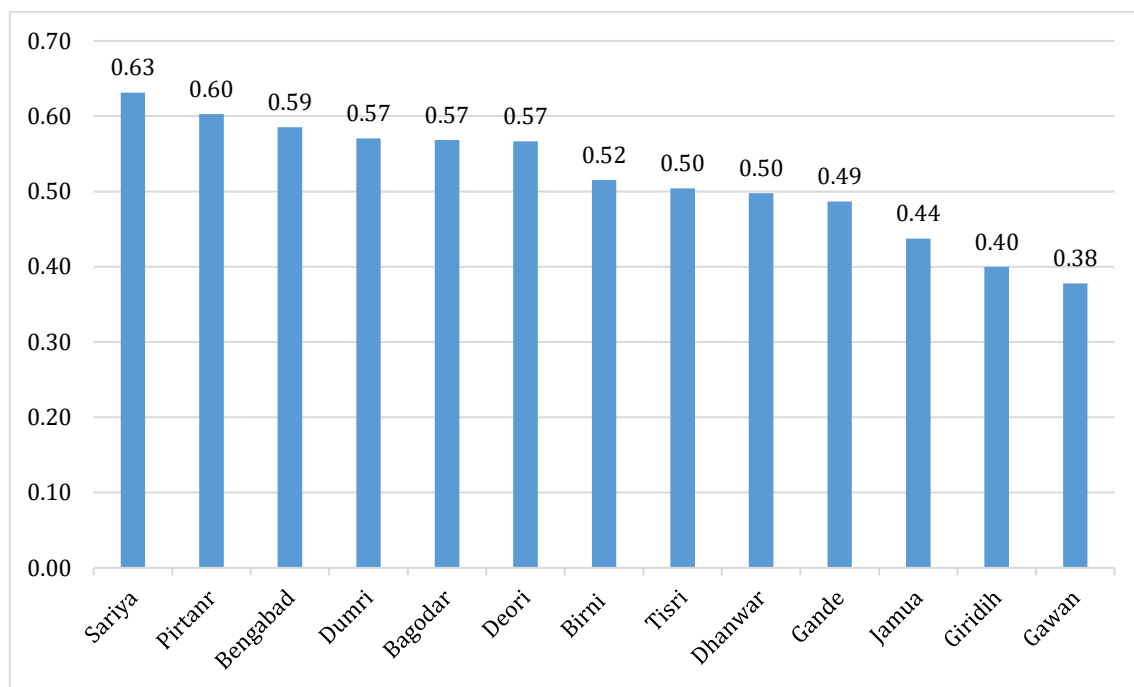
Table 16: Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Sariya	Dumri	Dhanwar
Pirtanr	Bagodar	Gande
Bengabad	Deori	Jamua
	Birni	Giridih
	Tisri	Gawan

5.6.2   Identification of main drivers

Giridih has 13 blocks within the jurisdiction of its district. Sariya is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land play a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 30: Percentage Contribution of Different Indicators
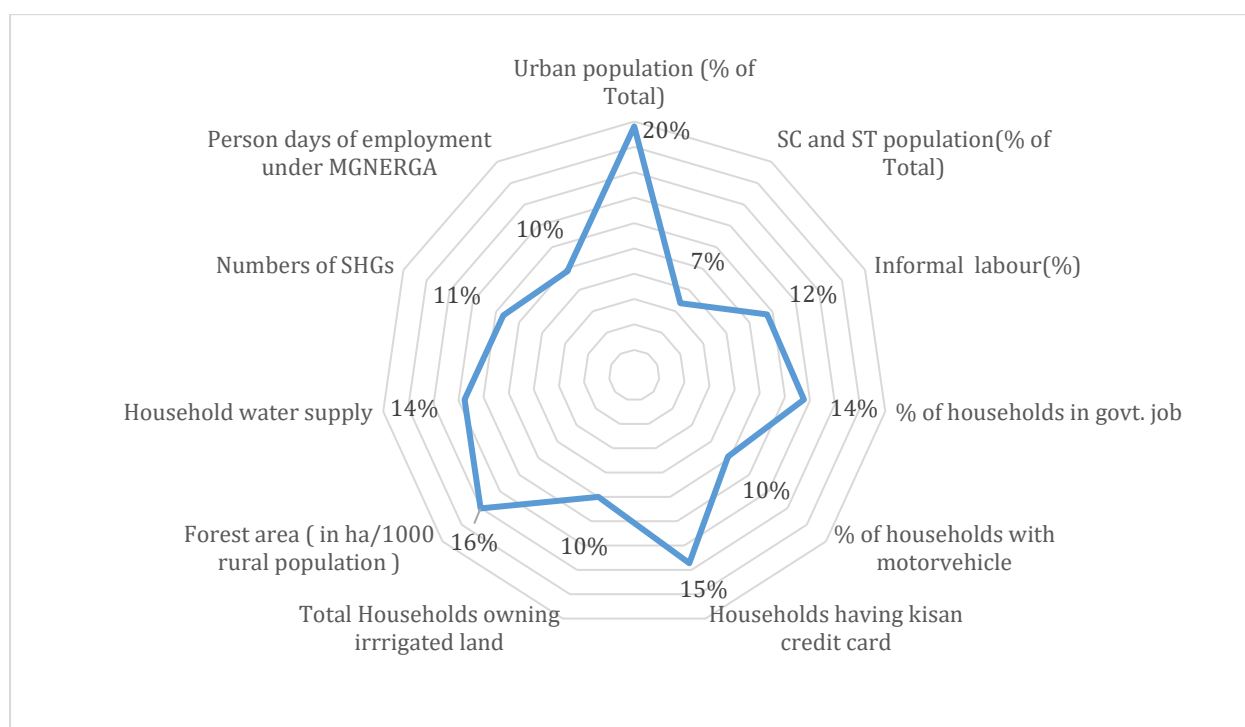
5.7 Brief Profile of the Pakur District

This District consists of 6 blocks: Pakur, Hiranpur, Litipara, Amrapara, Maheshpur, Pakaraira (Pakuria). Though Pakur is not rich in minerals. However, a number of economic minerals occurred here & there being worked out. Among the minerals found here coal, china clay, fire clay, quarter, silica sand and glass sand. Black stone chips (Pakur stone). The district is also known for its good forest cover, contributing significantly to local small- and medium-scale industries.

The district is mainly divided into three parts and these are the hilly area, the rolling area and the alluvial area. Geography of Pakur District includes three main rivers in this district namely Bansloi, Torai and Brahmani River. This District falls under Central and North-Eastern Plateau.

Figure 31: Block map of Pakur District
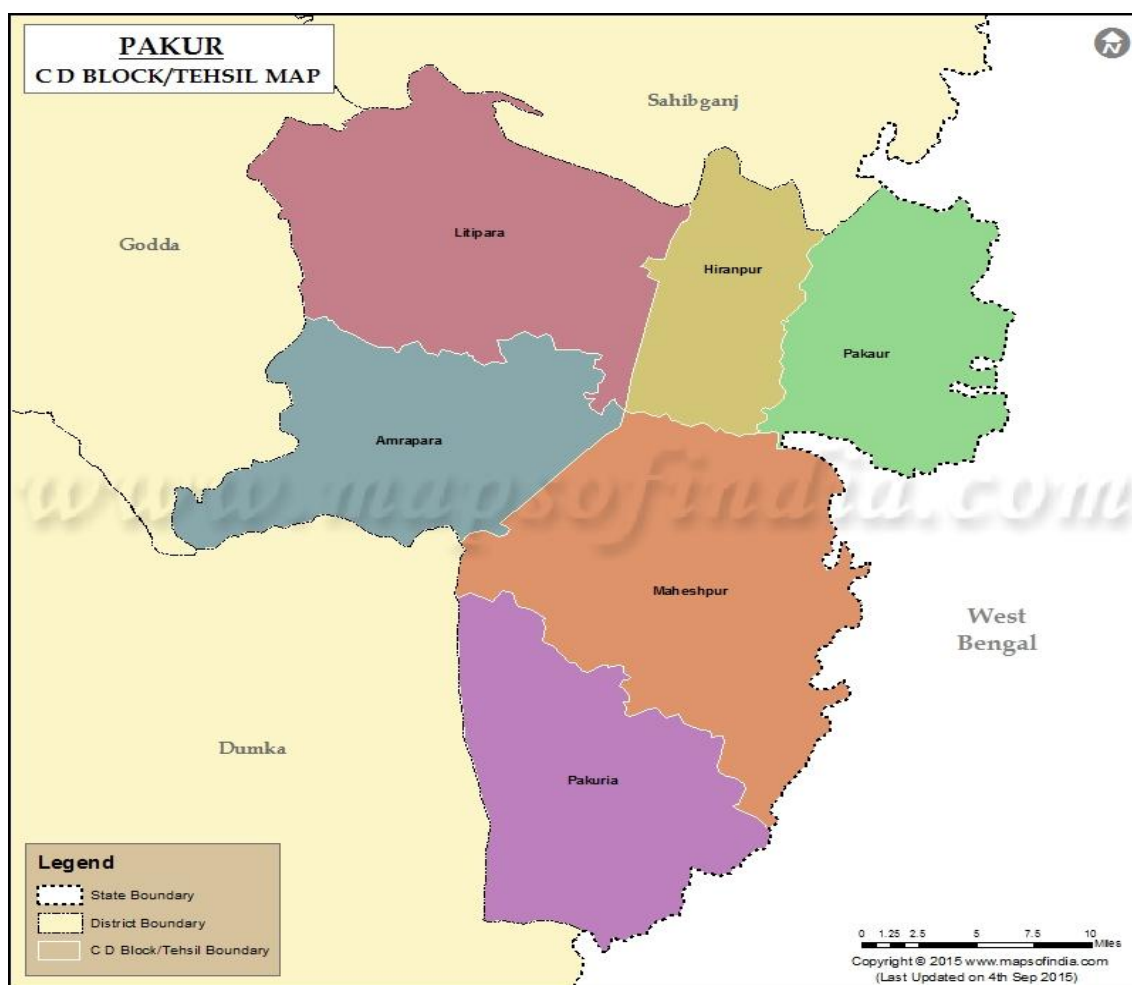
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Shri. Manish Kumar (I.A.S)
b.	Lok Sabha Constituencies	Rajmahal
c.	Vidhan Sabha Constituencies	Litipara, Pakur, Maheshpur
B)	**POPULATION**	
d.	Total	9,00,422
e.	Male	4,52,661
f.	Female	4,47,761
C)	**AREA**	
g.	Total Geographical Area	1,806 sq. km
h.	Number of sub-divisions	1
i.	Number of blocks	6
	No. of Panchayats	128
	No. of Villages	1250
D)	**DEMOGRAPHICS**	
j.	Literacy Rate	48.82%
k.	Sex Ratio	989/1000

Land Use Pattern

II. Land	
Total Geographical Area	1,811 Sq. km
Total Area Reported	1,81,100 Ha
Forest Land	28,425.74 Ha
%Forest Land	20.70%

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Eastern Plateau and Hills Region (VII)
Climate	sub-tropical monsoon climate
Soil Type	Red lateritic soils, Loam soils, Fine loam soils, Fine mixed Loam soils
Rainfall 2020(in mm)	1,354.6 mm

Population Profile

IV. People & their Work			
Total		**Male**	**Female**
Population (in '000)	9,00,422	4,52,661	4,47,761
SC	28,469	14,352	14,117
ST	3,79,054	1,86,967	1,92,087
Total Households (in '000)	1,82,317		

Agriculture profile

Net Sown Area(ha)	58,800
Gross Cropped Area(ha)	13,233
Cropping Intensity(ha)	22.50%
Net Irrigated Area (ha)	12,977
%Net Sown Area is Irrigated	22.10%

Figure 32: LULC/Forest Cover Map-Pakur
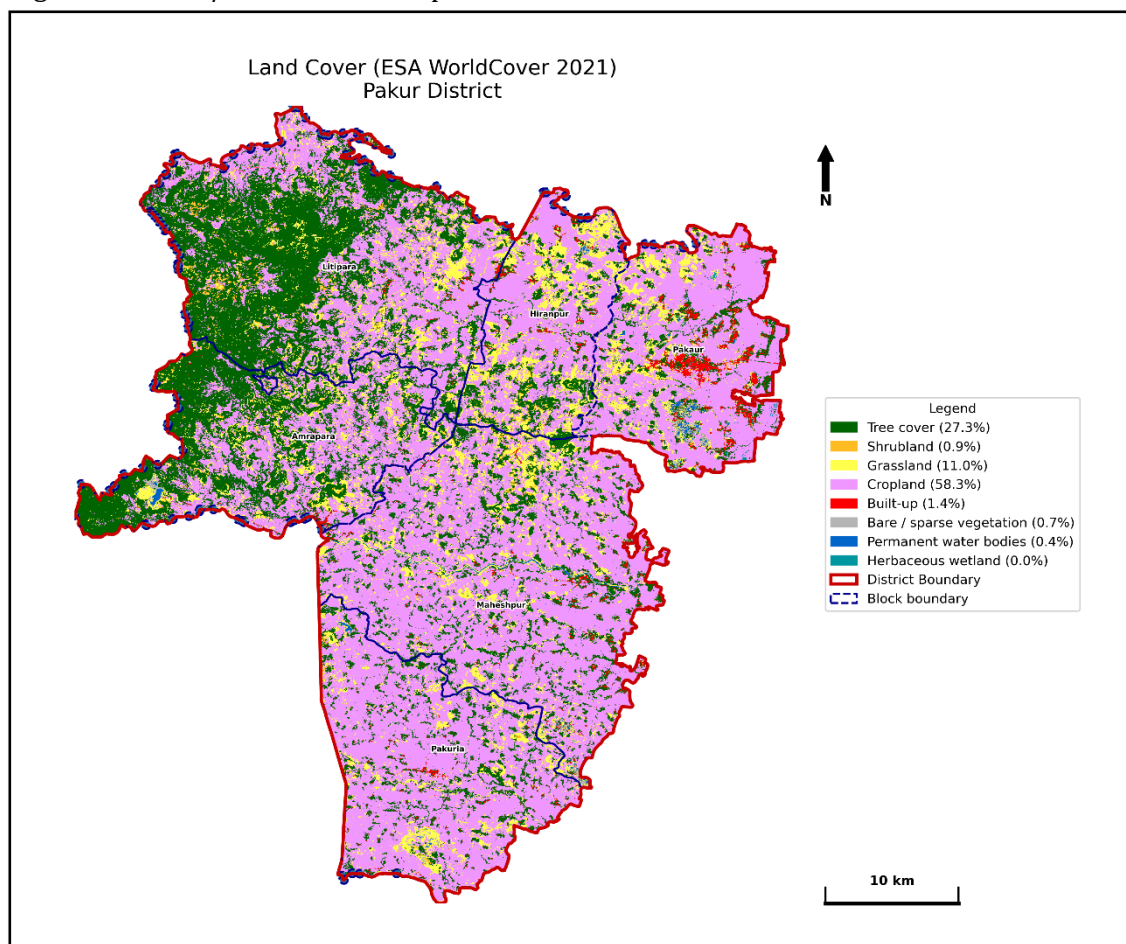
5.7.1   Vulnerability Mapping of Pakur District

Table 17: Vulnerability Index of all Six Blocks – Pakur

Sl. No	Blocks	Equal weights	
		Vulnerability Index	Ranking
1	Amrapara	0.60	6
2	Pakuria	0.60	5
3	Maheshpur	0.60	4
4	Hiranpur	0.59	3
5	Pakaur	0.56	2
6	Litipara	0.31	1

Figure 33 : Ranking of Blocks in Pakur District
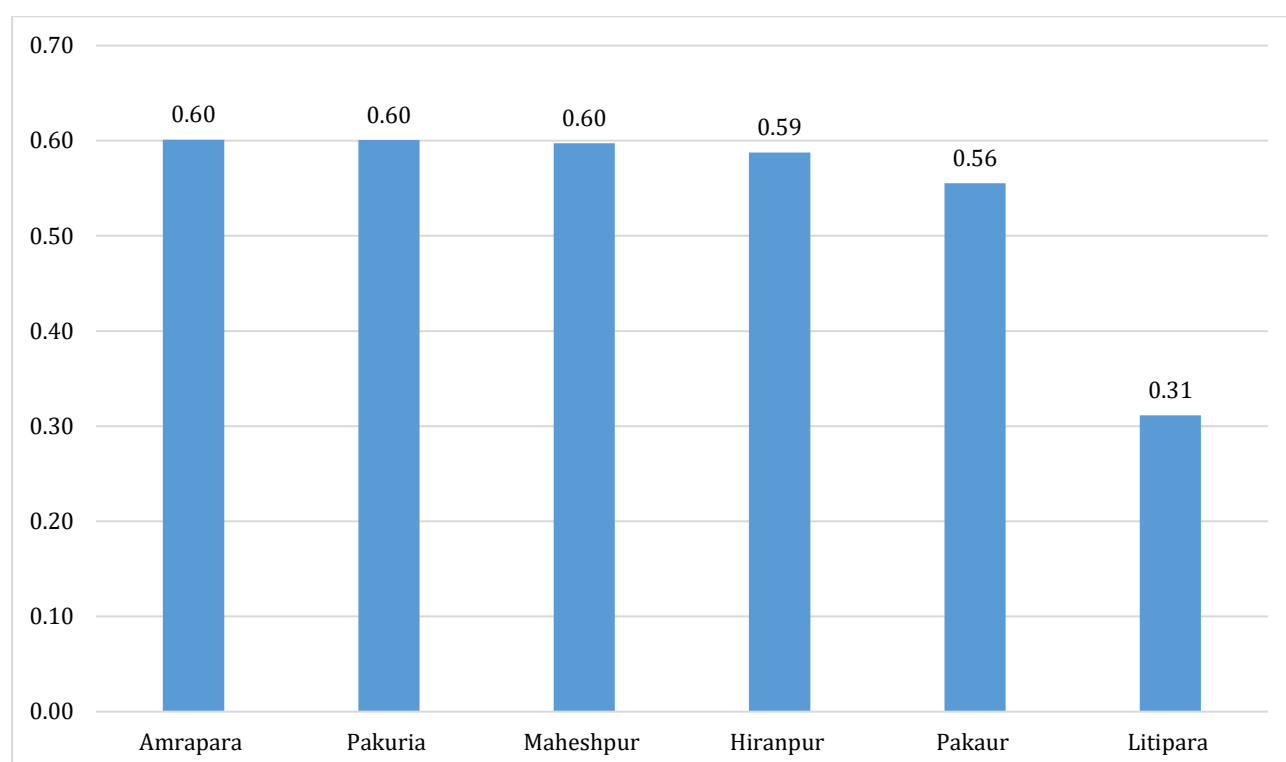
Table 18 : Classification of Blocks According to Vulnerability *Index*

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Amrapara	Maheshpur	Pakaur
Pakuria	Hiranpur	Litipara

5.7.2   Identification of main drivers

Pakur has six blocks within the jurisdiction of its district. Amrapara is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land play a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 34: Percentage Contribution of Different Indicators
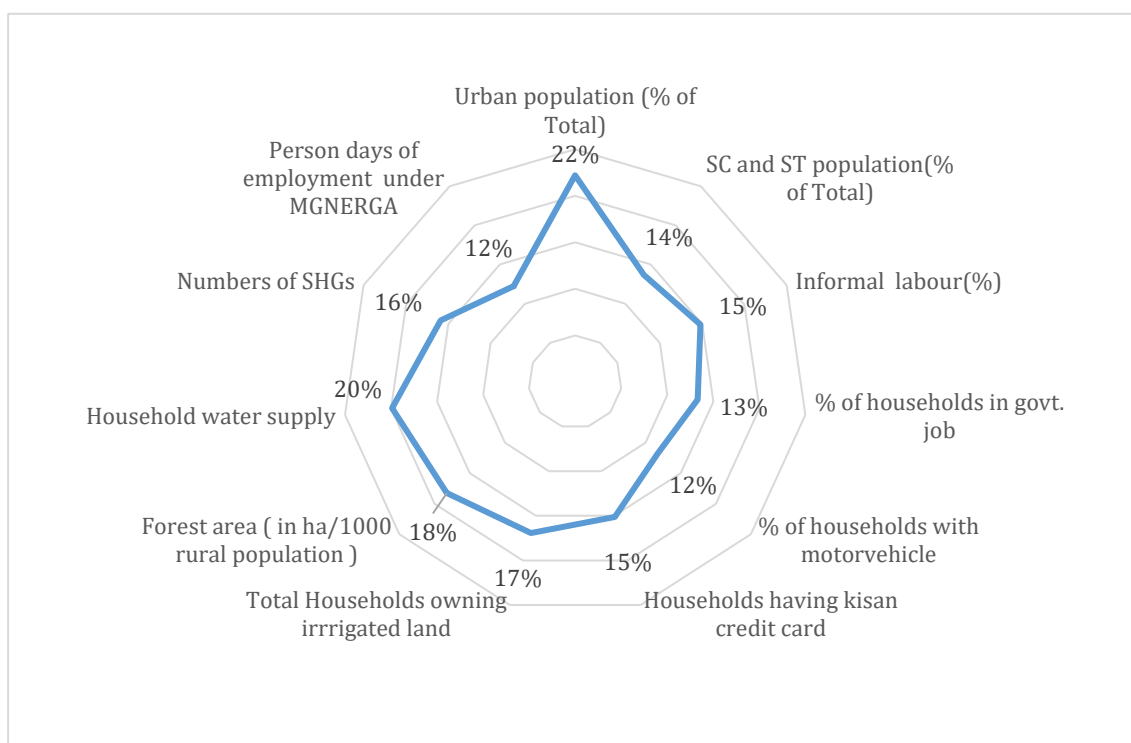
5.8   Brief Profile of the Deoghar District

This District consists of 10 blocks: Deoghar, Devipur, Mohanpur Sarwan, Sonaraithari, Madhupur, Sarath, Palajori, Karown and Margomunda.

Deoghar is located in the western part of the Santhal Parganas, sharing borders with Bihar and other Jharkhand districts like Dumka, Jamtara, and Giridih. It features a landscape of rocky hills and forests with a series of ridges. The climate is semi-tropical with hot and dry summers and cool winters. The primary river flowing through the district is the Ajay, the most commercially significant mineral wealth of Deoghar is associated with coal and industrial minerals like quartz and feldspar. This District falls under Central and North-eastern plateau.

Figure 35 : Block Map of Deoghar District

District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Shri Naman Priyesh Lakra, (I.A.S)
b.	Lok Sabha Constituencies	Godda
c.	Vidhan Sabha Constituencies	Jarmundi, Madhupur, Sarath and Deoghar (SC)
B)	POPULATION	
d.	Total	14,91,879
e.	Male	7,76,726
f.	Female	7,15,138
C)	AREA	
g.	Total Geographical Area	2,478.61 sq. km
h.	Number of sub-divisions	2
i.	Number of blocks	10
	No. of Panchayats	194
	No. of Villages	2,662
D)	DEMOGRAPHICS	

j.	Literacy Rate	64.85%
k.	Sex Ratio	925/1000

Land Use Pattern

II. Land		
Total Geographical Area	2,479	sq km
Total Area Reported	247,900	Ha
Forest Land	23,906	Ha
% Forest Land	10%	

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Central and North Western Plateau Zone
Climate	Humid to Sub-humid tropical monsoon.
Soil Type	Entisols, Inceptisols and Alfisols, Deep sandy loam to shallow infertile coarse sandy murram.
Rainfall 2020 (in mm)	573 mm	Mm

Population Profile

IV. People & their Work		Male	Female
Total		Male	Female
Population (in '000)	14,91,879	7,76,726	7,15,138
SC	1,90,036	98,295	91,741
ST	1,80,962	91,012	89,950
Total Households (in '000)	4,03,335		

Agricultire Profile

Net Sown Area (ha)	64,229
Gross Cropped Area(ha)	132,028
Cropping Intensity(ha)	205.7%
Net Irrigated Area	73,367
% Net Sown Area is Irrigated	114.2%

Figure 36: LULC/ Forest Cover Map -Deoghar
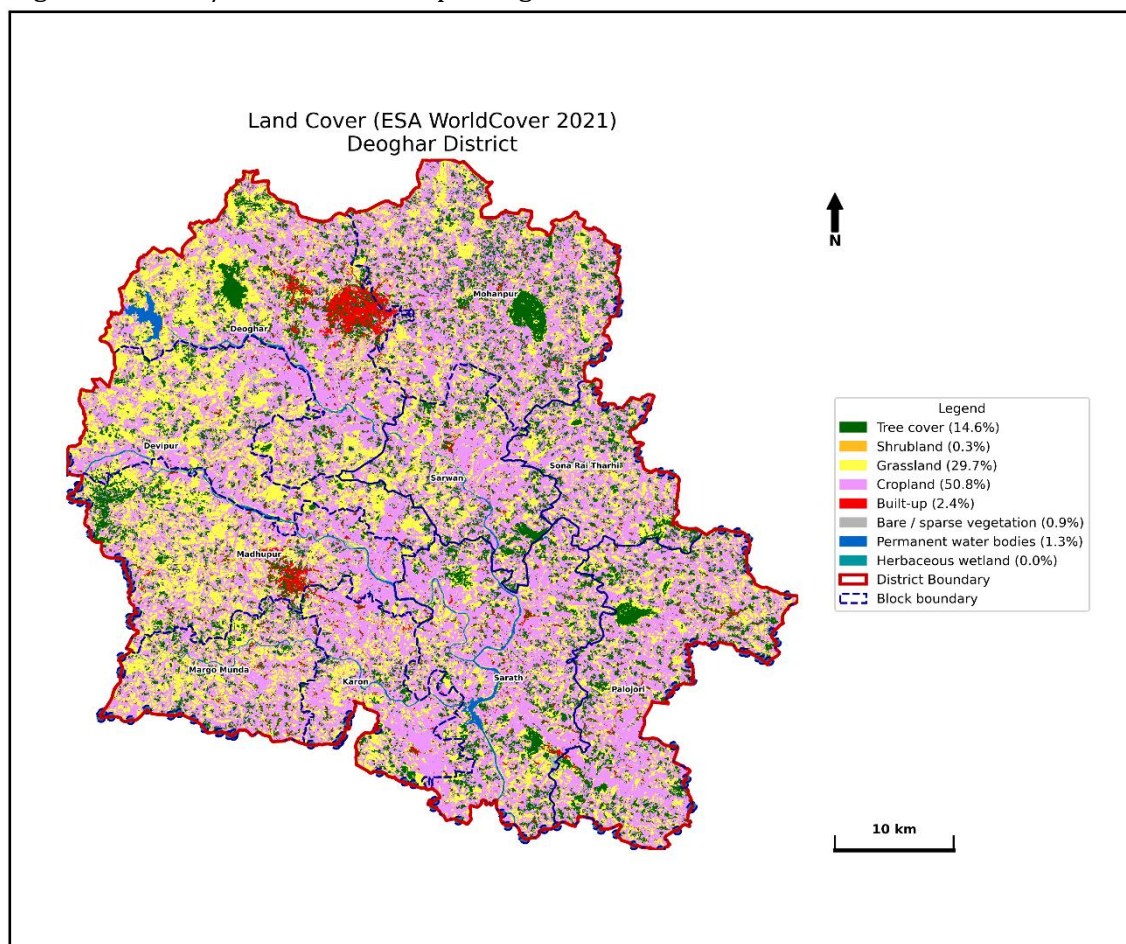
5.8.1   Vulnerability Mapping of Deoghar District

Table 19 : Vulnerability Index of all Ten Blocks – Deoghar

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Sona Rai Tharhi	0.66	10
2	Karon	0.65	9
3	Margo Munda	0.63	8
4	Sarwan	0.62	7
5	Palojori	0.53	6
6	Devipur	0.49	5
7	Sarath	0.48	4
8	Mohanpur	0.42	3
9	Madhupur	0.38	2
10	Deoghar	0.36	1

Figure 37: Ranking of Blocks in Deoghar District
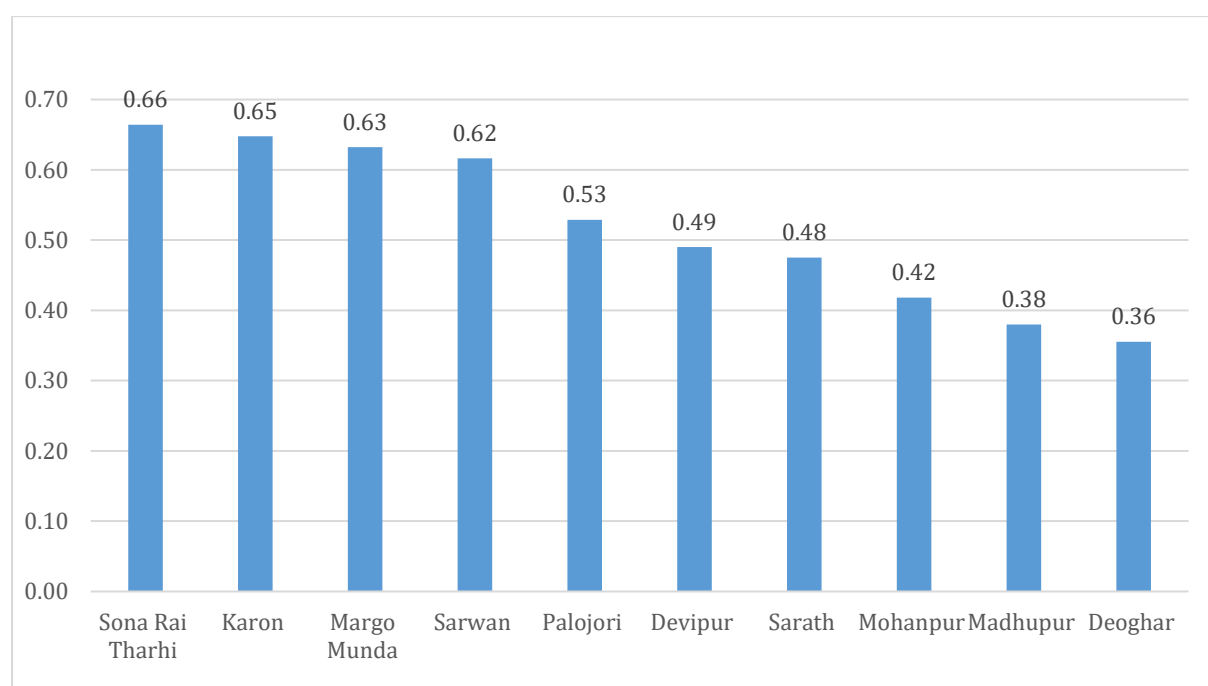
Table 20 : Classification of Blocks According to Vulnerability *Index*

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Sona Rai Tharhi	Sarwan	Mohanpur
Karon	Palojori	Madhupur
Margo Munda	Devipur	Deoghar
	Sarath	

5.8.2 Identification of main drivers

Deoghar has six blocks within the jurisdiction of its district. Sona Rai Tharhi is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land play a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 38 : Percentage contribution of different indicators
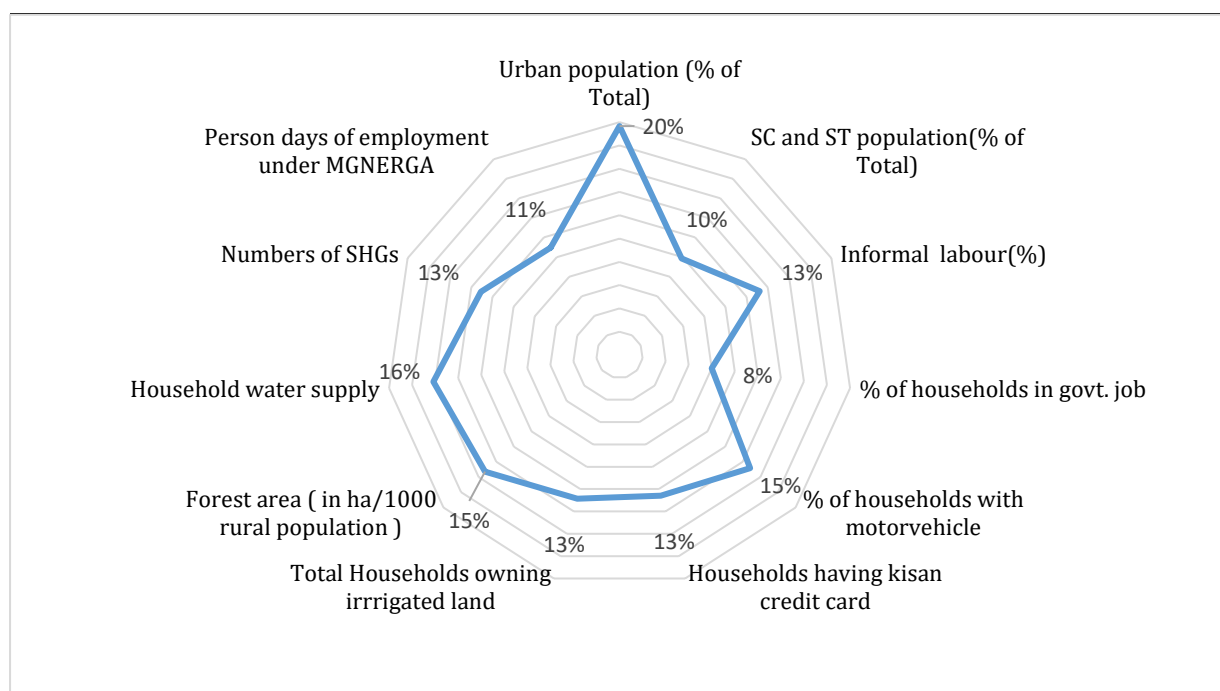
5.9 Brief Profile of the Dumka District

This District consists of 10 blocks: Dumka, Gopikandar, Jama, Jarmundi, Kathikund, Masaliya, Ramgarh, Ranishwar, Saraiyahat and Shikaripara.

Mineral resources in Dumka include quartz, feldspar, building stone, and morrum (sand). Major crops include rice, maize, and various pulses. The district is a significant producer of tussar silk cocoons in India, a potential area for future industrial growth. It has an excellent climate and beautiful scenery all around in it. It is full of medicinal plants and tree. Tall bamboo trees could be the sparking light for forest-based industries. This District falls under Central and North-Eastern Plateau.

Figure 39 : Block Map of Dumka District
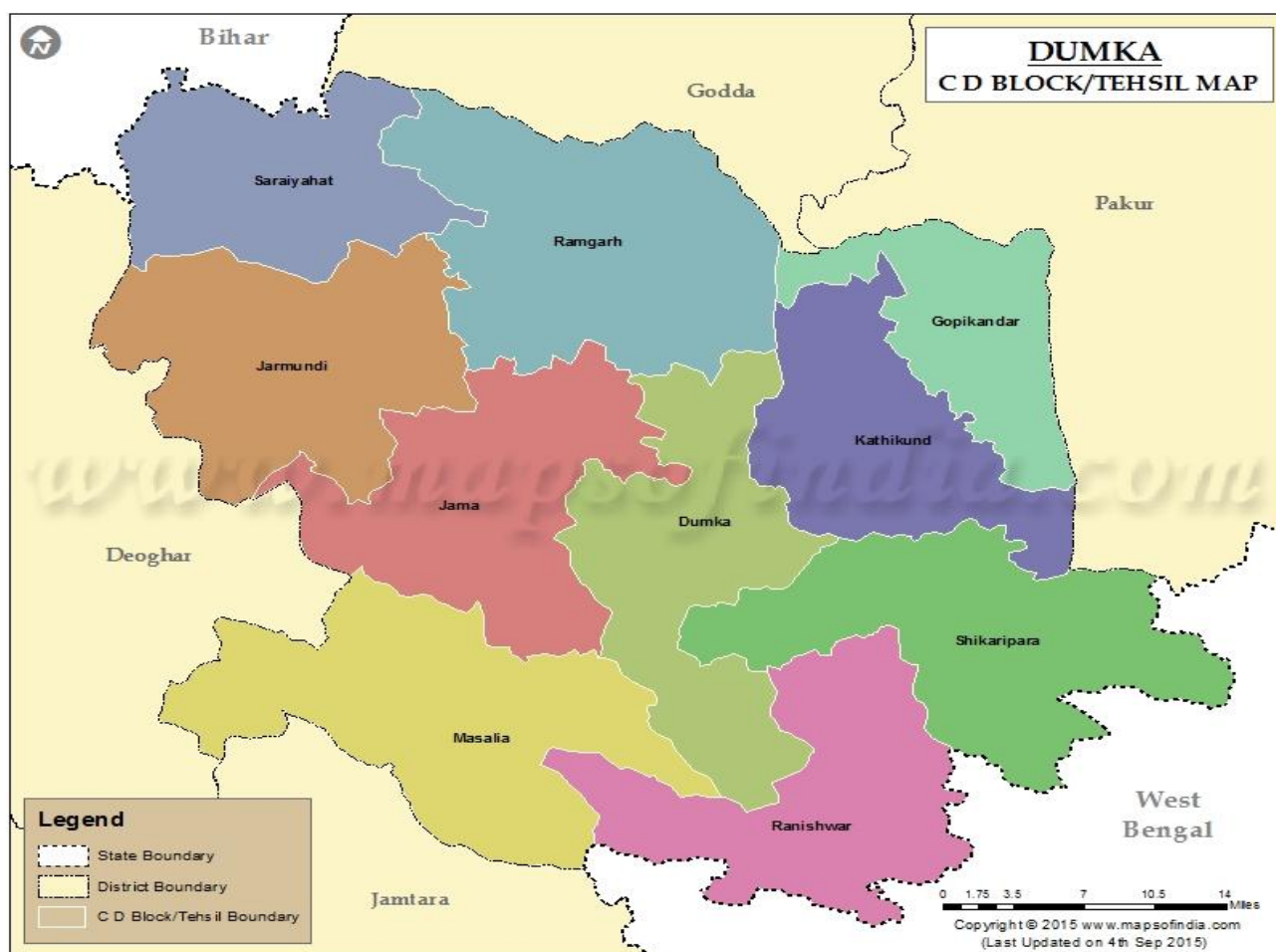
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Shri Abhijeet Sinha (I.A.S.).
b.	Lok Sabha Constituencies	Dumka
c.	Vidhan Sabha Constituencies	Shikaripara, Dumka, Jama, Jarmundi
B)	POPULATION	
d.	Total	13,21,442
e.	Male	6,68,514
f.	Female	6,52,928
C)	AREA	
g.	Total Geographical Area	3,716.2 sq. km
h.	Number of sub-divisions	1
i.	Number of blocks	10
	No. of Panchayats	206
	No. of Villages	2688
D)	DEMOGRAPHICS	
j.	Literacy Rate	61.02 %
k.	Sex Ratio	977/1000

Land Use Pattern

II. Land		
Total Geographical Area	3,761	sq km
Total Area Reported	5,61,900	Ha
Forest Land	1,11,972	Ha
% Forest Land	20 %	

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Central and North Eastern Plateau Zone
Climate	Humid to Sub-humid tropical monsoon.
Soil Type	Red & lateritic soils, sandy loam
Rainfall 2020 (in mm)	1400 mm	mm

Population Profile

IV. People & their Work			
Total		Male	Female
Population (in '000)	13,21,442	6,68,514	6,52,928
SC	79,614	40,802	38,812
ST	5,71,077	2,82,125	2,88,952
Total Households (in '000)	2,75,019		

Agriculture Profile

Net Sown Area (ha)	128,126
Gross Cropped Area(ha)	138,376
Cropping Intensity(ha)	108 %
Net Irrigated Area	30,493
% Net Sown Area is Irrigated	23.8%

Figure 40 : LULC/ Forest Cover Map - Dumka
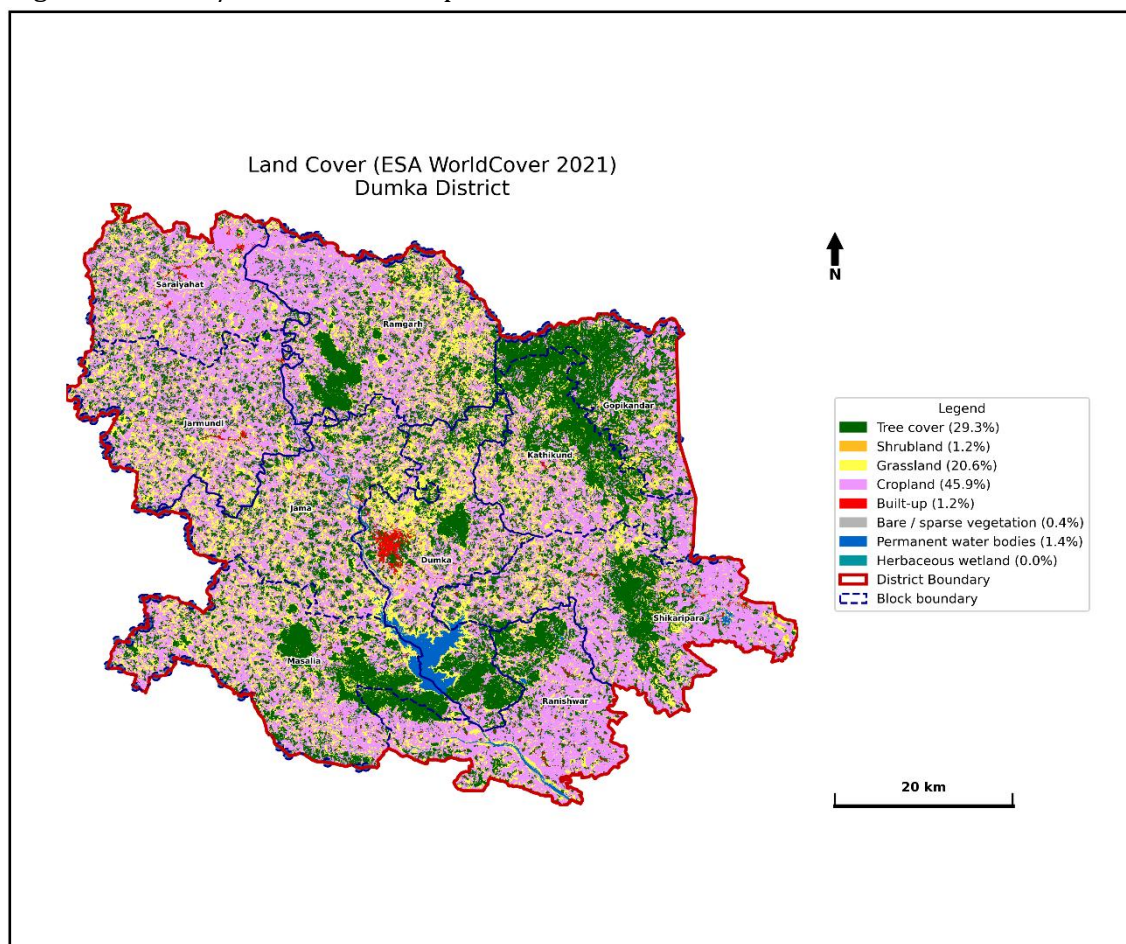
5.9.1　Vulnerability Mapping of Dumka District

Table 21 : Vulnerability Index of all Ten Blocks – Dumka District

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Gopikandar	0.72	10
2	Masalia	0.69	9
3	Jama	0.67	8
4	Kathikund	0.66	7
5	Ramgarh	0.58	6
6	Ranishwar	0.56	5
7	Shikaripara	0.53	4
8	Saraiyahat	0.46	3
9	Jarmundi	0.45	2
10	Dumka	0.37	1

Figure 41 : Ranking of Blocks in Dumka District
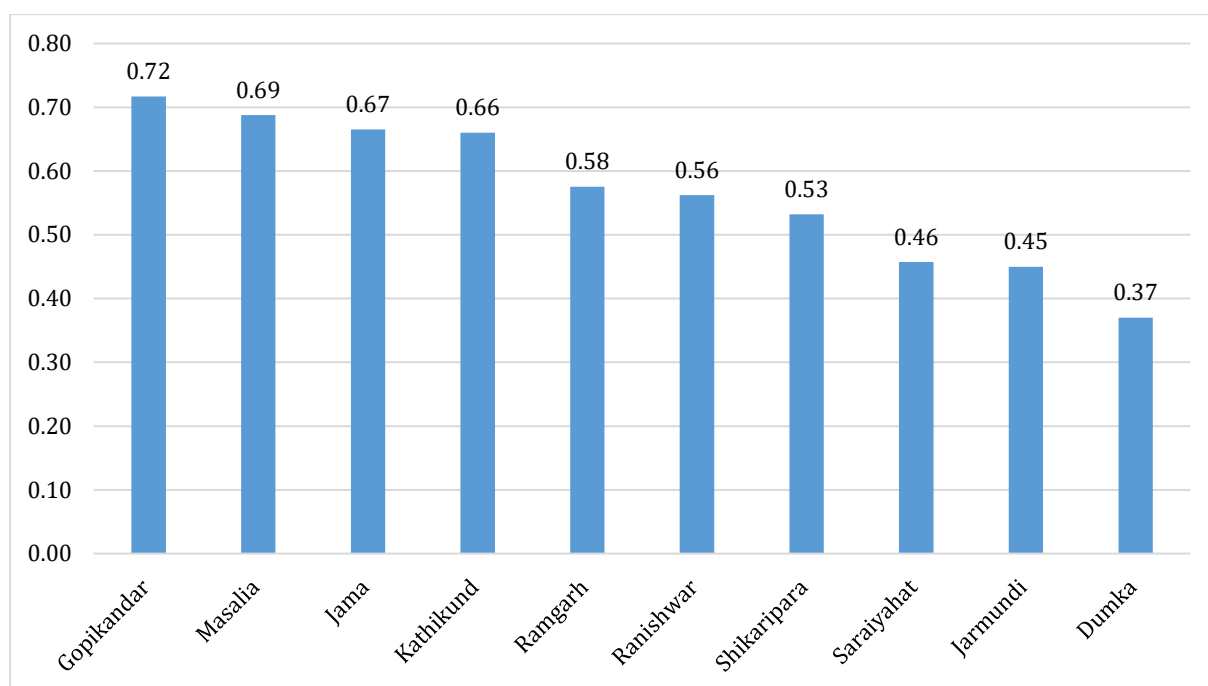
Table 22 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Gopikandar	Kathikund	Shikaripara
Masalia	Ramgarh	Saraiyahat
Jama	Ranishwar	Jarmundi
		Dumka

5.9.2   Identification of main drivers

Dumka has ten blocks within the jurisdiction of its district. Gopikandar is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land play a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 42 : Percentage Contribution of Different Indicators
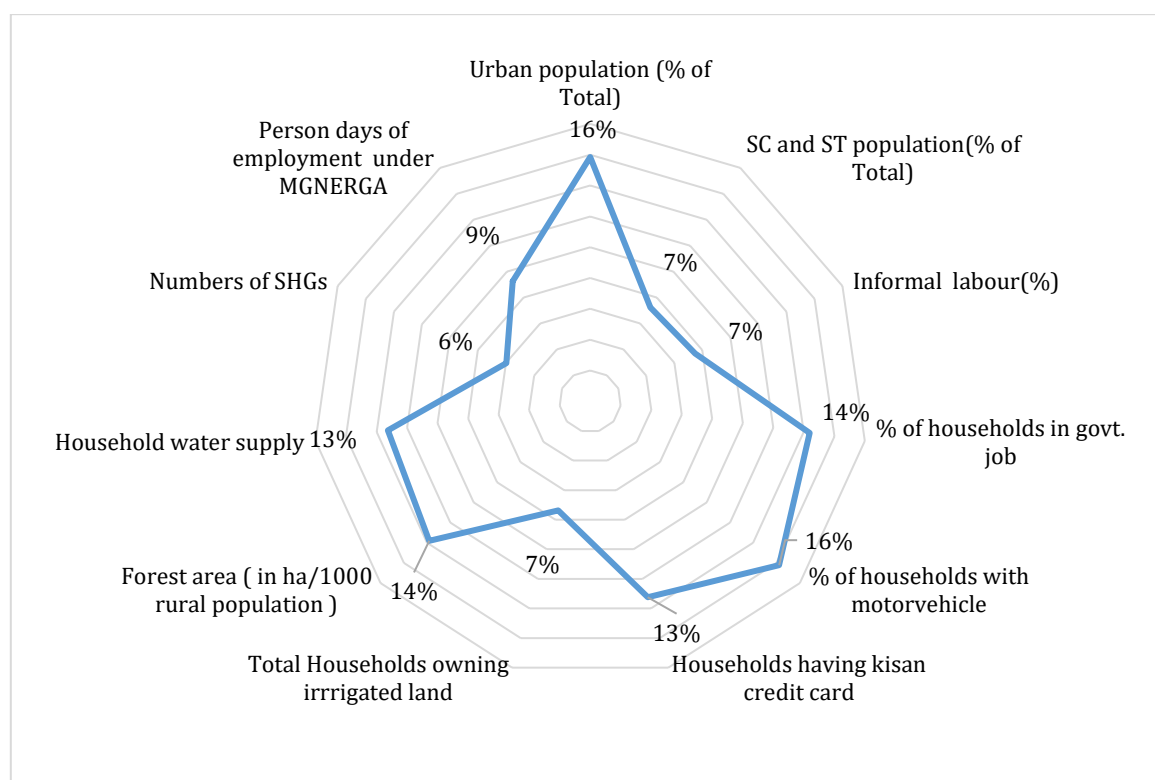
5.10 Brief Profile of the Bokaro District

This District consists of 9 blocks: Chas, Chandankiyari, Bermo, Chandrapura, Gomia, Jaridih, Kasmar, Nawadih and Petarwar.

The Bokaro district is rich in coal minerals. Other mineral like stone, sand, limestone, quartz etc are also available in the district. The rivers like Damodar, Garga, Bokaro, & Jamunia flow through the district and water is used for irrigation purpose as well as Industrial purpose The district is home to the Bokaro Steel Plant, which is one of Asia's largest steel manufacturing complexes, operated by the Steel Authority of India Limited (SAIL). This District falls under Central and North-Eastern Plateau.

Figure 43 : Block Map of Bokaro District
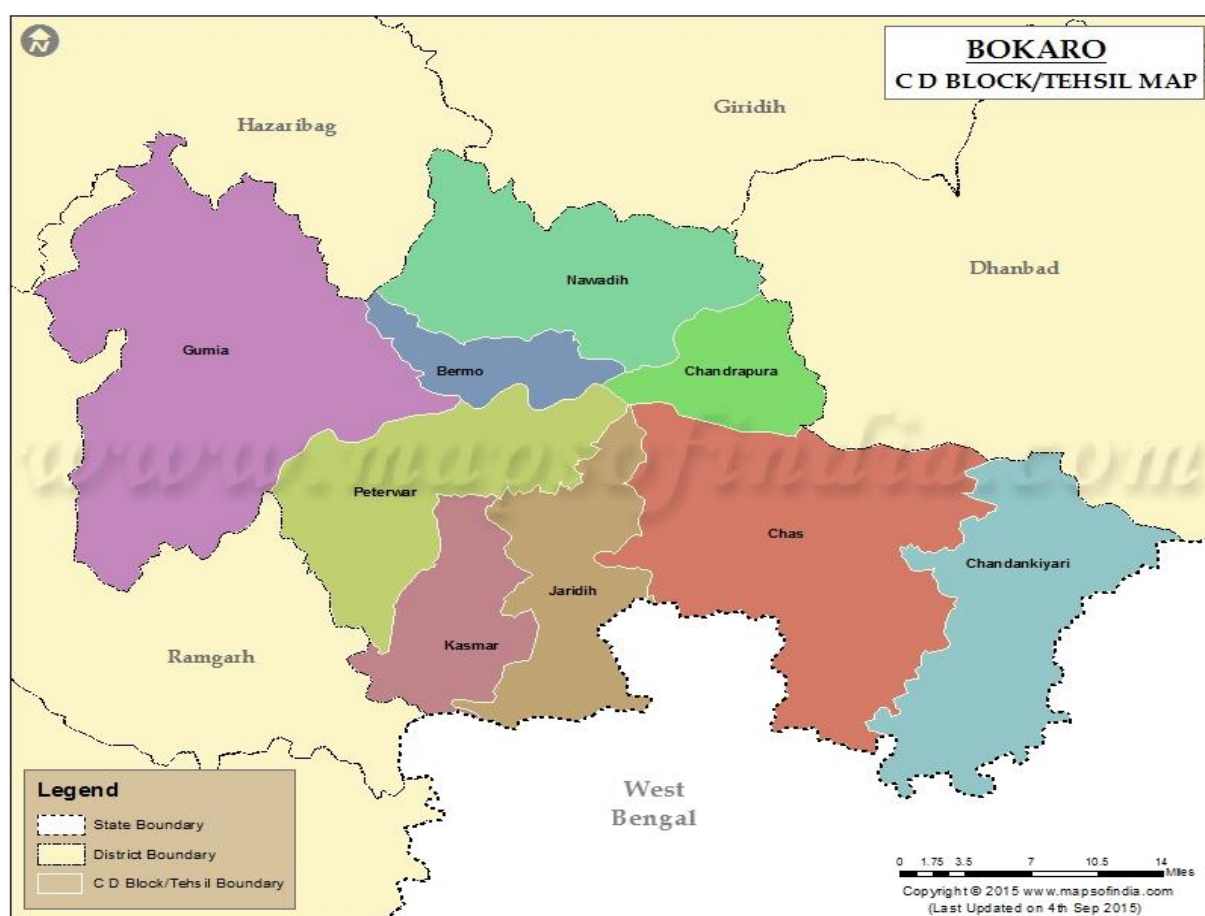
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Sri Ajay Nath Jha, (I.A.S)
b.	Lok Sabha Constituencies	Dhanbad
c.	Vidhan Sabha Constituencies	Bokaro, Gomia, Bermo, kasmar, Chandankiyari
B)	POPULATION	
d.	Total	20,62,330
e.	Male	10,72,802
f.	Female	9,89,523
C)	AREA	
g.	Total Geographical Area	2,883 sq. km
h.	Number of sub-divisions	2
i.	Number of blocks	9
	No. of Panchayats	249
	No. of Villages	751
D)	DEMOGRAPHICS	
j.	Literacy Rate	72.01 %
k.	Sex Ratio	922/1000

Land Use Pattern

II. Land		
Total Geographical Area	2,883	sq km
Total Area Reported	2,88,300	Ha
Forest Land	54,200	Ha
% Forest Land	18.8 %	

Climatic and Other Parameters

III. Characteristics		
Agro-climatic zone	Central and North Eastern Plateau Zone	
Climate	Humid to Sub-humid tropical monsoon.	
Soil Type	Red sandy & lateritic soils, Red loamy	
Rainfall 2020 (in mm)	1150 mm	mm

Population Profile

IV. People & their Work			
Total		Male	Female
Population (in '000)	20,62,330	10,72,802	9,89,523
SC	2,99,227	1,54,297	1,44,930
ST	2,55,626	1,29,233	1,26,393
Total Households (in '000)	3,94,918		

Agriculture Profile

Net Sown Area (ha)	46,600
Gross Cropped Area(ha)	53,900
Cropping Intensity(ha)	116 %
Net Irrigated Area	6,772
% Net Sown Area is Irrigated	14.5%

Figure 44 : LULC/Forest Cover Map -Bokaro
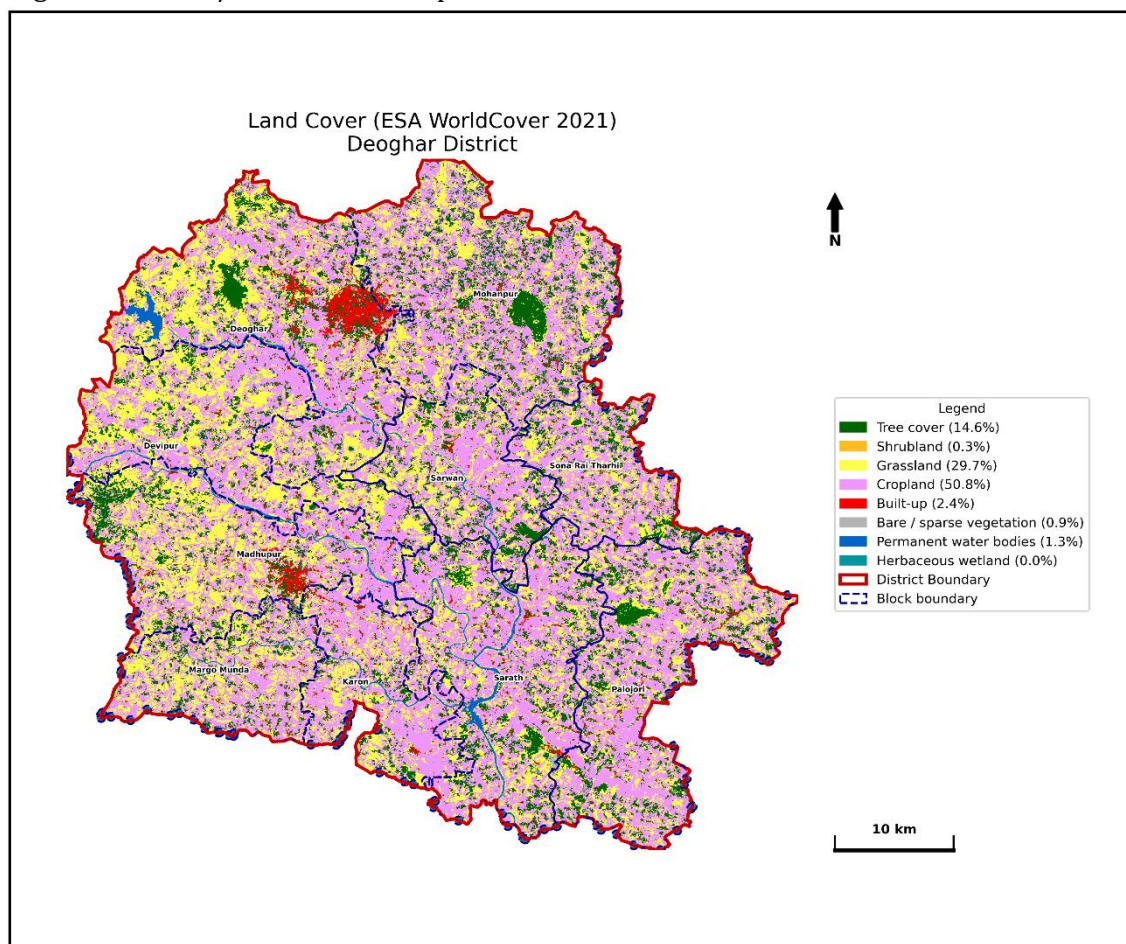
5.10.1 Vulnerability Mapping of Bokaro District

Table 23 : Vulnerability Index of all Nine Blocks – Bokaro District

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Peterwar	0.66	9
2	Chandankiyari	0.66	8
3	Kasmar	0.65	7
4	Jaridih	0.64	6
5	Nawadih	0.63	5
6	Chandrapura	0.48	4
7	Gumia	0.35	3
8	Bermo	0.35	2
9	Chas	0.15	1

Figure 45 : Ranking of Blocks in Bokaro District
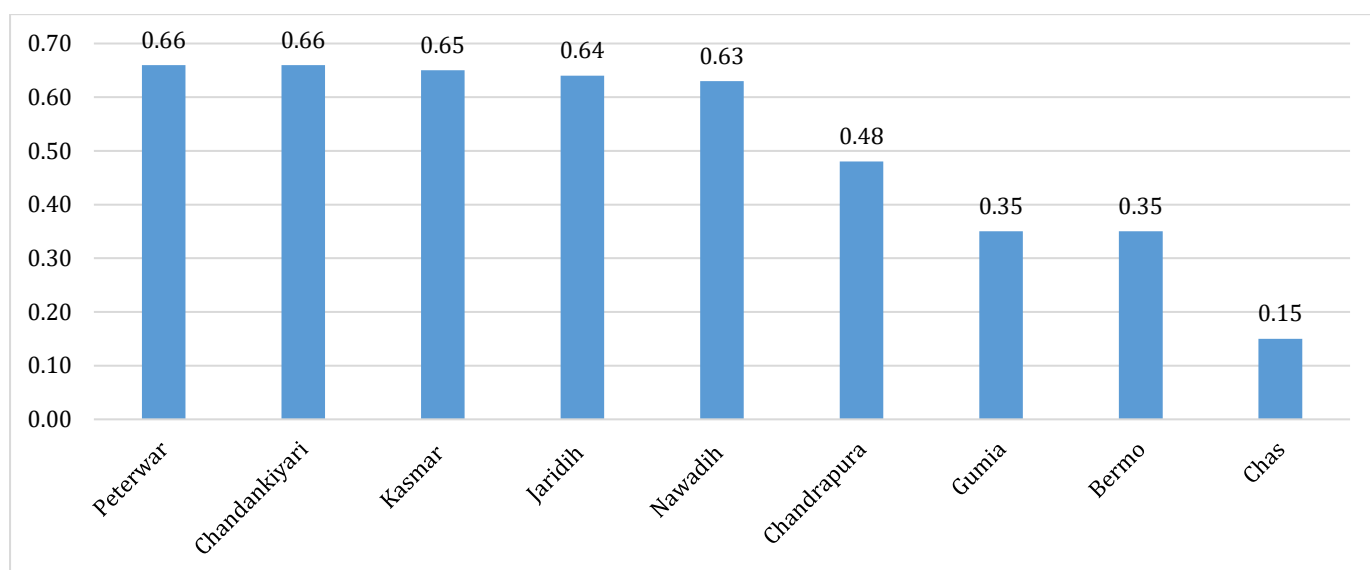
Table 24 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Peterwar	Jaridih	Gumia
Chandankiyari	Nawadih	Bermo
Kasmar	Chandrapura	Chas

5.10.2 Identification of main drivers

Bokaro has Nine blocks within the jurisdiction of its district. Peterwar is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land play a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 46 : Percentage Contribution of Different Indicators
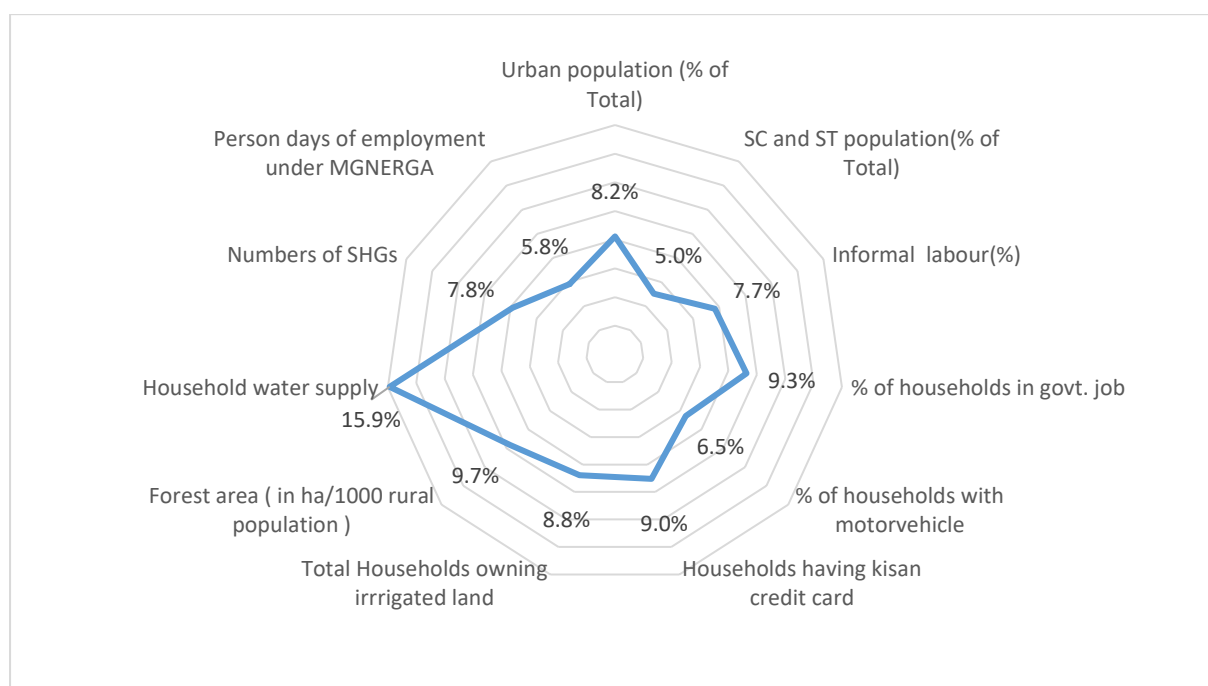
5.11 Brief Profile of the Koderma District

This district consists of 6 blocks: Koderma, Jainagar, Domchanch, Markacho, Satgawan and Chandwara.

This district Famous by the name of the Mica city. In the district, minerals such as Mica, Limestone, Fire Clay, Feldspar, Metallic stone and other precious stone are found in good quantity, China Clay, Quartz are found.

The economy is primarily dependent on agriculture and the mineral industry, particularly small-scale mining and related labour welfare activities. The majority of the population (around 58%) relies on agriculture. Rice is the main crop, with other crops including wheat, corn, pulses, and vegetables. This District falls under Central and North-eastern Plateau.

Figure 47: Block Map of Koderma District
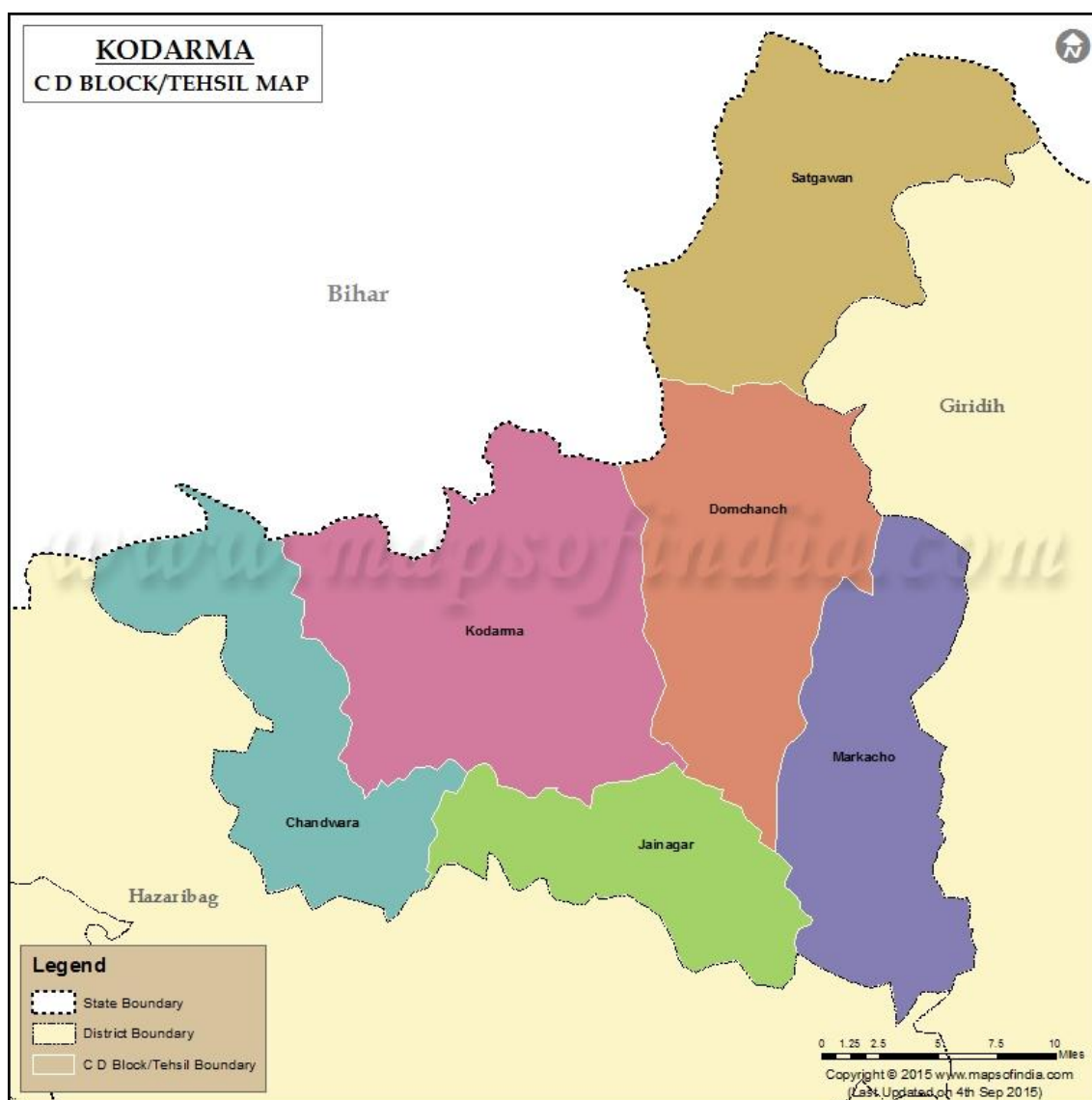
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Shri Rituraj (IAS)
b.	Lok Sabha Constituencies	Koderma
c.	Vidhan Sabha Constituencies	Koderma,Barkatha,Dhanwar,Bagodar,Jamua,Gandey
B)	POPULATION	
d.	Total	7,16,259
e.	Male	3,67,222
f.	Female	3,49,037
C)	AREA	
g.	Total Geographical Area	1,656 sq. km
h.	Number of sub-divisions	2
i.	Number of blocks	6
	No. of Panchayats	109

	No. of Villages	717
D)	**DEMOGRAPHICS**	
j.	Literacy Rate	66.84 %
k.	Sex Ratio	950/1000

Land Use Pattern

II. Land		
Total Geographical Area	1,656	sq. km
Total Area Reported	1,65,600	Ha
Forest Land	64,796.90	Ha
% Forest Land	39.1 %	

Climatic and Other Parameters

III. Characteristics		
Agro-climatic zone	Central and North Eastern Plateau Zone	
Climate	Humid to Sub-humid tropical monsoon.	
Soil Type	Red sandy & lateritic soils, Red loamy	
Rainfall 2020 (in mm)	1192 mm	mm

Population Profile

IV. People & their Work			
Total		Male	Female
Population (in '000)	7,16,259	3,67,222	3,49,037
SC	1,09,003	55,346	53,657
ST	6,903	3,594	3,309
Total Households (in '000)	1,16,155		

Agriculture Profile

Net Sown Area (ha)	41,457
Gross Cropped Area(ha)	49,960
Cropping Intensity(ha)	121 %
Net Irrigated Area	7,572
% Net Sown Area is Irrigated	15%
GPs having 20-80% area irrigated	%

Figure 48 : LULC/ Forest Cover Map- Koderma
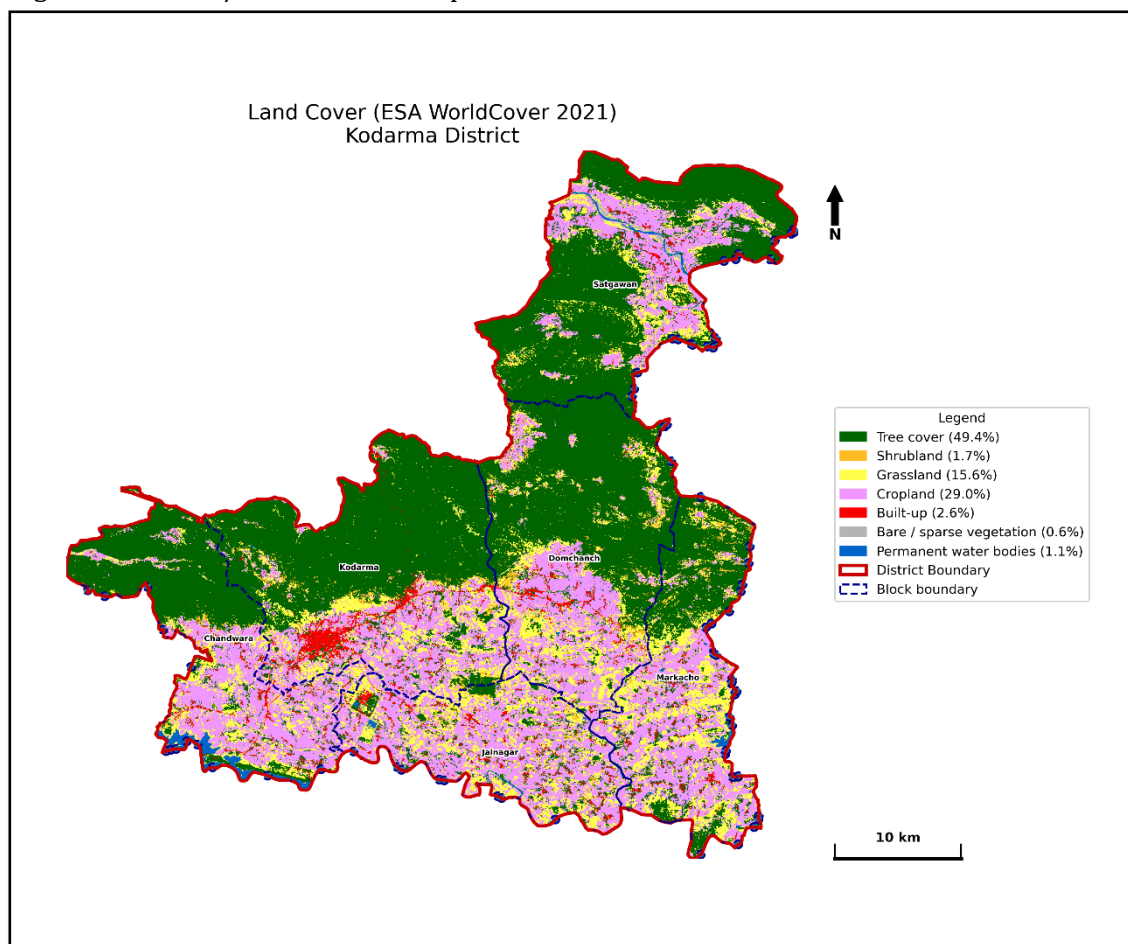
5.11.1 Vulnerability Mapping of Koderma District

Table 25 : Vulnerability Index of all Six Blocks – Koderma District

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Chandwara	0.71	6
2	Satgawan	0.55	5
3	Kodarma	0.45	4
4	Jainagar	0.45	3
5	Domchanch	0.44	2
6	Markacho	0.41	1

Figure 49 : Ranking of Blocks in Koderma District

Table 26 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Chandwara	Kodarma	Domchanch
Satgawan	Jainagar	Markacho

5.11.2 Identification of main drivers

Koderma has six blocks within the jurisdiction of its district. Chandwara is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land play a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 50 : Percentage Contribution of Different Indicators
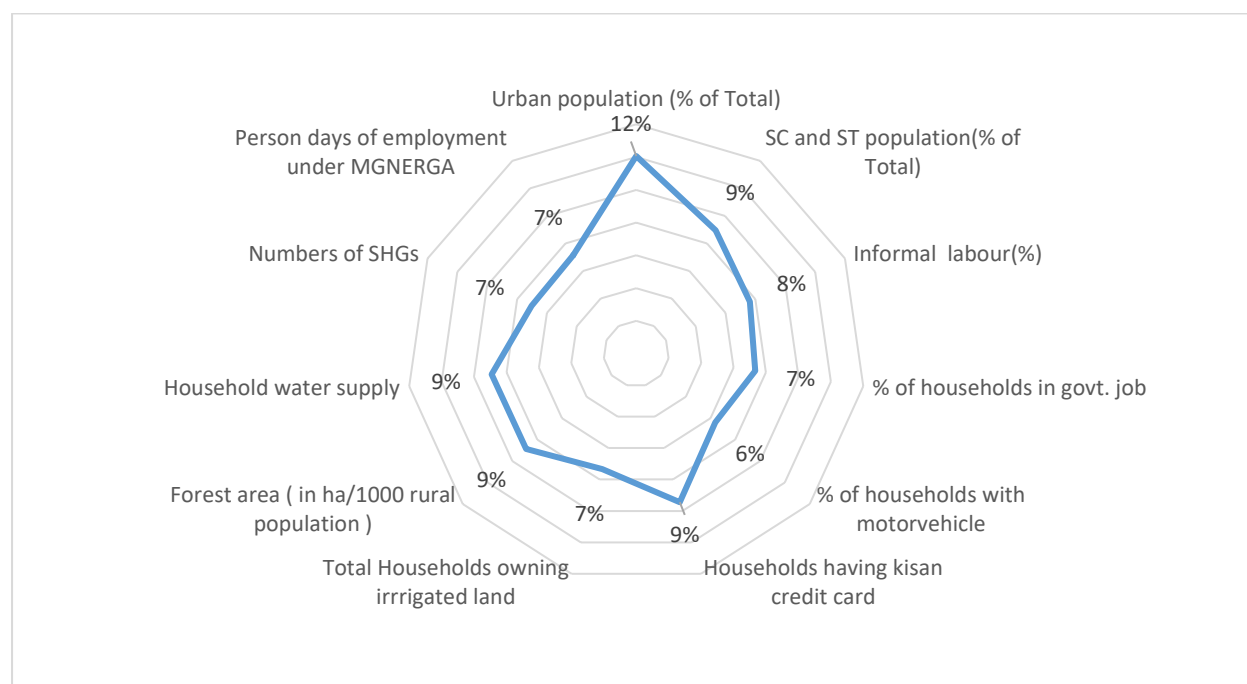
5.12 Brief Profile of the Godda District

This district consists of 9 blocks: Basantrai, Boarijor, Godda, Mahagama, Meherma, Pathargama, Poreyahat, Sundarpahari and Thakurgangti.

Godda's economy is predominantly agricultural, with key crops being paddy, wheat, and maize. However, its mineral wealth is substantial, primarily centered around large-scale coal mines. Godda is the land of a tribe called Santhals. This District falls under Central and North-Eastern Plateau.

Figure 51 : Block Map of Godda District

District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Smt. Anjali Yadav (I.A.S.)
b.	Lok Sabha Constituencies	Godda
c.	Vidhan Sabha Constituencies	Mahagama,Madhupur,Deoghar,Poreyahat,Godda,Jama
B)	POPULATION	
d.	Total	13,13,551
e.	Male	6,77,927
f.	Female	6,35,624
C)	AREA	
g.	Total Geographical Area	2,110 sq. km
h.	Number of sub-divisions	2
i.	Number of blocks	9
	No. of Panchayats	109
	No. of Villages	717
D)	DEMOGRAPHICS	
j.	Literacy Rate	66.84 %

k.	Sex Ratio	950/1000

Land Use Pattern

II. Land		
Total Geographical Area	2,110	sq km
Total Area Reported	2,11,040	Ha
Forest Land	23,670	Ha
% Forest Land	11.2 %	

Climatic and Other Parameters

III. Characteristics		
Agro-climatic zone	Central and North Eastern Plateau Zone	
Climate	Humid to Sub-humid tropical monsoon.	
Soil Type	Red sandy & lateritic soils, Red loamy	
Rainfall 2020 (in mm)	1063 mm	mm

Population Profile

IV. People & their Work			
Total		Male	Female
Population (in '000)	13,13,551	6,77,927	6,35,624
SC	1,15,567	59,835	55,732
ST	2,79,208	1,38,510	1,40,698
Total Households (in '000)	2,61,149		

Agriculture Profile

Net Sown Area (ha)	78,210
Gross Cropped Area(ha)	90,688
Cropping Intensity(ha)	116 %
Net Irrigated Area	12,478
% Net Sown Area is Irrigated	16%

Figure 52 : LULC/ Forest Cover Map -Godda
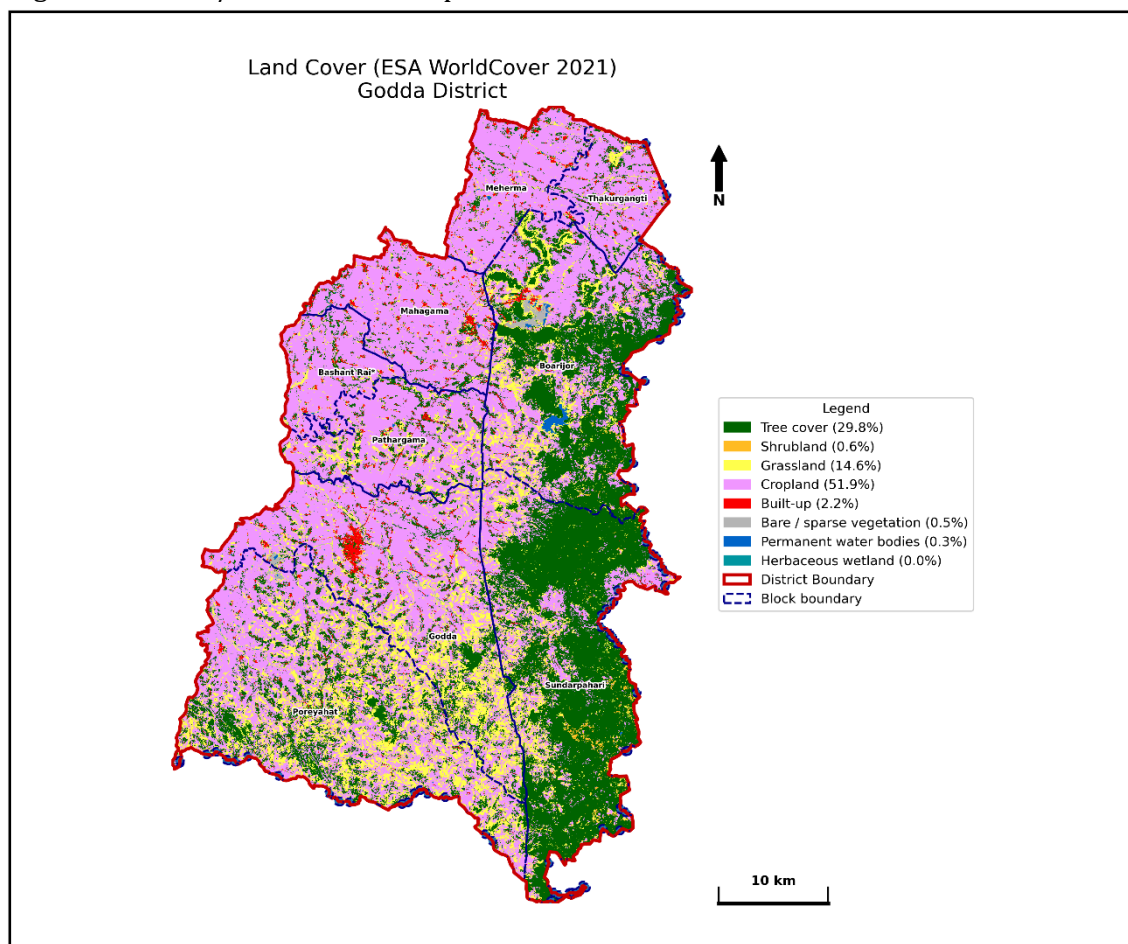
5.13 Vulnerability Mapping of Godda District

Table 27 : Vulnerability Index of all Nine Blocks – Godda

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Sundarpahari	0.68	9
2	Bashant Rai	0.62	8
3	Thakurgangti	0.60	7
4	Meherma	0.60	6
5	Pathargama	0.54	5
6	Boarijor	0.49	4
7	Mahagama	0.47	3
8	Poreyahat	0.40	2
9	Godda	0.19	1

Figure 53 : Ranking of Blocks in Godda
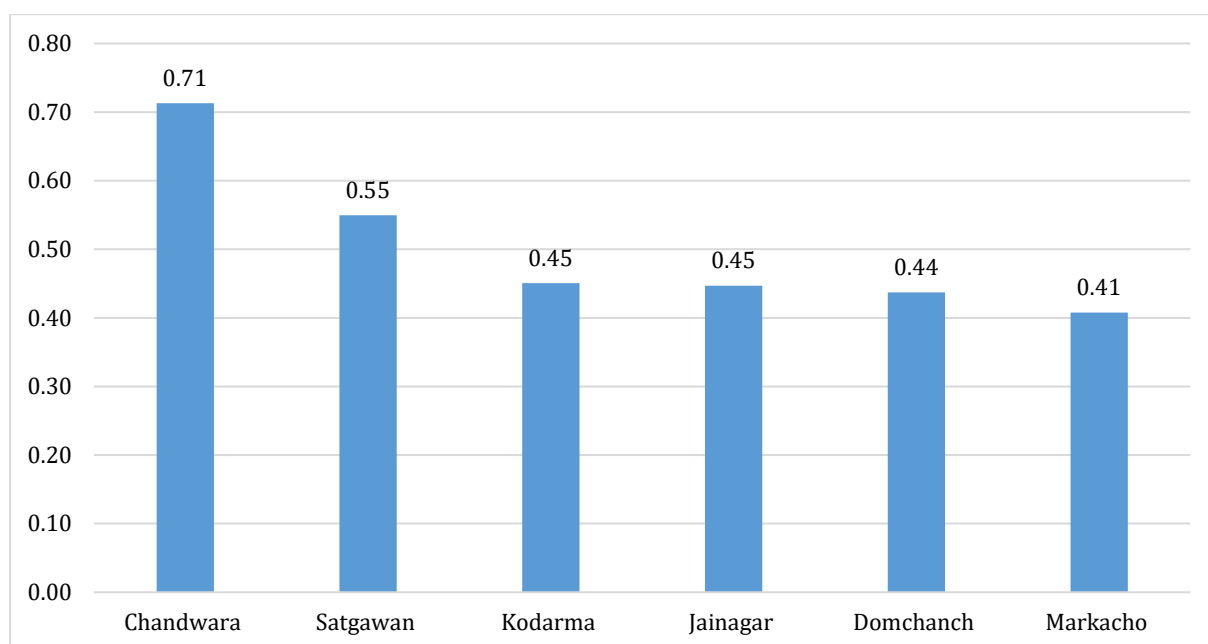

Table 28 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Sundarpahari	Meherma	Mahagama
Bashant Rai	Pathargama	Poreyahat
Thakurgangti	Boarijor	Godda

5.13.1 Identification of main drivers

Godda has Nine blocks within the jurisdiction of its district. Sudarpahri is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 54 : Percentage Contribution of Different Indicators
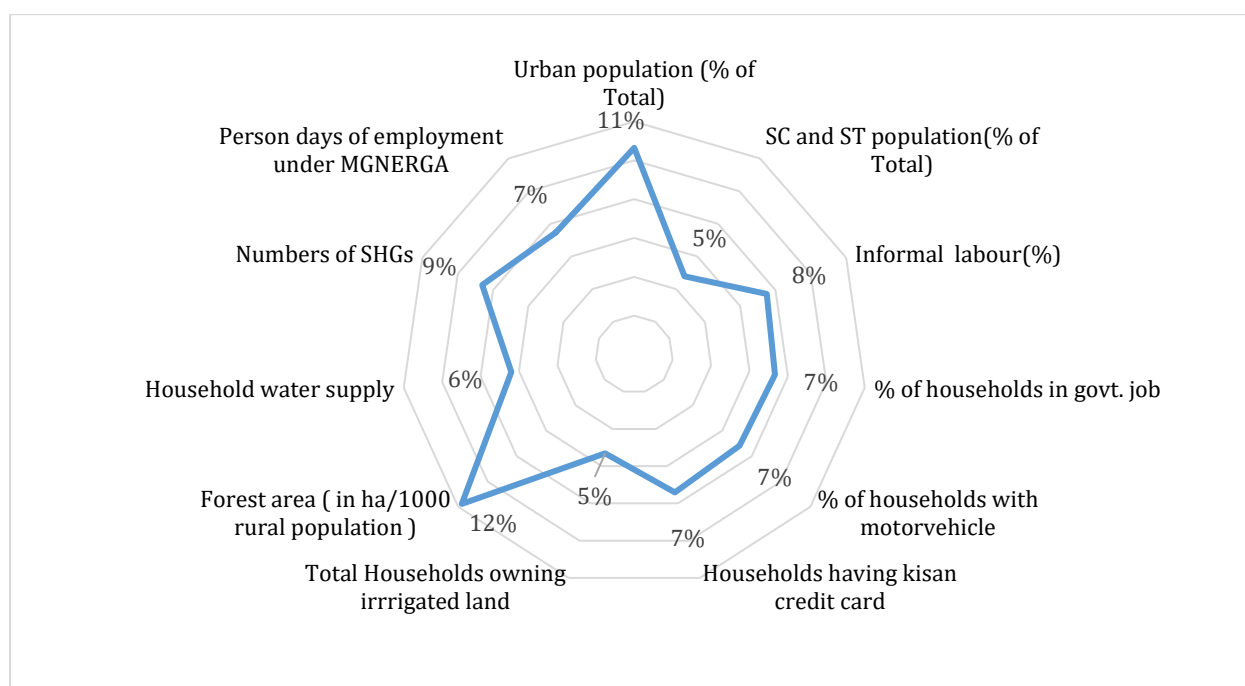
5.14 Brief Profile of the Dhanbad District

This District consists of 10 blocks Baghmara, Baliapur, Dhanbad, Govindpur, Nirsa, Topchanchi,Tundi, Egarkund, Kaliasole.

Dhanbad is a highly industrialized district in Jharkhand, popularly known as the "Coal Capital of India" due to its vast coal reserves and extensive mining industry. The district plays a vital role in the nation's energy production and is a major economic hub in the region. Dhanbad's economy revolves primarily around coal mining and related heavy industries.

The district is characterized by an undulating landscape and is traversed by the Damodar and Barakar rivers. The Maithon and Panchet Dams are major hydel power projects. This District falls under central and North-Eastern Plateau.

Figure 55: Block map of Dhanbad District

District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Shri Aditya Ranjan
b.	Lok Sabha Constituencies	Dhanbad
c.	Vidhan Sabha Constituencies	Dhanbad,Jharia,Sindri,Nirsa,Baghmara,Tundi
B)	POPULATION	
d.	Total	28,46,954
e.	Male	14,98,305
f.	Female	13,48,649
C)	AREA	
g.	Total Geographical Area	2,886 sq. km
h.	Number of sub-divisions	1
i.	Number of blocks	10
	No. of Panchayats	181
	No. of Villages	1209
D)	DEMOGRAPHICS	

j.	Literacy Rate	74.52 %
k.	Sex Ratio	909/1000

Land Use Pattern

II. Land		
Total Geographical Area	2,886	sq km
Total Area Reported	2,88,600	Ha
Forest Land	20,646	Ha
% Forest Land	7 %	

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Central and North Eastern Plateau Zone
Climate	tropical Sub-humid tropical monsoon.
Soil Type	Red sandy & lateritic soils, Alluvial Soil
Rainfall 2020 (in mm)	1200 mm	mm

Population Profile

IV. People & their Work		Male	Female
Total		Male	Female
Population (in '000)	26,84,487	14,98,305	13,48,649
SC	4,37,309	2,26,362	2,10,947
ST	2,33,119	1,17,256	1,15,863
Total Households (in '000)	3,37,118		

Agriculture profile

Agriculture Profile	
Net Sown Area (ha)	92,301
Gross Cropped Area(ha)	1,30,511
Cropping Intensity(ha)	141 %
Net Irrigated Area	20,508
% Net Sown Area is Irrigated	22%

Figure 56: LULC/ Forest Cover Map- Dhanbad
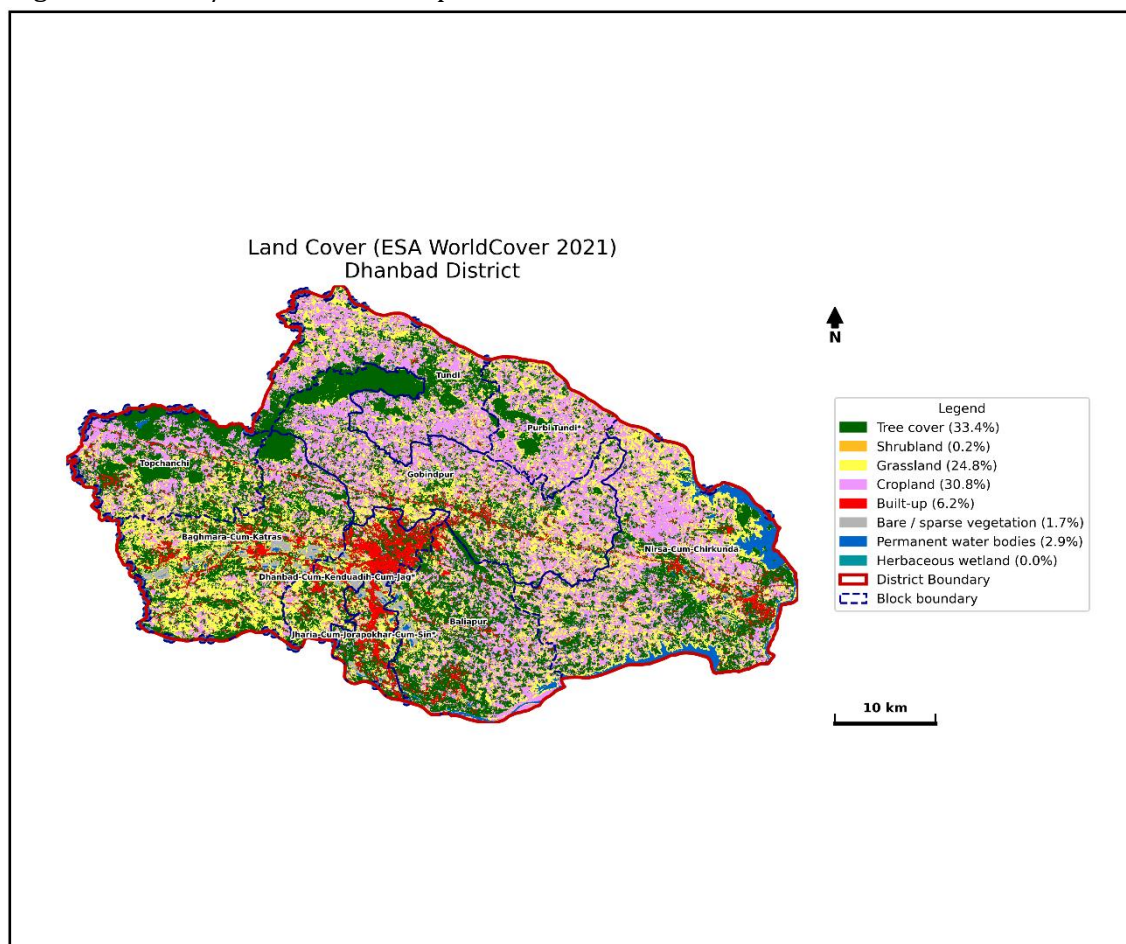
Table 29 : Vulnerability Index of all Eight Blocks – Dhanbad District

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Purbi Tundi	0.82	8
2	Baliapur	0.68	7
3	Tundi	0.68	6
4	Topchanchi	0.61	5
5	Nirsa-Cum-Chirkunda	0.60	4
6	Gobindpur	0.48	3
7	Baghmara-Cum-Katras	0.40	2
8	Dhanbad-Cum-Kenduadih-Cum-Jagata	0.37	1

Figure 57: Ranking of Blocks in Dhanbad District
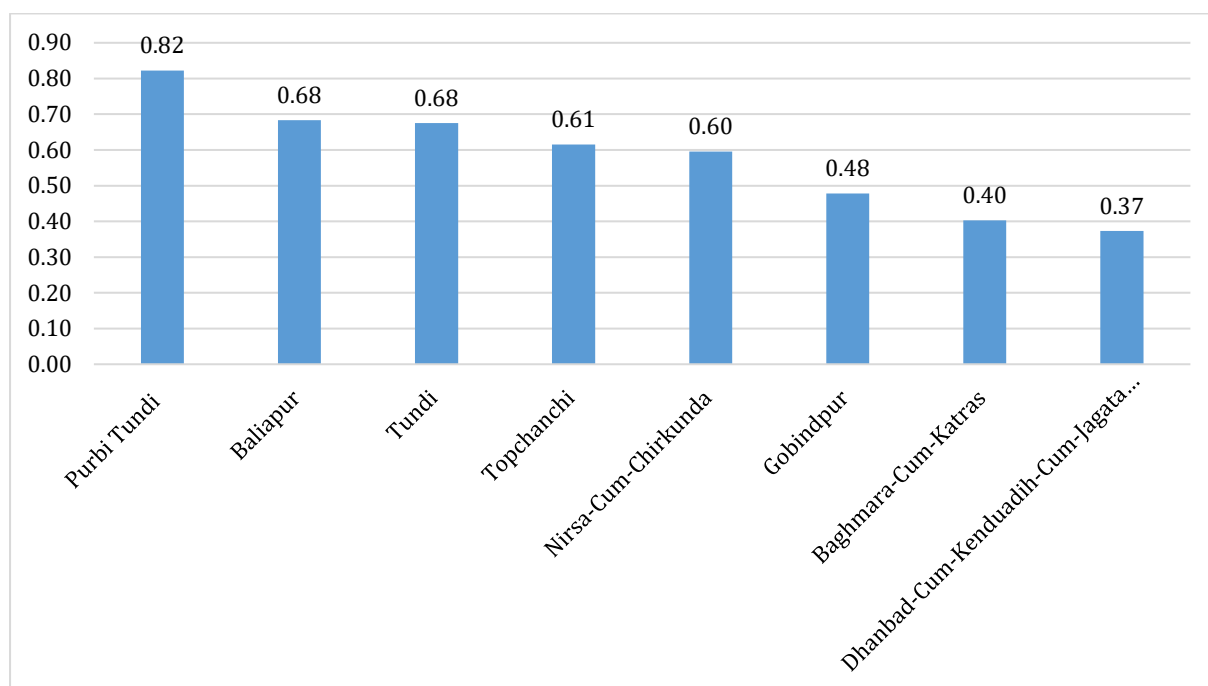
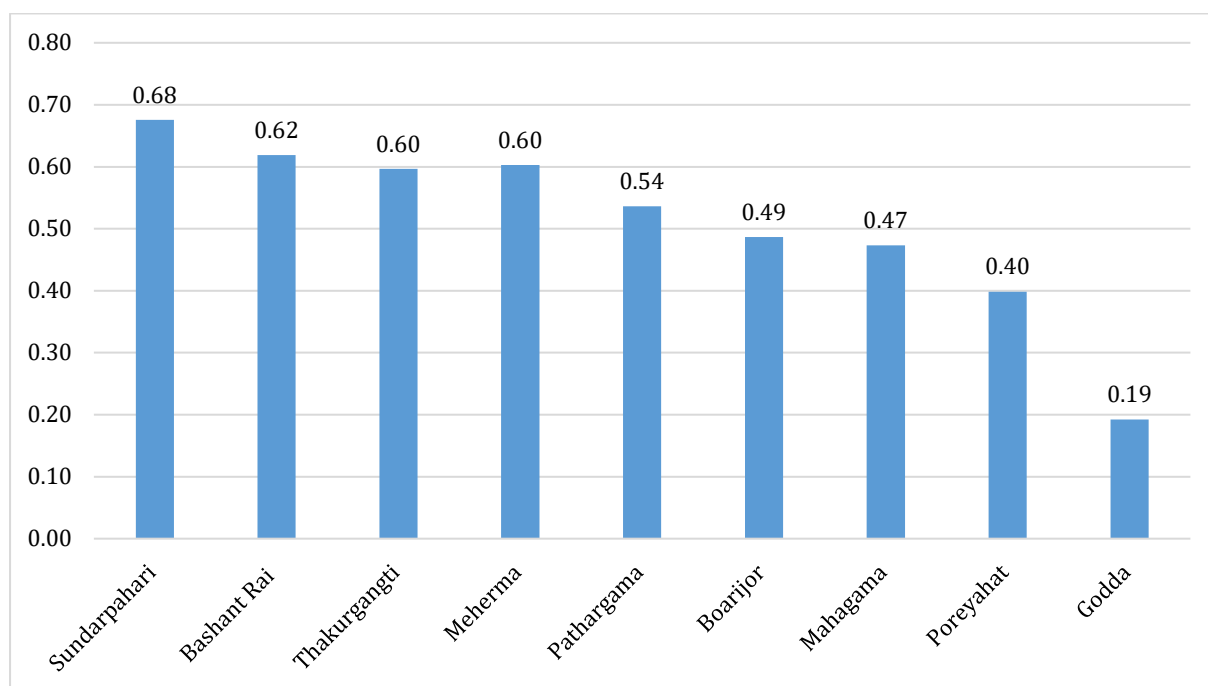
Table 30 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Purbi Tundi	Topchanchi	Baghmara-Cum-Katras
Baliapur	Nirsa-Cum-Chirkunda	Dhanbad-Cum-Kenduadih-Cum-Jagata
Tundi	Gobindpur	

5.14.1 Identification of main drivers

Dhanbad has Eight blocks within the jurisdiction of its district. Purbi Tundi is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 58 : Percentage Contribution of Different Indicators
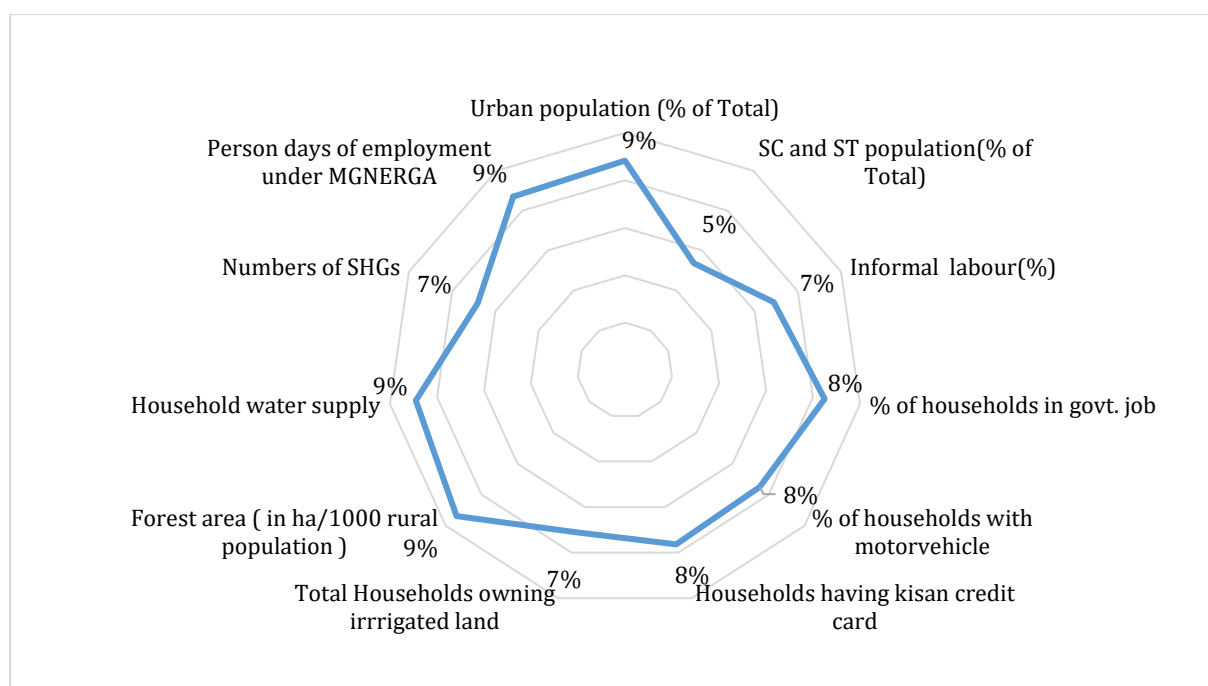
5.15 Brief Profile of the Garhwa District

This District consists of 20 blocks Garhwa_Sadar, Meral, Ramna, BanshidharNagar, Bhawanathpur, Bardiha, Bhandaria, Chinia, Ranka, Ramkanda, Dhurki, Bishunpura, Manjhiaon, Kandi, Kharaundhi, Danda, Dandai, Bargarh, Ketar and Sagma.

The economy is predominantly agrarian, with most of the population depending on agriculture and allied activities. The main crops are rice, maize, and wheat. The district is rich in mineral resources. Deposits of Graphite, China clay and Granite are also available in this district. The district is characterized by an undulating hilly terrain and is rich in forest cover and mineral resources. This District falls under Western Plateau.

Figure 59: Block Map of Garhwa District
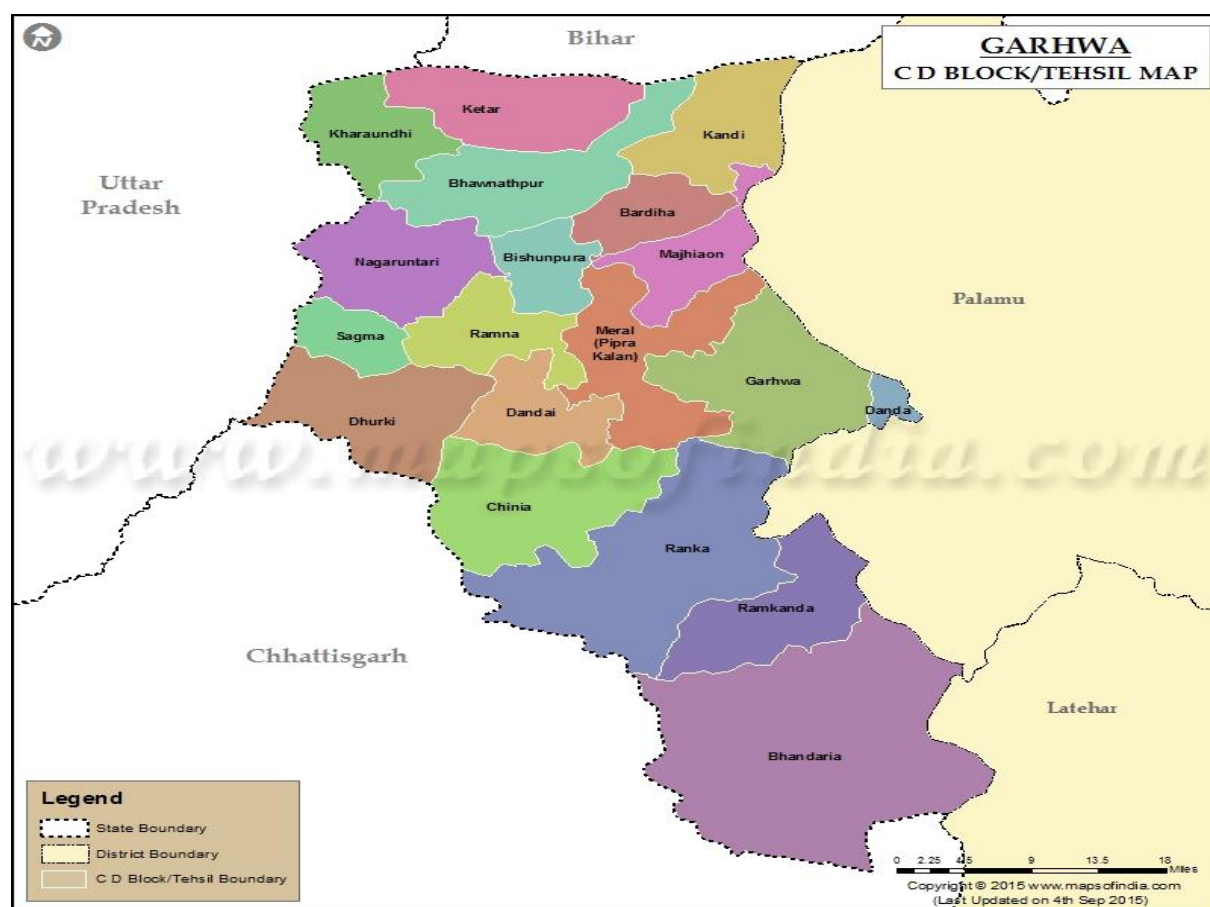
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Shri Dinesh Kumar Yadav (I.A.S)
b.	Lok Sabha Constituencies	Garhwa
c.	Vidhan Sabha Constituencies	Garhwa, Bhwanathpur, Daltonganj, Barkagaon, Sisai, Chhatarpur
B)	POPULATION	
d.	Total	10,35,464
e.	Male	5,35,332
f.	Female	5,00,132
C)	AREA	
g.	Total Geographical Area	4,044 sq. km
h.	Number of sub-divisions	1
i.	Number of blocks	20
J	No. of Panchayats	189
k	No. of Villages	915
D)	DEMOGRAPHICS	
j.	Literacy Rate	80 %
k.	Sex Ratio	892/1000

Land Use Pattern

II. Land		
Total Geographical Area	4,044	sq. km
Total Area Reported	4,04,400	Ha
Forest Land	1,07,016	Ha
% Forest Land	26.5 %	

Climatic and Other Parameters

III. Characteristics		
Agro-climatic zone	Chotanagpur Plateau Zone	
Climate	tropical Sub-humid tropical monsoon.	
Soil Type	Red & lateritic soils, Alluvial Soil	
Rainfall 2020 (in mm)	1200 mm	Mm

Population Profile

IV. People & their Work			
Total		Male	Female
Population (in '000)	10,35,464	10,35,464	10,35,464
SC	43,362	43,362	43,362
ST	67,457	67,457	67,457
Total Households (in '000)	1,54,176		

Agriculture profile

Net Sown Area (ha)	1,10,926
Gross Cropped Area(ha)	1,95,630
Cropping Intensity(ha)	176 %
Net Irrigated Area	35,178
% Net Sown Area is Irrigated	31.7%

Figure 60: LULC/ Forest Cover Map -Garhwa
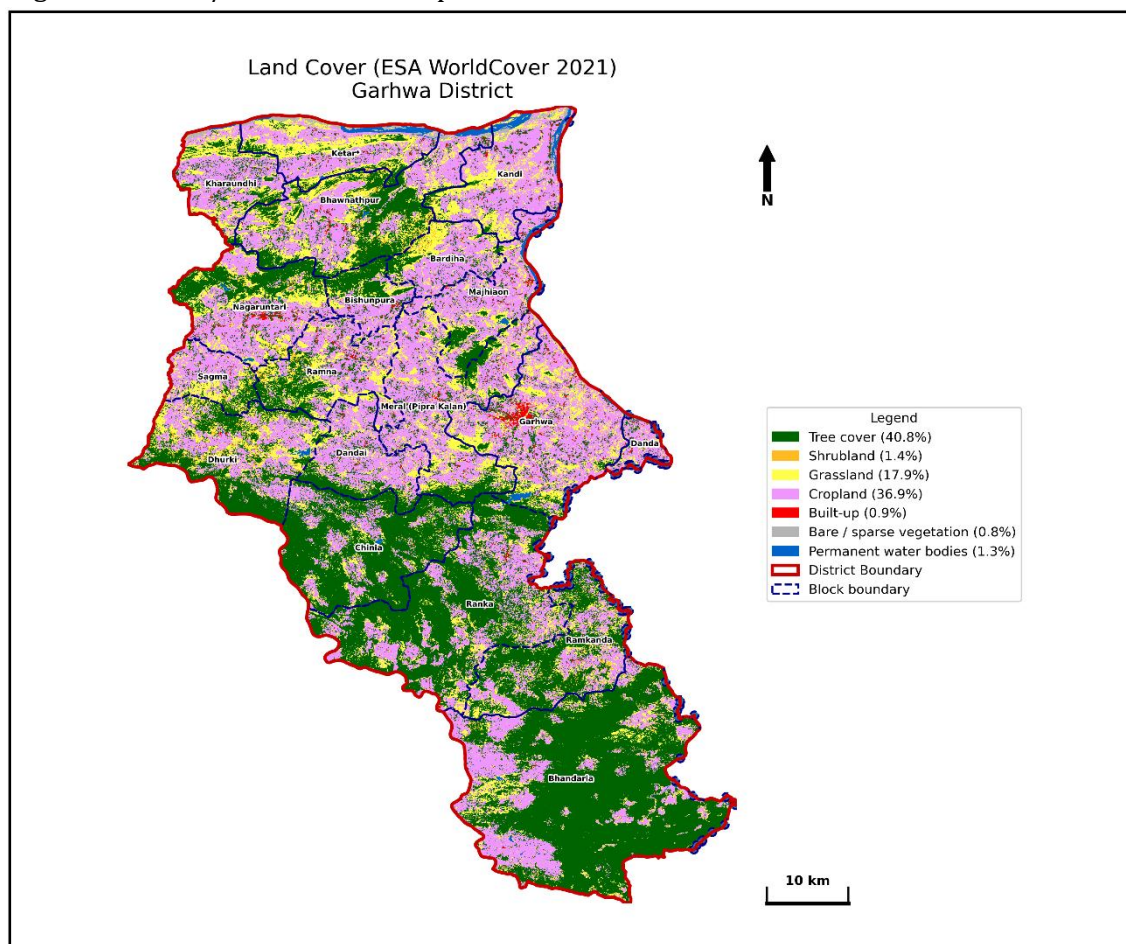
Table 31 : Vulnerability Index of all 19 Blocks – Garhwa District

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Dhurki	0.71	19
2	Danda	0.70	18
3	Kharaundhi	0.68	17
4	Bardiha	0.68	16
5	Chinia	0.67	15
6	Sagma	0.67	14
7	Ketar	0.66	13
8	Ramna	0.64	12
9	Bishunpura	0.63	11
10	Ramkanda	0.61	10
11	Ranka	0.60	9
12	Bhandaria	0.60	8

| 13	Dandai	0.56	7
14	Majhiaon	0.53	6
15	Nagaruntari	0.48	5
16	Meral (Pipra Kalan)	0.47	4
17	Kandi	0.47	3
18	Bhawnathpur	0.41	2
19	Garhwa	0.23	1

Figure 61 : Ranking of Blocks in Garhwa District
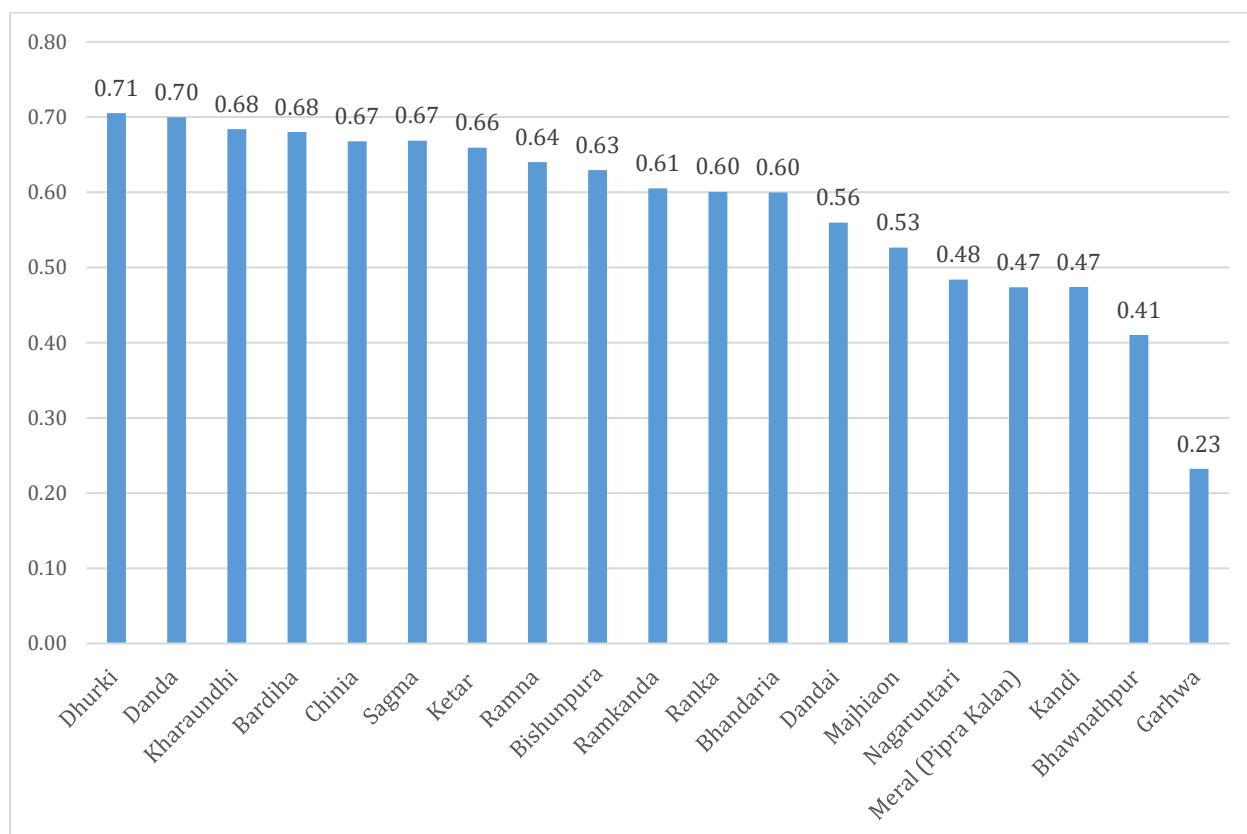
Table 32 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Dhurki	Ramna	Nagaruntari
Danda	Bishunpura	Meral (Pipra Kalan)
Kharaundhi	Ramkanda	Kandi
Bardiha	Ranka	Bhawnathpur
Chinia	Bhandaria	Garhwa
Sagma	Dandai	
Ketar	Majhiaon	

5.15.1 Identification of main drivers

Garwha has Nineteen blocks within the jurisdiction of its district. Dhurki is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

Figure 62 : Percentage Contribution of Different Indicators
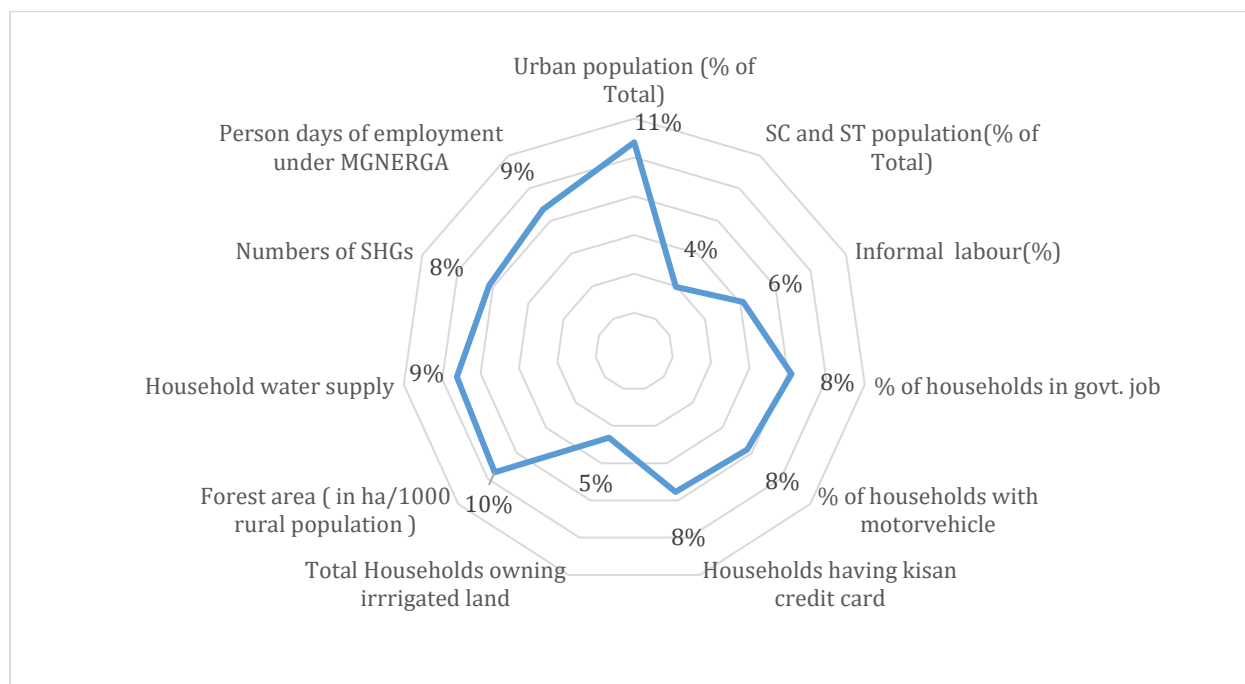
5.16 Brief Profile of the East Singhbhum District

This District consists of 11 blocks: Golmuri-cum-Jugsalai, Patamda, Boram, Potka, Dhalbhumgarh, Ghatshila, Musabani, Dumaria, Chakulia, Baharagora, Gurabanda. The district has 231 Panchayats and 1785 Villages.

About 53% of the total area of district is covered by residual mountains and hills consisting of granite,gneiss,schist.It is a part of Chhotanagpur plateau. The district is rich in minerals and these are found abundantly.
The Climate of the district is temperate. Annual rainfall is 1200 mm to 1400 mm. The district is rich in minerals and is found abundantly. Iron Ore, Copper, Uranium, Gold Kynite are the main minerals.

Figure 63 : Blocks in East Singhbhum District
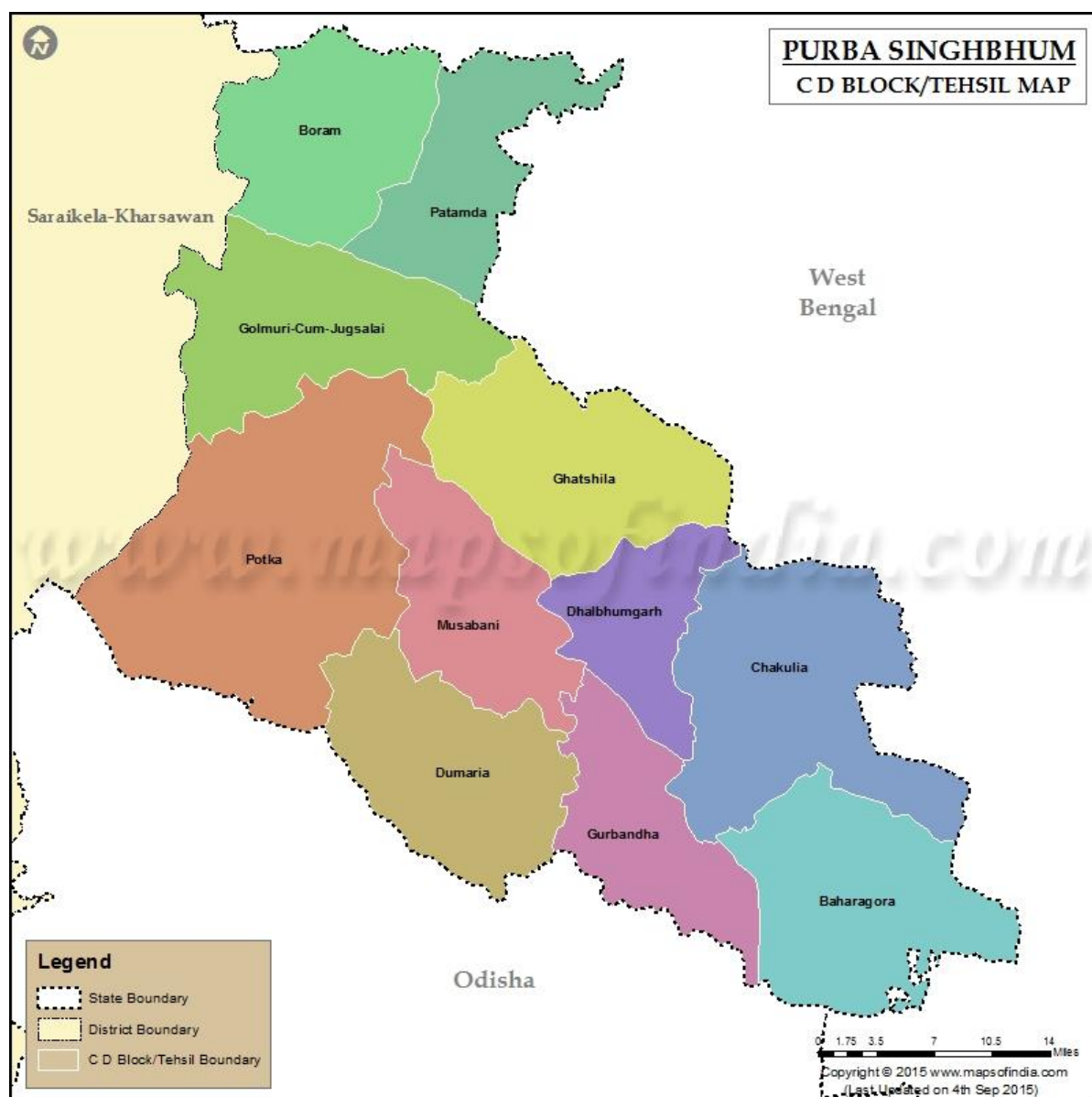
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	SHRI KARN SATYARTHI (I.A.S)
b.	Lok Sabha Constituencies	Jamshedpur
c.	Vidhan Sabha Constituencies	Jamshedpur east, Jamshedpur west, Jugsalai, Potka,Ghatsila, Musabani
B)	POPULATION	
d.	Total	22,93,919
e.	Male	11,76,902
f.	Female	11,17,017
C	AREA	

)		
g.	Total Geographical Area	3,533 sq. km
h.	Number of sub-divisions	2
i.	Number of blocks	11
	No. of Panchayats	231
	No. of Villages	1,785
D)	**DEMOGRAPHICS**	
j.	Literacy Rate	75.49%
k.	Sex Ratio	949/1000

Land Use Pattern

II. Land		
Total Geographical Area	3,533	sq km
Total Area Reported	3,53,300	Ha
Forest Land	70,000	Ha
% Forest Land	19.8%	

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	South EasternWestern Plateau Zone
Climate	Humid to Sub-humid tropical monsoon.
Soil Type	Red Soil, laterite soil and murum soil
Rainfall 2020 (in mm)	1400 mm	mm

Population Profile

IV. People & their Work			
Total		Male	Female
Population (in '000)	22,93,919	11,76,902	11,17,017
SC	1,11,414	56,147	55,267
ST	6,53,923	3,25,989	3,27,934
Total Households (in '000)	5,00,000		

Agriculture Profile

Net Sown Area (ha)	**1,19,300**
Gross Cropped Area(ha)	1,37,000
Cropping Intensity(ha)	115.8%
Net Irrigated Area	14,700
% Net Sown Area is Irrigated	12.35%

Figure 64: LULC/ Forest Cover Map - East Singhbhum
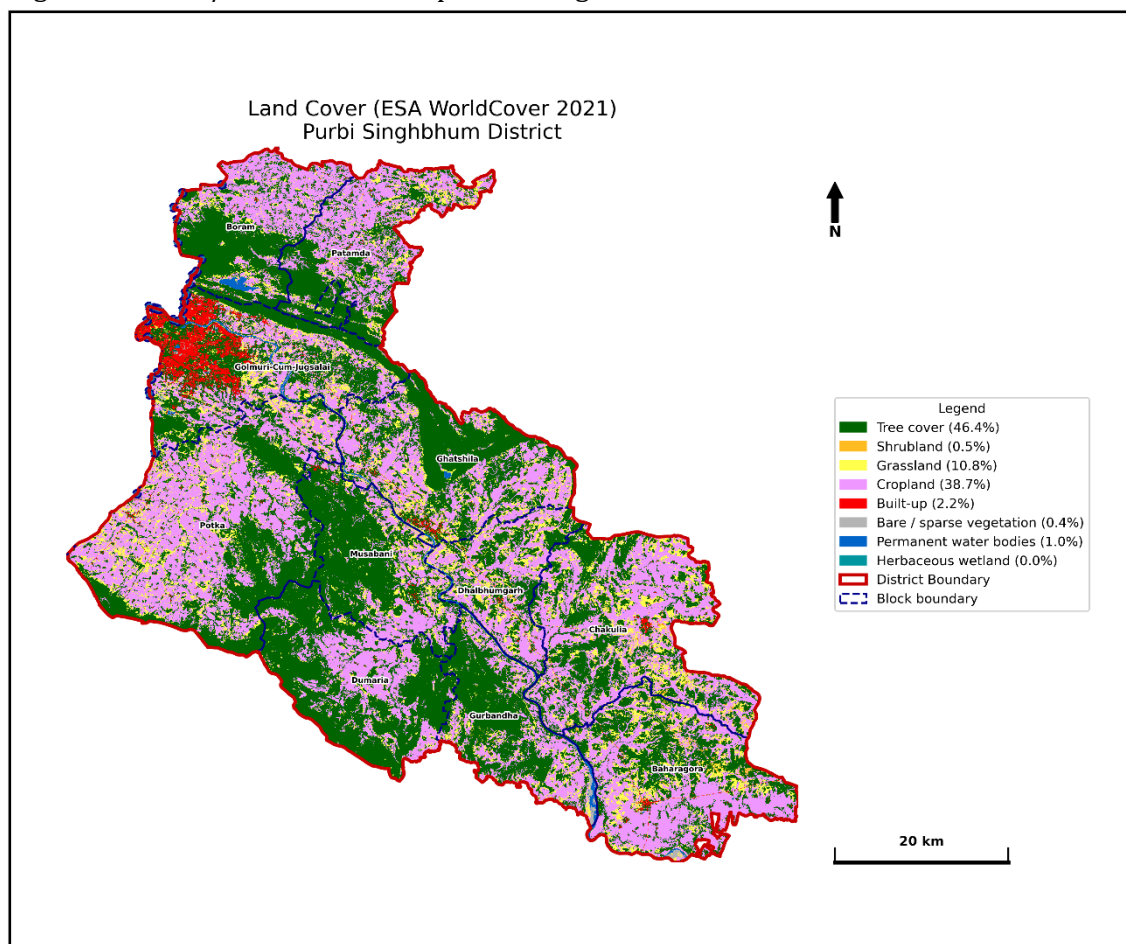
Table 33 : Vulnerability Index of all 11 Blocks – East Singhbhum

| Sl. No	Blocks	Equal weights	
		Vulnerability Index	Ranking
1	Dumaria	0.78	11
2	Dhalbhumgarh	0.74	10
3	Gurbandha	0.71	9
4	Patamda	0.66	8
5	Chakulia	0.60	7
6	Boram	0.59	6
7	Potka	0.56	5
8	Baharagora	0.53	4
9	Musabani	0.52	3
10	Ghatshila	0.48	2
11	Golmuri-Cum-Jugsalai	0.29	1

Figure 65 : Ranking of Blocks in East Singhbhum District
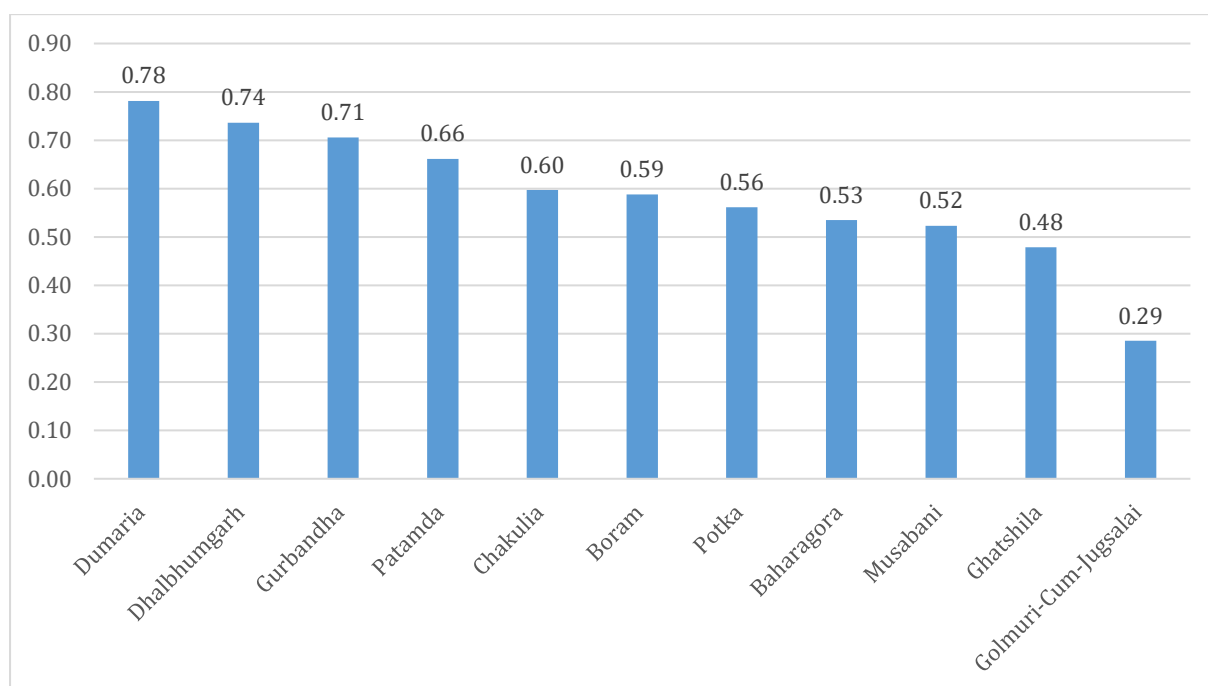
Table 34 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Dumaria	Chakulia	Musabani
Dhalbhumgarh	Boram	Ghatshila
Gurbandha	Potka	Golmuri-Cum-Jugsalai
Patamda	Baharagora	

5.16.1 Identification of main drivers

East Singhbhum has eleven blocks within the jurisdiction of its district. Dumaria is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 66 : Percentage Contribution of Different Indicators
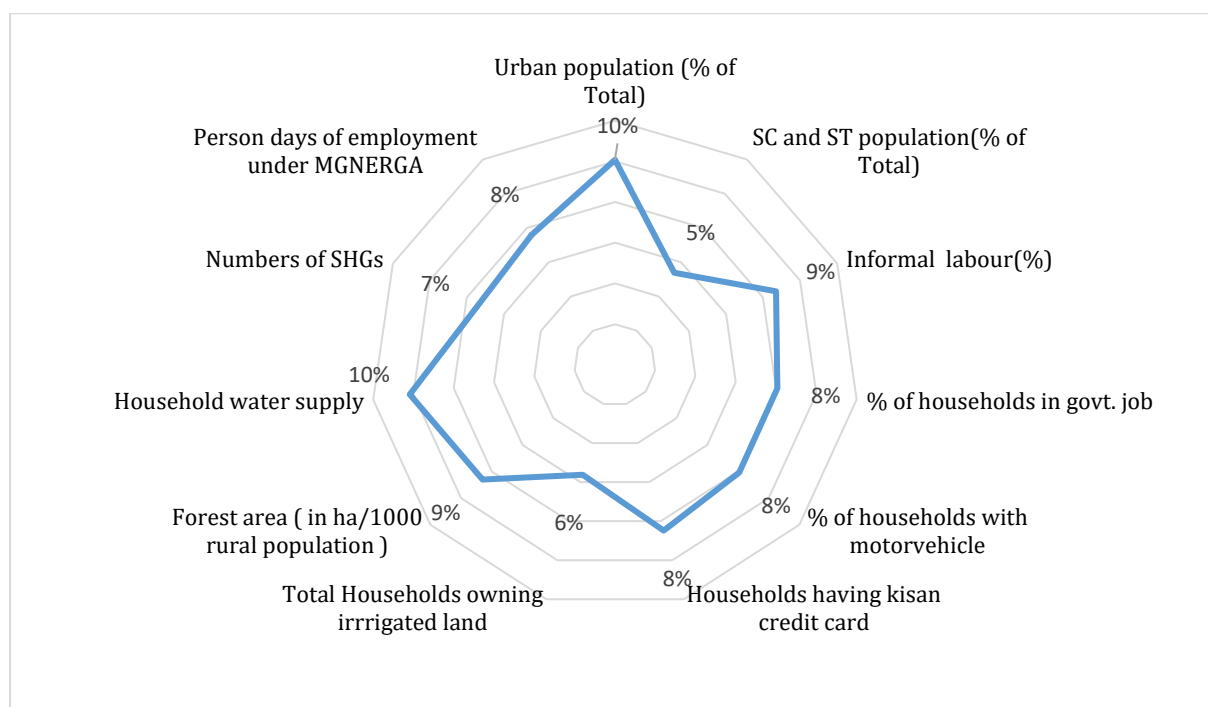
5.17 Brief Profile of the Hazaribagh District

This District consists of 16 blocks: Barhi, Barkagaon, Barkatha, Bishnugarh, Chalkusha, Chauparan, Churchu, Dadi, Daru, Hazaribagh Sadar, Ichak, Katkamdag, Katkamsandi, Keredari, Padma and Tati Jhariya.

The economy of Hazaribagh is primarily agrarian supplemented by forest produce and mining. Coal, bauxite, dolomite and graphite contribute to industrial and economic development offering employment opportunities beyond agriculture. The district is rich in mineral resources, primarily high-grade coal from the North Karanpura Coalfield. Other minerals include fireclay, stone chips, and minor reserves of limestone and bauxite. This District falls under Central and North-Eastern Plateau.

Figure 67 : Blocks in Hazaribagh District

District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Ms. Nancy Sahay (I.A.S.)
b.	Lok Sabha Constituencies	Hazaribagh, Ramgarh
c.	Vidhan Sabha Constituencies	Barhi, Barkagaon, Ramgarh, Mandu, Hazaribagh
B)	POPULATION	
d.	Total	17,34,495
e.	Male	8,90,881
f.	Female	8,43,614

C)	AREA	
g.	Total Geographical Area	4,313 sq. km
h.	Number of sub-divisions	2
i.	Number of blocks	16
	No. of Panchayats	257
	No. of Villages	1,324
D)	DEMOGRAPHICS	
j.	Literacy Rate	69.75%
k.	Sex Ratio	947/1000

Land Use Pattern

II. Land		
Total Geographical Area	4,313	Sq km
Total Area Reported	4,31,300	Ha
Forest Land	1,64,154	Ha
%Forest Land	38.06 %	*Indicates quantum of potential for NTFP & IFR/CFR livelihoods*

Climate And Other Parameter

III. Characteristics	
Agro-climatic zone	Eastern Plateau and Hills Region (VII) (Planning Commission) Central and North Eastern plateau Zone (BI-4) (NARP)
Climate	sub-tropical monsoon climate
Soil Type	Red Laterite and Clay Loamy, Red Sandy, Red and Yellow
Rainfall 2020(in mm)	1,354.6	mm

Population Profile

IV. People & their Work		Male	Female
Total		Male	Female
Population (in '000)	17,34,495	8,90,881	8,43,614
SC	3,03,515	1,55,013	1,48,502

ST	1,21,768	60,796	60,972
Total Households (in '000)	2,78,302		

Agriculture Profile

Net Sown Area(ha)	96,381
Gross Cropped Area(ha)	1,23,940
Cropping Intensity(ha)	128%
Net Irrigated Area	2,330 ha
%Net Sown Area is Irrigated	2.41%

Figure 68 : LULC/ Forest Cover Map -Hazaribagh
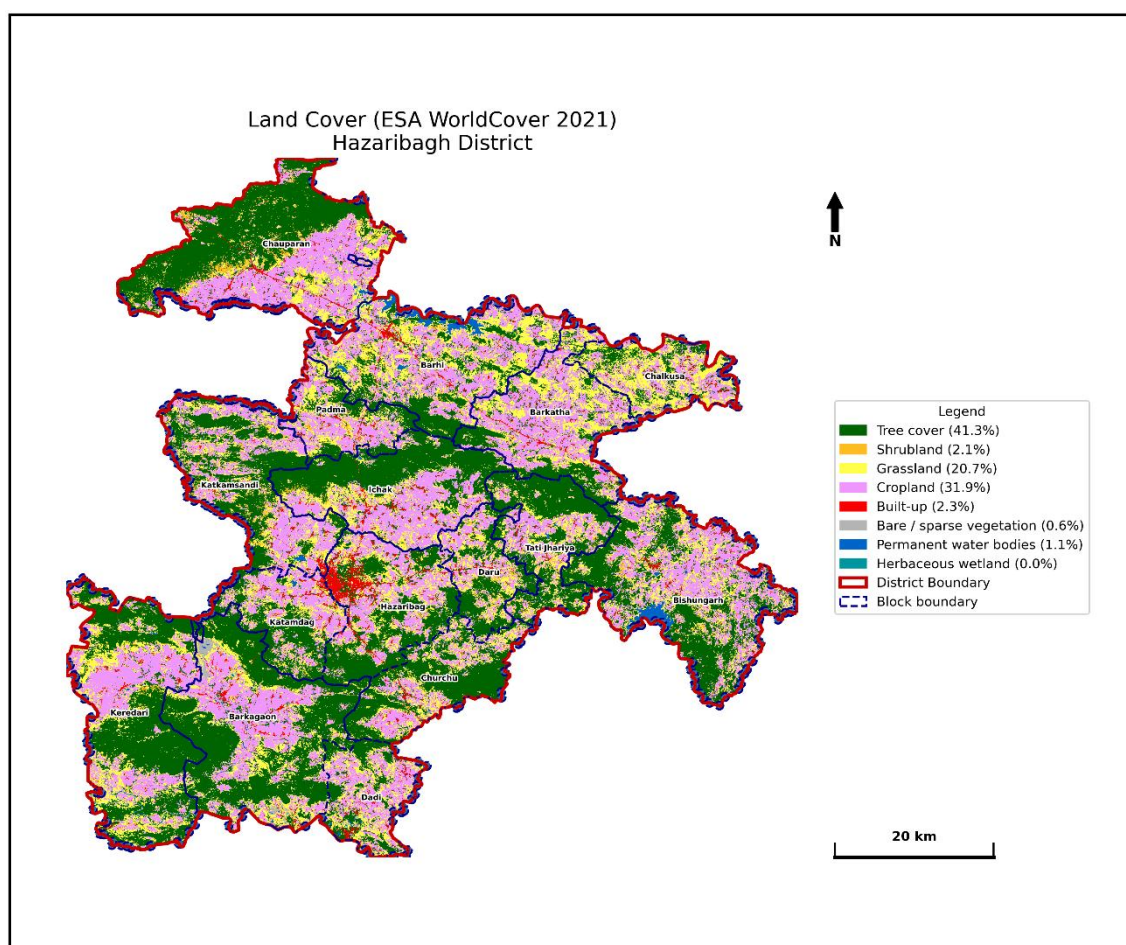
Table 35 : Vulnerability Index of all 16 Blocks – Hazaribhag District

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Padma	0.72	16
2	Tati Jhariya	0.66	15
3	Barkatha	0.66	14
4	Churchu	0.65	13
5	Katamdag	0.65	12
6	Daru	0.64	11
7	Chalkusa	0.59	10
8	Dadi	0.58	9
9	Keredari	0.58	8
10	Bishungarh	0.58	7
11	Katkamsandi	0.55	6

12	Barhi	0.53	5
13	Chauparan	0.49	4
14	Ichak	0.49	3
15	Barkagaon	0.45	2
16	Hazaribag	0.33	1

Figure 69 : Ranking of Blocks in Hazaribag District
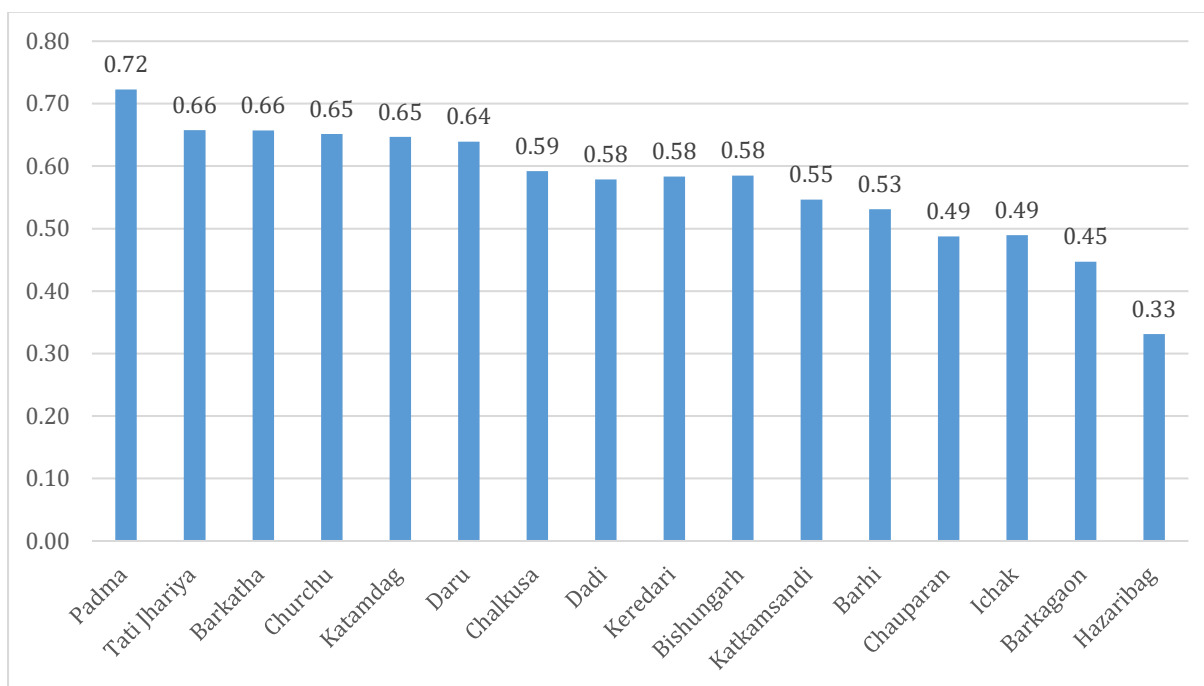
Table 36 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Padma	Chalkusa	Barhi
Tati Jhariya	Dadi	Chauparan
Barkatha	Keredari	Ichak
Churchu	Bishungarh	Barkagaon
Katamdag	Katkamsandi	Hazaribag
Daru		

5.17.1 Identification of main drivers

Hazaribagh has sixteen blocks within the jurisdiction of its district. Padma is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 70 : Percentage Contribution of Different Indicators
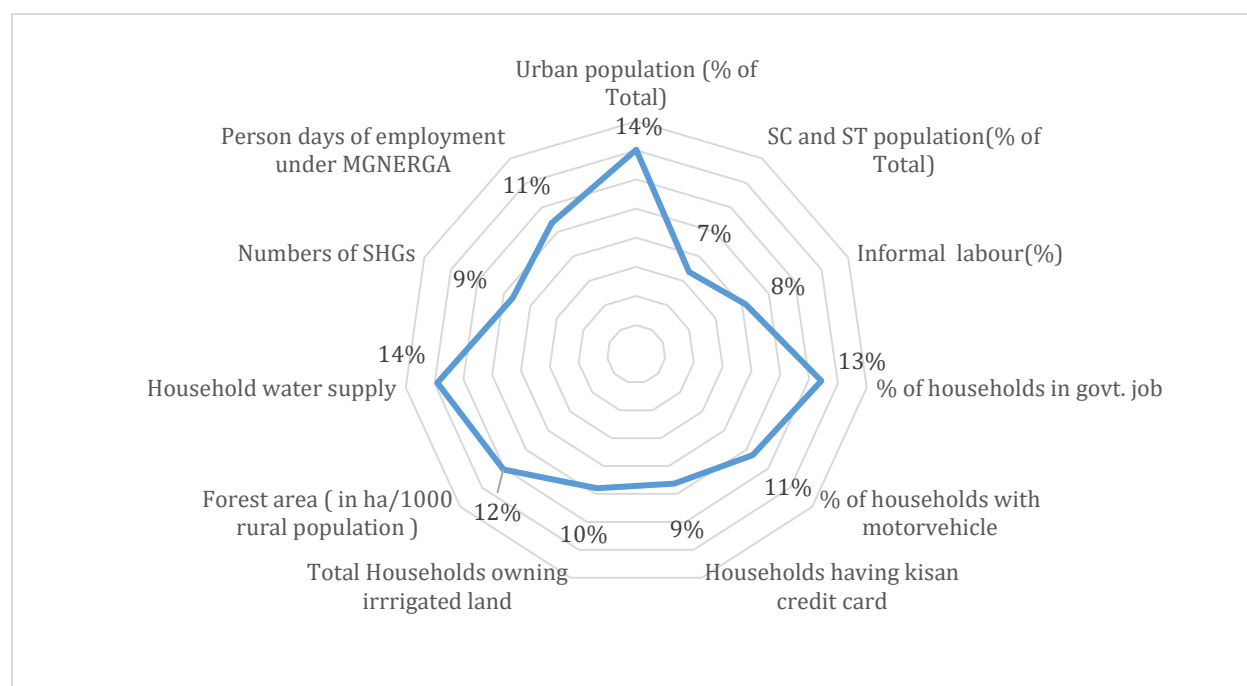
5.18 Brief Profile of the Jamtara District

This District consists of 6 blocks Jamtara, Nala, Fatehpur, Kundhit, Narayanpur and Karmatanr.

The economy of Jamtara is predominantly agricultural, with 83% of the population residing in rural areas and depending on farming for their livelihood. The primary crops include paddy, wheat, maize, pulses, and oilseeds. Mineral resources are limited compared to other districts in Jharkhand, mainly consisting of minor minerals like stone chips and morrum. There is very little large-scale industry in the district.

The main river flowing through the district is the Ajay River, which provides water for irrigation and other purposes. The main river flowing through the district is the Ajay River, which provides water for irrigation and other purposes. This District falls under Central and North-Eastern Plateau zone.

Figure 71 : Blocks in Jamtara District
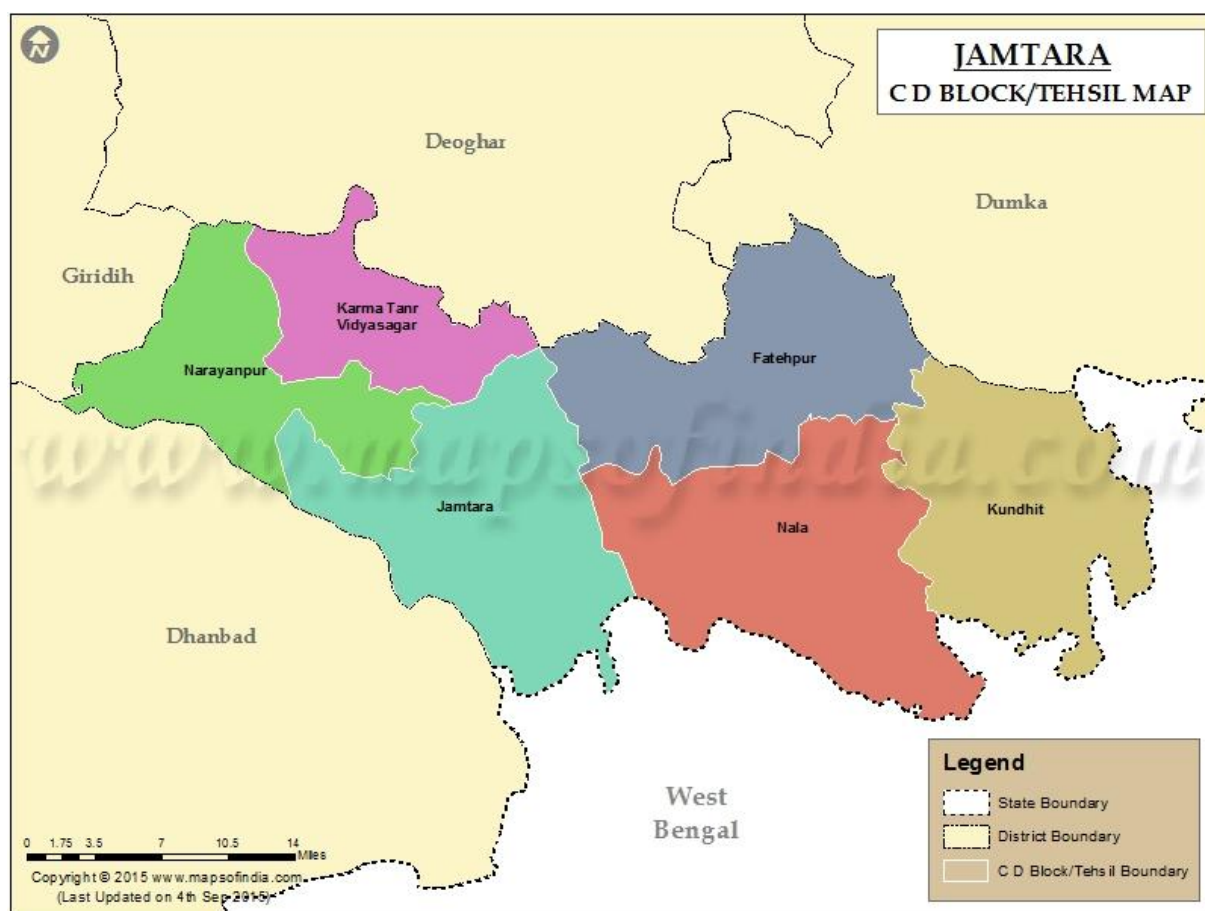
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Shri Sashibhushan Mehra (I.A.S.).
b.	Lok Sabha Constituencies	Dumka
c.	Vidhan Sabha Constituencies	Jamtara, Nala
B)	**POPULATION**	
d.	Total	7,91,042
e.	Male	4,04,830
f.	Female	3,86,212
C)	**AREA**	
g.	Total Geographical Area	1,811 sq. km
h.	Number of sub-divisions	1
i.	Number of blocks	6

	No. of Panchayats	128
	No. of Villages	1,250
D)	**DEMOGRAPHICS**	
j.	Literacy Rate	64.59%
k.	Sex Ratio	959/1000

Land Use Pattern District Profile

II. Land		
Total Geographical Area	1,811	Sq. km
Total Area Reported	1,81,100	Ha
Forest Land	28,425.74	Ha
%Forest Land	20.7 %	*Indicates quantum of potential for NTFP & IFR/CFR livelihoods*
GPs with an availability of community forest	%	
GPs with availability of minor forest produce	%	

Climatic and Other Parameters

III. Characteristics		
Agro-climatic zone	Eastern Plateau and Hills Region (VII)	
Climate	sub-tropical monsoon climate	
Soil Type	Red lateritic soils, Loam soils, Fine loam soils, Fine mixed Loam soils	
Rainfall 2020(in mm)	~1500	mm
% of NRM Expenditure (Public+ Individual)		MGNREGS 2021-22. Potential for increase.
GPs having a watershed project in at- least 20% villages		Scope to strengthen INRM approach
GPs with community rain water harvesting / pond etc. in >60% of villages		

Population Profile

IV. People & their Work			
Total		Male	**Female**
Population (in '000)	7,91,042	4,04,830	3,86,212

SC	72,885	14,352	14,117
ST	2,40,489	1,86,967	1,92,087
Total Households (in '000)	1,55,275		

Agriculture profile

Net Sown Area(ha)	56,300
Gross Cropped Area(ha)	59,100
Cropping Intensity(ha)	105.6%
Net Irrigated Area	11,400ha
%Net Sown Area is Irrigated	22.24%

Figure 72 : LULC/ Forest Cover Map - Jamtara
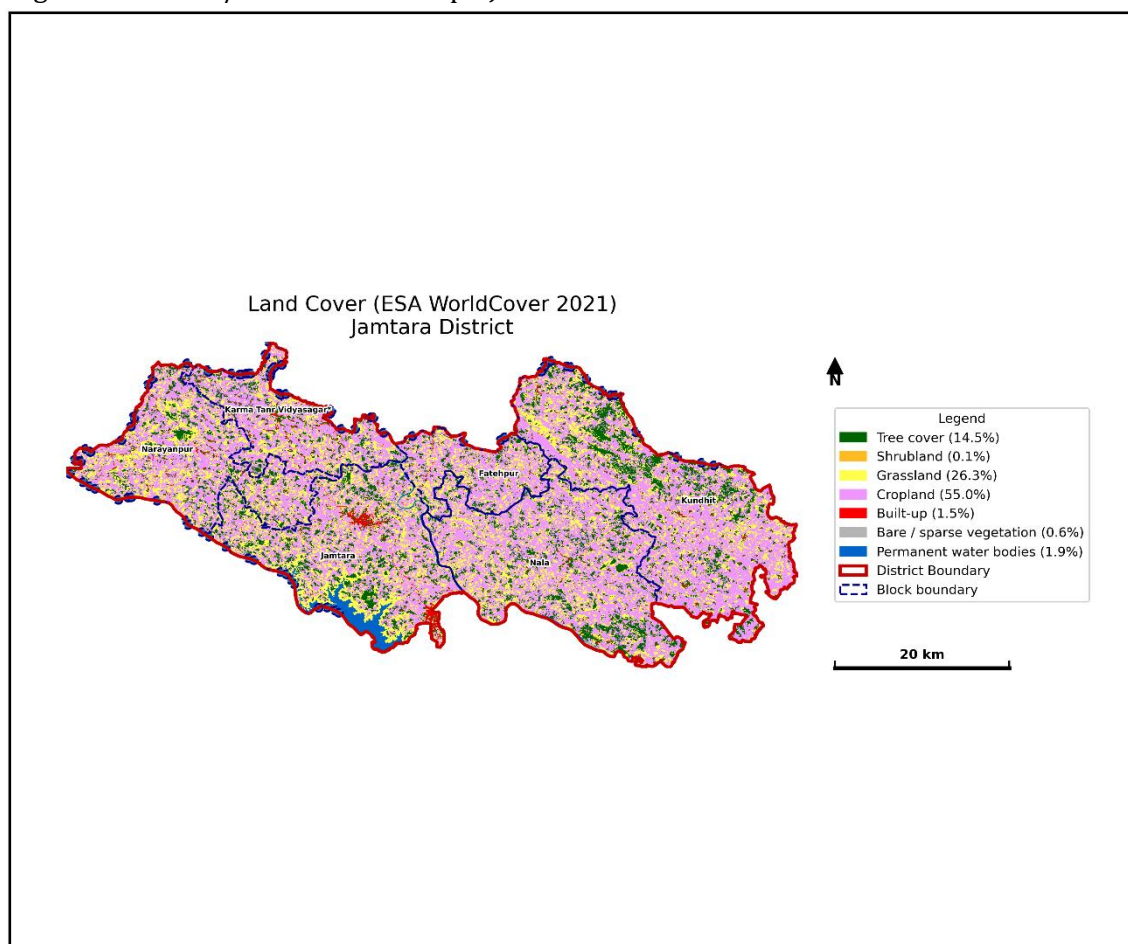
Table 37 : Vulnerability Index of all Six Blocks – Jamtara

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking

1	Karma Tanr Vidyasagar	0.57	6
2	Kundhit	0.53	5
3	Narayanpur	0.51	4
4	Fatehpur	0.50	3
5	Nala	0.49	2
6	Jamtara	0.30	1

Figure 73 : Ranking of Blocks in Jamtara District
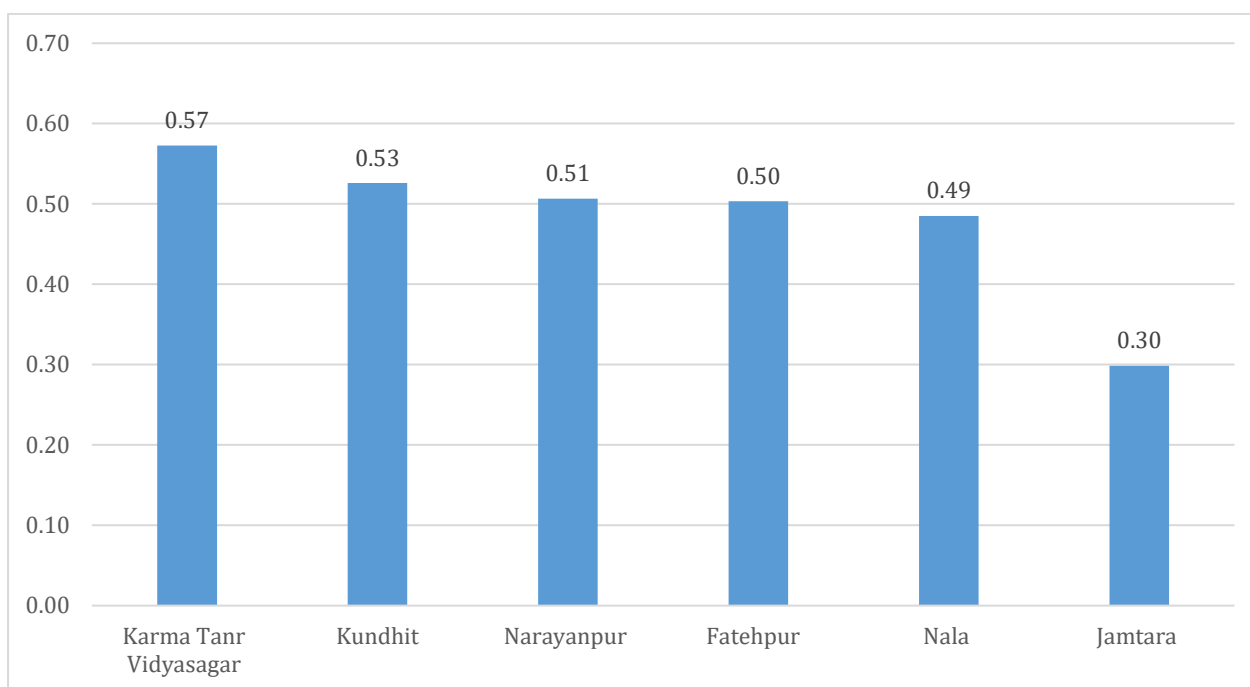
Table 38 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Karma Tanr Vidyasagar	Narayanpur	Nala
Kundhit	Fatehpur	Jamtara

5.18.1 Identification of main drivers

Jamtara has six blocks within the jurisdiction of its district. Karma tanr Vidyasagar is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 74 : Percentage Contribution of Different Indicators
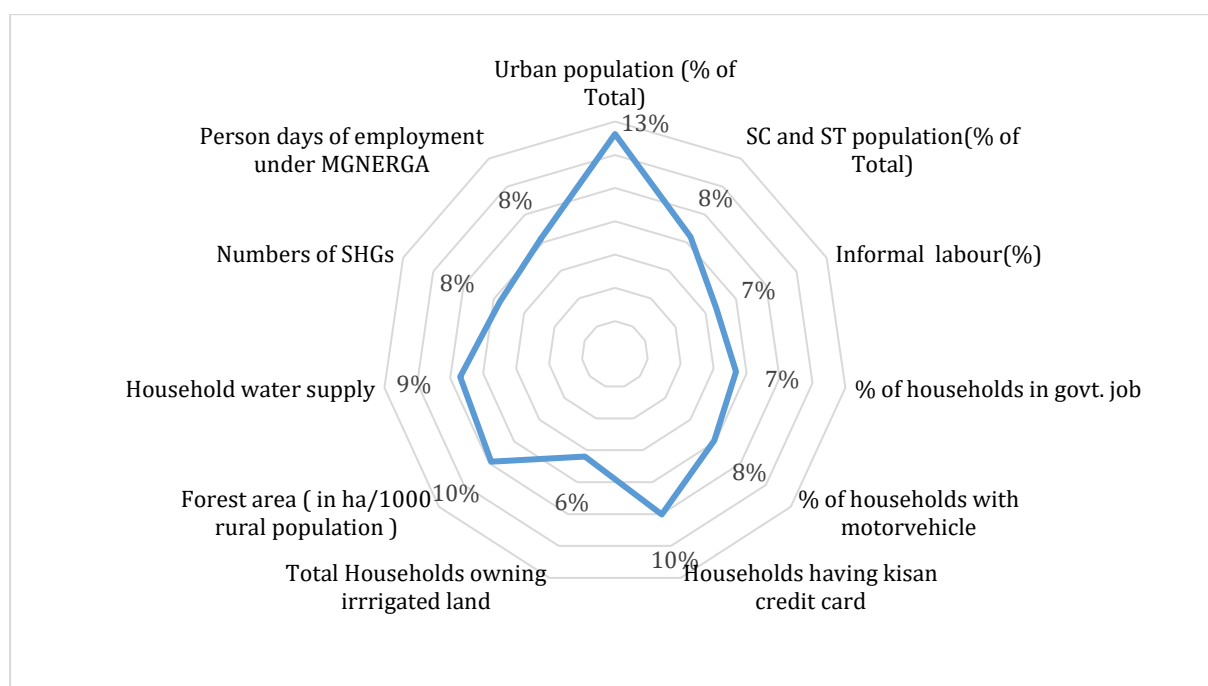
5.19   Brief Profile of the Khunti District

This District consists of 6 blocks: Pakur, Hiranpur, Litipara, Amrapara, Maheshpur, Pakaraira (Pakuria).

The economy of Khunti is heavily reliant on agriculture and the abundant forest resources. The primary crops include paddy, maize, and various vegetables. Mineral resources include deposits of bauxite, kyanite, limestone, and fireclay. The district has a high concentration of tribal population (over 70%), primarily the Munda tribe. Though Pakur is not rich in minerals. The minerals found here coal, china clay, fire clay, quarter, silica sand and glass sand. Black stone chips (Pakur stone), which is used extensively for construction across India. Pakur District includes three main rivers in this district namely Bansloi, Torai and Brahmani River. This District falls under Western Plateau.

Figure 75 : Blocks in Khunti District

KHUNTI
C D BLOCK/TEHSIL MAP
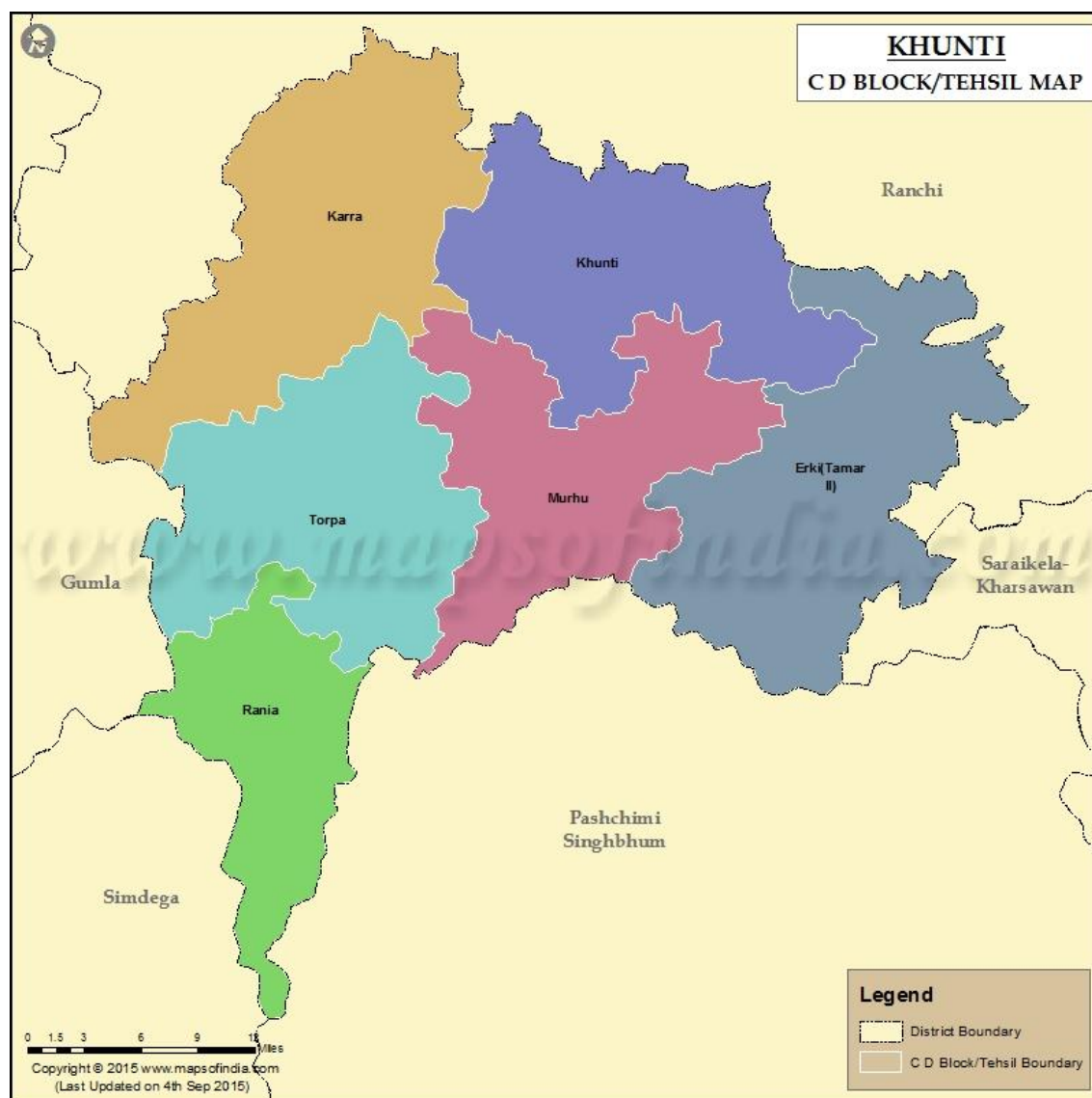
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Smt. R. Ronita (I.A.S.)
b.	Lok Sabha Constituencies	Khunti (shared with Simdega, Ranchi and Seraikela Kharsawan)
c.	Vidhan Sabha Constituencies	Torpa, Khunti
B)	POPULATION	
d.	Total	5,31,885
e.	Male	2,67,525
f.	Female	2,64,360
C)	AREA	

g.	Total Geographical Area	2,611 sq. km
h.	Number of sub-divisions	1
i.	Number of blocks	6
	No. of Panchayats	86
	No. of Villages	756
D)	**DEMOGRAPHICS**	
j.	Literacy Rate	64.51%
k.	Sex Ratio	998/1000

Land Use Pattern

II. Land		
Total Geographical Area,	2,611	sq. km
Total Area Reported	2,61,100	Ha
Forest Land	95,171	Ha
%Forest Land	36.45%	*Indicates quantum of potential for NTFP & IFR/CFR livelihoods*

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Eastern Plateau and Hills Region (VII) (by planning commission)
Climate	Moist Sub Humid to Dry Sub Humid
Soil Type	Red Laterite and Clay Loam, Red Loamy, Red and Yellow
Rainfall 2020(in mm)	1323	mm

Population Profile

IV. People & their Work		Male	Female
Total		Male	Female
Population (in '000)	5,31,885	2,67,525	2,64,360
SC	24,037	12,223	11,814
ST	3,89,626	1,93,710	1,95,916
Total Households (in '000)	95,140		

Agriculture Profile

Net Sown Area(ha)	1,04,335
Gross Cropped Area(ha)	1,42,857
Cropping Intensity(ha)	137%
Net Irrigated Area	ha
%Net Sown Area is Irrigated	22.10%

Figure 76 : LULC/Forest Cover Map -Khunti
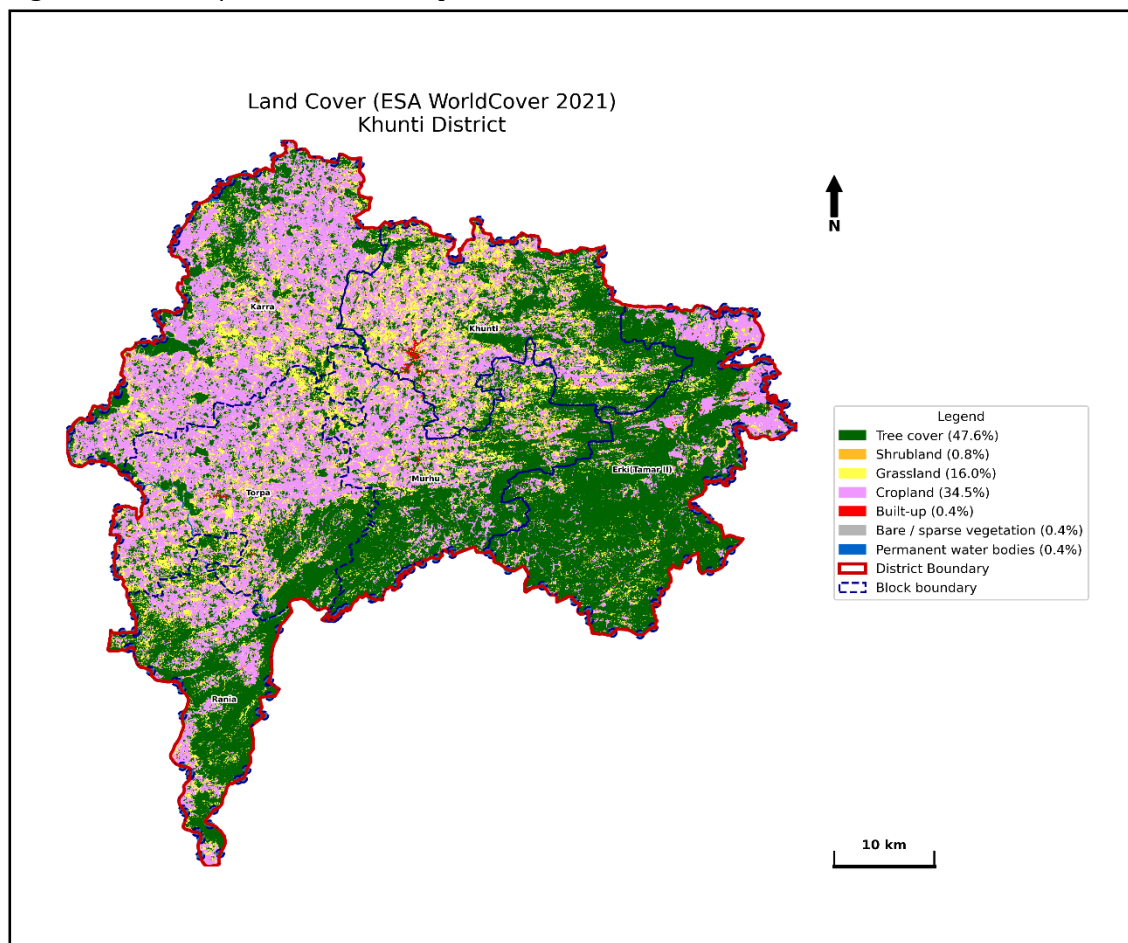
Table 39 : Vulnerability Index of all Six Blocks – Khunti

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Murhu	0.65	6
2	Rania	0.64	5
3	Erki (Tamar Ii)	0.53	4

4	Torpa	0.47	3
5	Khunti	0.44	2
6	Karra	0.38	1

Figure 77 : Ranking of Blocks in Kunti District
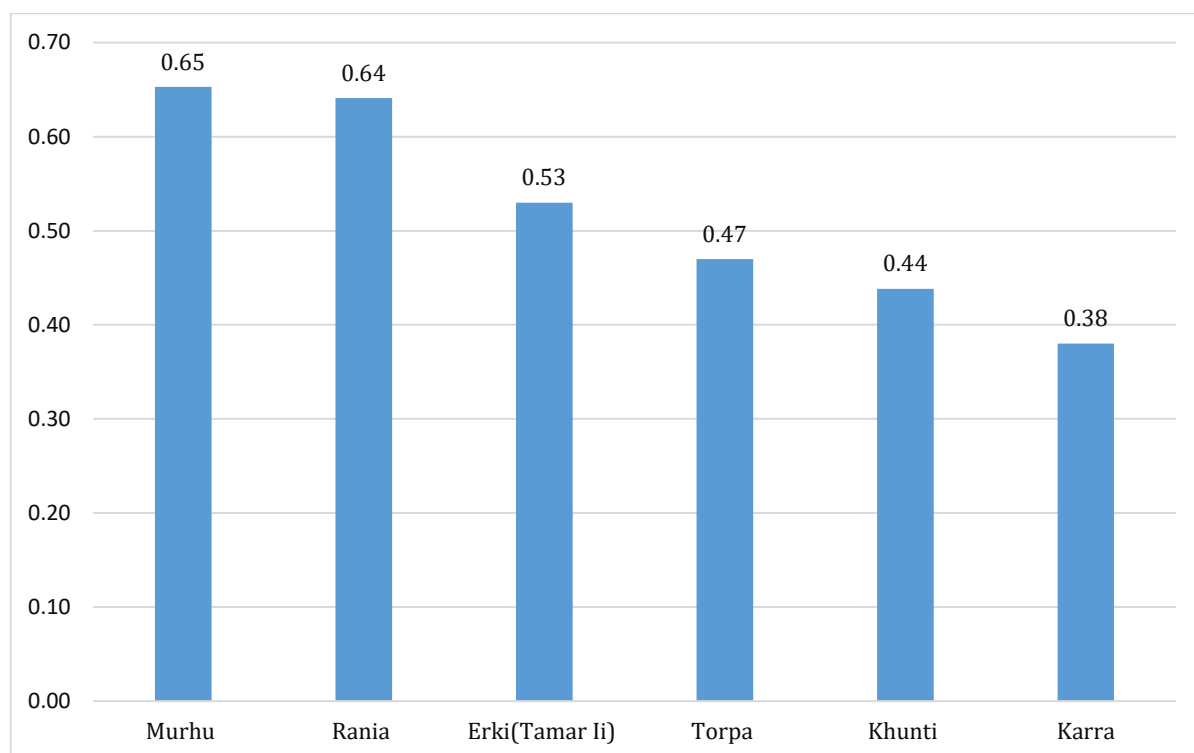
Table 40 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Murhu	Erki (Tamar Ii)	Khunti
Rania	Torpa	Karra

5.19.1 Identification of main drivers

Kunti has six blocks within the jurisdiction of its district. Murhu is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 78 : Percentage Contribution Different Indicators
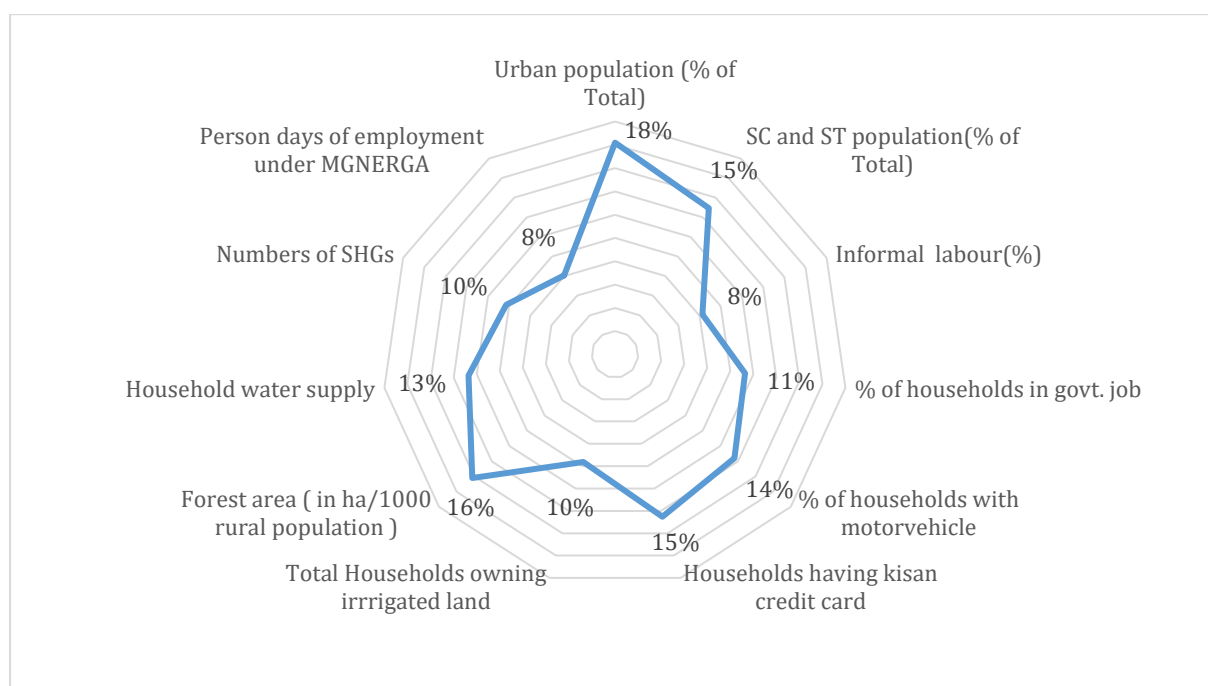
5.20   Brief Profile of the Lohardaga District

This District consists of 7 blocks: Lohardaga, Kuru, Kairo, Peshrar, Bhandra, Kisko, Senha.

Lohardaga economy relies heavily on mining and agriculture. The district holds massive deposits of bauxite, which is the primary ore for aluminium. Other minor minerals include China Clay, fireclay, and building stone. Agriculture is a major occupation, with paddy, maize, and oilseeds being the main crops. The district has significant potential for horticultural crops and vegetable cultivation. Lohardaga has a significant tribal population (over 56%), predominantly from the Oraon, Munda, and Kharia communities. This District falls under Western Plateau.

Figure 79 : Blocks in Lohardaga District
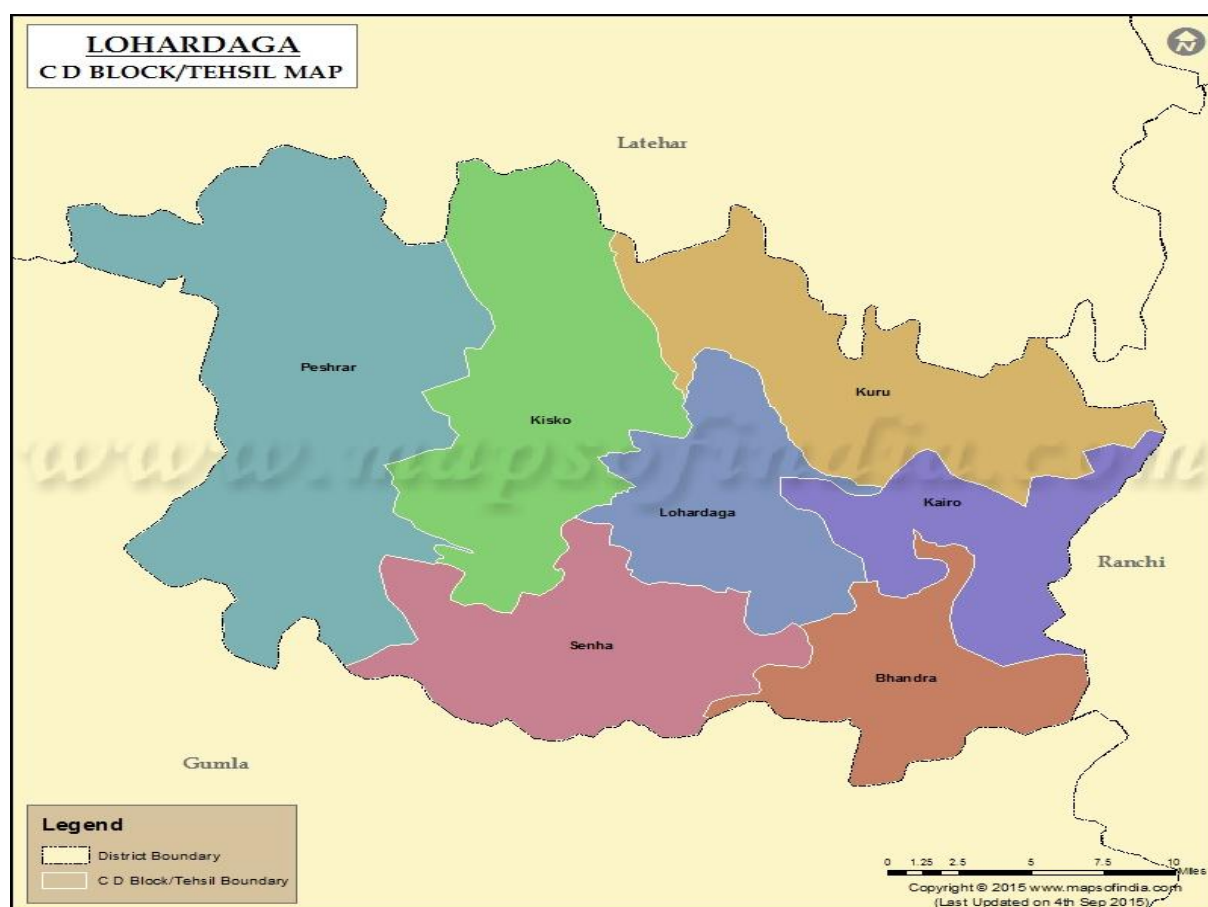
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Dr. Kumar Tarachand (I.A.S.)
b.	Lok Sabha Constituencies	Ranchi, Gumla and Lohardaga
c.	Vidhan Sabha Constituencies	Mandar, Sisai, Gumla, Bishunpur and Lohardaga
B)	POPULATION	
d.	Total	4,61,790
e.	Male	2,32,629
f.	Female	2,29,161
C)	AREA	
g.	Total Geographical Area	1,502 sq. km
h.	Number of sub-divisions	1
i.	Number of blocks	7
	No. of Panchayats	66

	No. of Villages	354	
D)	**DEMOGRAPHICS**		
j.	Literacy Rate	67.61%	
k.	Sex Ratio	985/1000	

Land Use Pattern

II. Land		
Total Geographical Area	1502	Sq km
Total Area Reported	150200	Ha
Forest Land	50310	Ha
%Forest Land	33.50 %	*Indicates quantum of potential for NTFP & IFR/CFR livelihoods*

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Eastern Plateau and Hills Region (VII) (by planning commission) Western Plateau Zone (BI-5) (by NARP)
Climate	Hot Moist or Dry Sub Humid
Soil Type	Golden Alluvium, Red and Sandy and Red and Gravelly soils, Laterite and Red and Yellow soils.
Rainfall 2020(in mm)	1,228	mm

Population Profile

IV. People & their Work		Male	Female
Total		Male	Female
Population (in '000)	4,61,790	2,32,629	2,29,161
SC	4,059	2,093	1,966
ST	59,539	29,534	30,005
Total Households (in '000)	79,897		

Agriculture profile

Net Sown Area(ha)	40,468
Gross Cropped Area(ha)	53,047

Cropping Intensity(ha)	131%
Net Irrigated Area	7,752 ha
%Net Sown Area is Irrigated	19.15%

Figure 80 : LULC/ Forest Cover of -Lohardaga
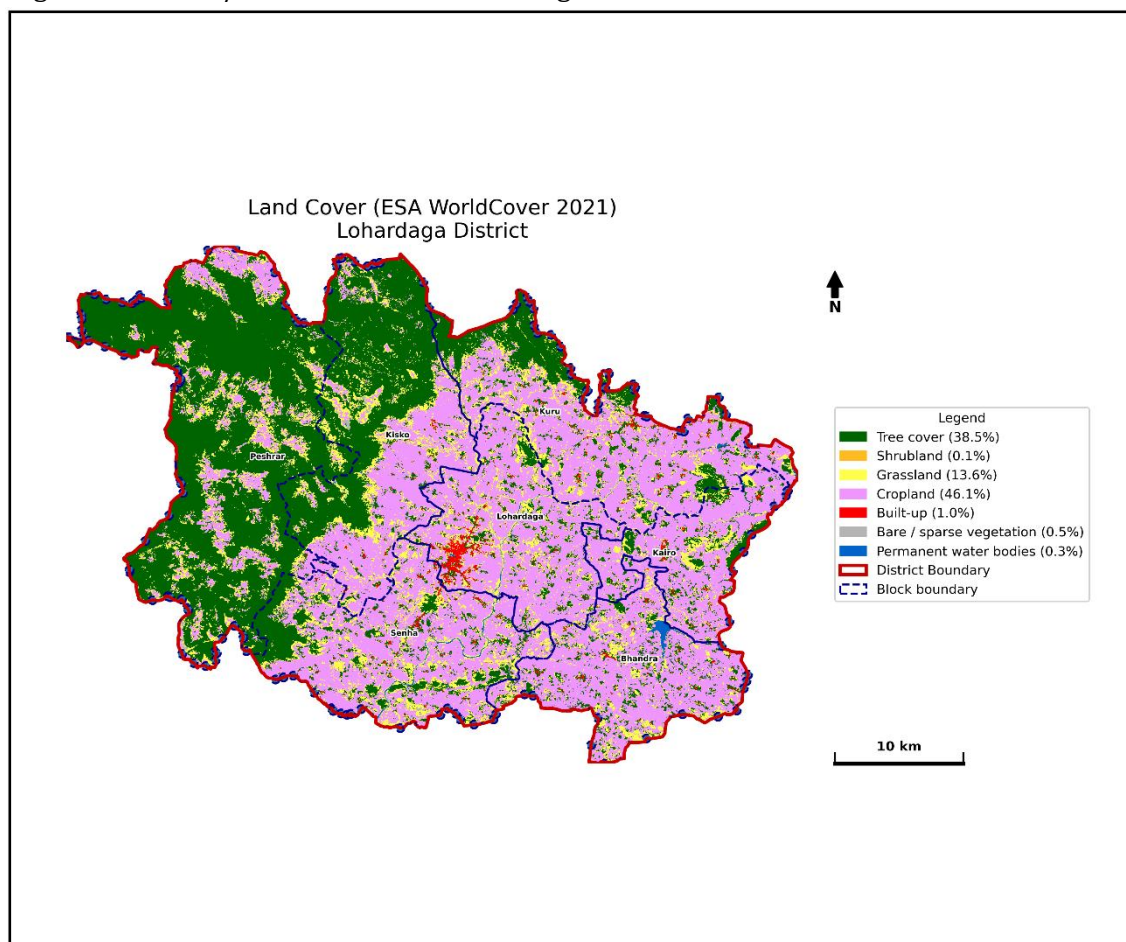
Table 41 : Vulnerability Index of all Seven Blocks – Lohardaga

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Peshrar	0.79	7
2	Kairo	0.75	6
3	Kisko	0.51	5
4	Bhandra	0.47	4
5	Senha	0.44	3
6	Kuru	0.44	2
7	Lohardaga	0.31	1

Figure 81 : Ranking of Blocks in Lohardaga District
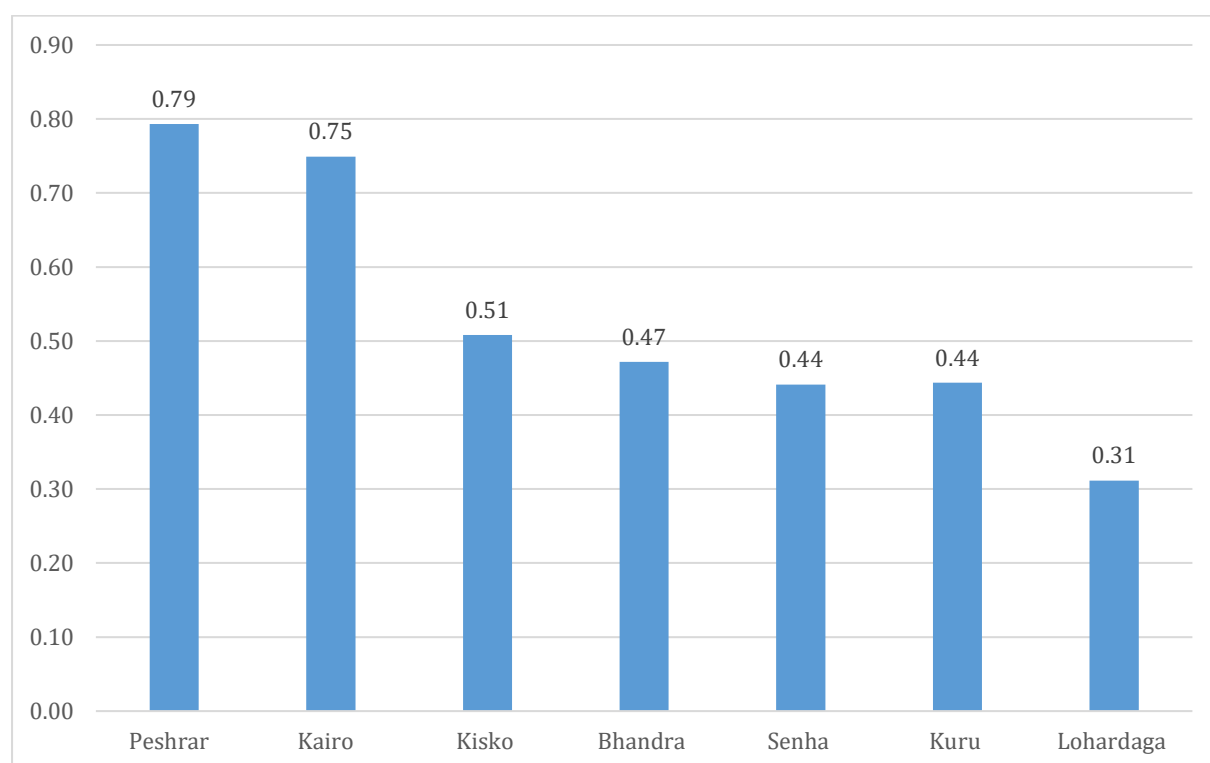
Table 42 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Peshrar	Kisko	Kuru
Kairo	Bhandra	Lohardaga
	Senha	

5.20.1 Identification of main drivers

Lohardaga has Seven blocks within the jurisdiction of its district. Peshrar is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 82 : Percentage Contribution of Different Indicators
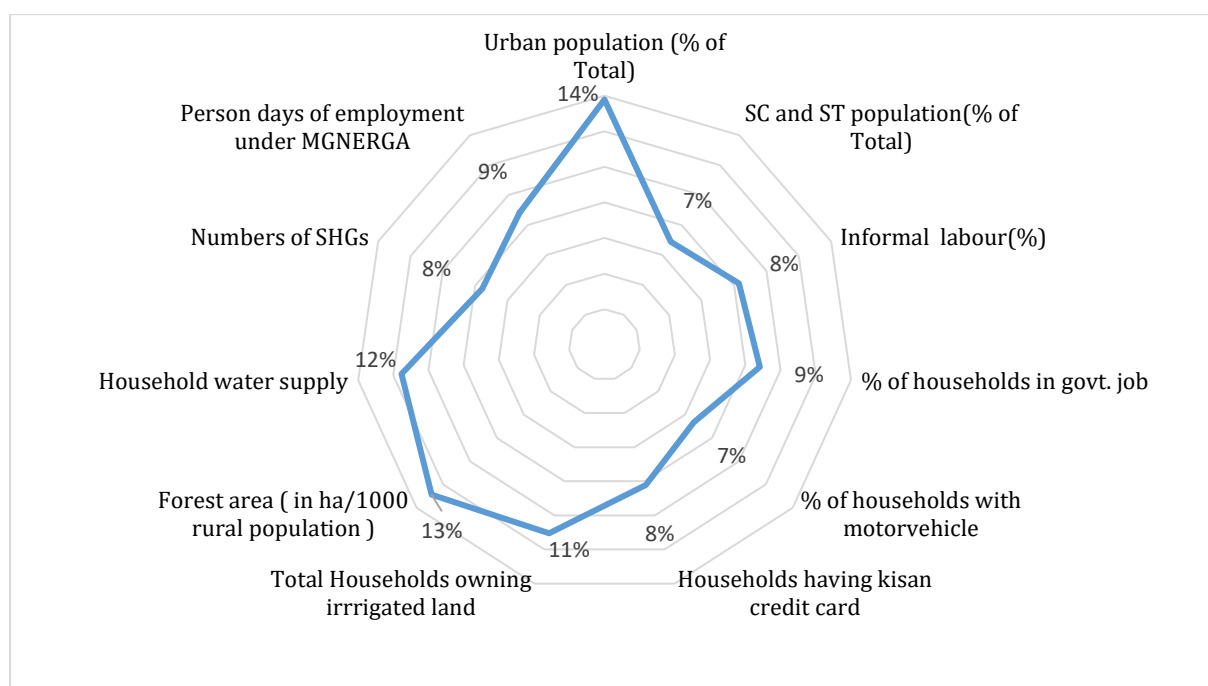
5.21 Brief Profile of the Palamu District

This District consists of 21 blocks: Sadar Medininagar, Chainpur, Ramgarh, Pandwa, Bishrampur, Nawa Bazar, Satbarwa, Nilambar-Pitambarpur, Manatu, Untari Road, Panki, Patan, Tarhasi, Pandu, Chhatarpur, Hariharganj, Naudiha Bazar, Pipra, Hussainabad, Mohammadganj and Haidernagar.

Palamu is rich in minerals such as coal, graphite, limestone, dolomite, iron ore, and bauxite. The area has significant potential for mining and mineral-based industries. Major Kharif crops include paddy, maize, jowar, bajra, oilseeds and pulses, while Rabi crops comprise wheat, gram, peas, mustard, masoor and vegetables. The major rivers flowing through the district are the son, Koel, and Auranga. This District falls under Western Plateau zone.

Figure 83 : Blocks in Palamu District
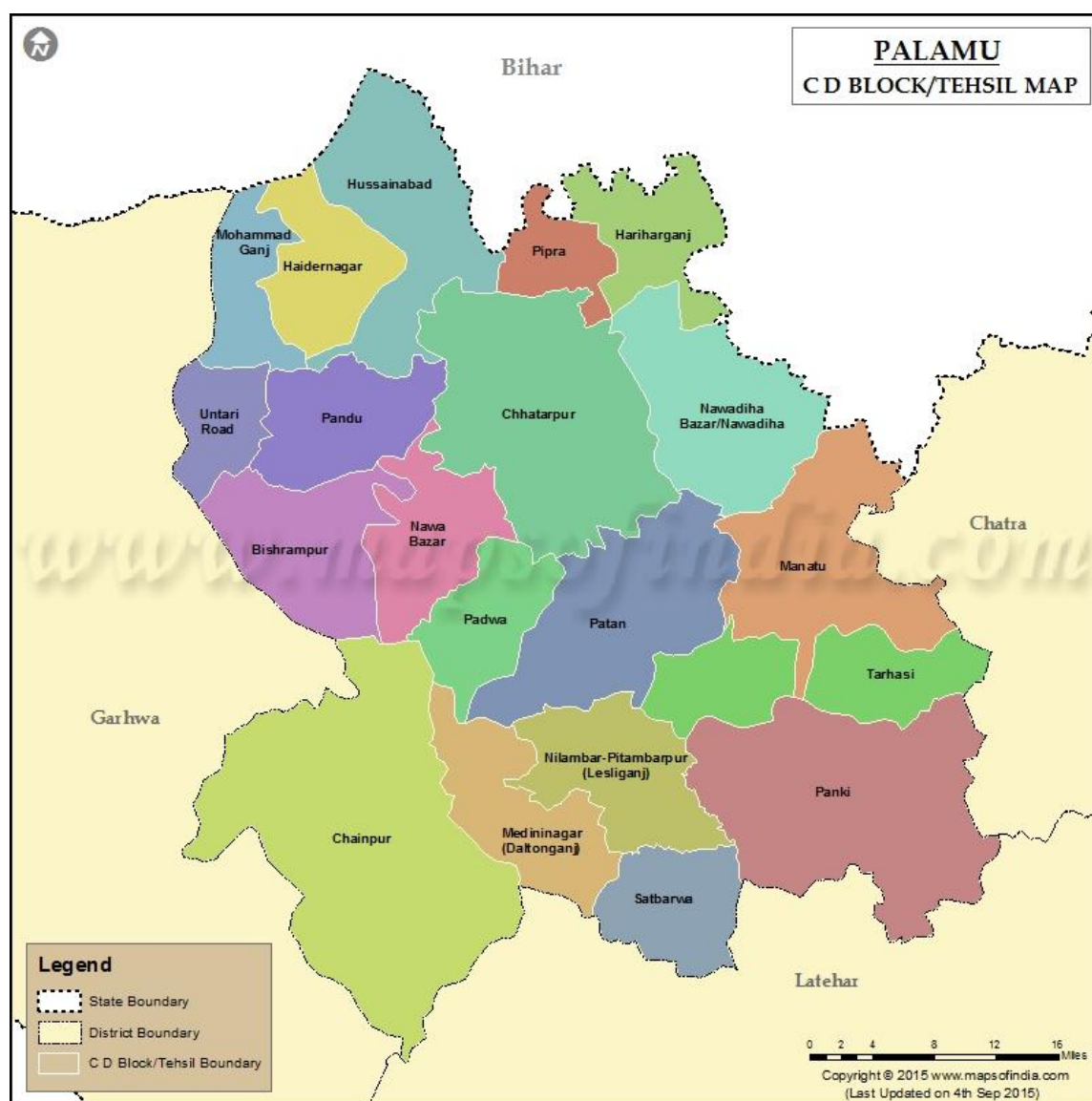
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Smt. Sameera S (I.A.S)
b.	Lok Sabha Constituencies	Palamu and Garhwa
c.	Vidhan Sabha Constituencies	Daltonganj, Bishrampur, Chhatarpur, Hussainabad, Garhwa, Bhawanathpur
B)	POPULATION	
d.	Total	19,36,319
e.	Male	10,03,876
f.	Female	9,32,443

C)	AREA	
g.	Total Geographical Area	5,043.8 sq. km
h.	Number of sub-divisions	3
i.	Number of blocks	21
	No. of Panchayats	283
	No. of Villages	1,,882
D)	DEMOGRAPHICS	
j.	Literacy Rate	65.5%
k.	Sex Ratio	947/1000

Land Use Pattern

II. Land		
Total Geographical Area	5,043.8	Sq km
Total Area Reported	5,04,380	Ha
Forest Land	1,21,792	Ha
%Forest Land	24.14 %	*Indicates quantum of potential for NTFP & IFR/CFR livelihoods*

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Eastern Plateau and Hills Region (VII) (by planning commission) Western Plateau Zone ((BI-5) (by NARP)
Climate	Hot Moist/ Dry Sub Humid
Soil Type	Red Laterite and Clay Loam, Red Loamy, Red and Yellow
Rainfall 2020(in mm)	1,285 mm

Population Profile

IV. People & their Work		Male	Female
Total		Male	Female
Population (in '000)	19,36,319	10,03,876	9,32,443
SC	5,36,382	2,77,119	2,59,263
ST	1,81,208	92,577	88,631

Total Households (in '000)	3,25,420	

Agriculture profile

Net Sown Area(ha)	94,500
Gross Cropped Area(ha)	1,14,345
Cropping Intensity(ha)	121%
Net Irrigated Area	36,101 ha
%Net Sown Area is Irrigated	38.20%

Figure 84 : LULC/ Forest Cover Map -Palamu
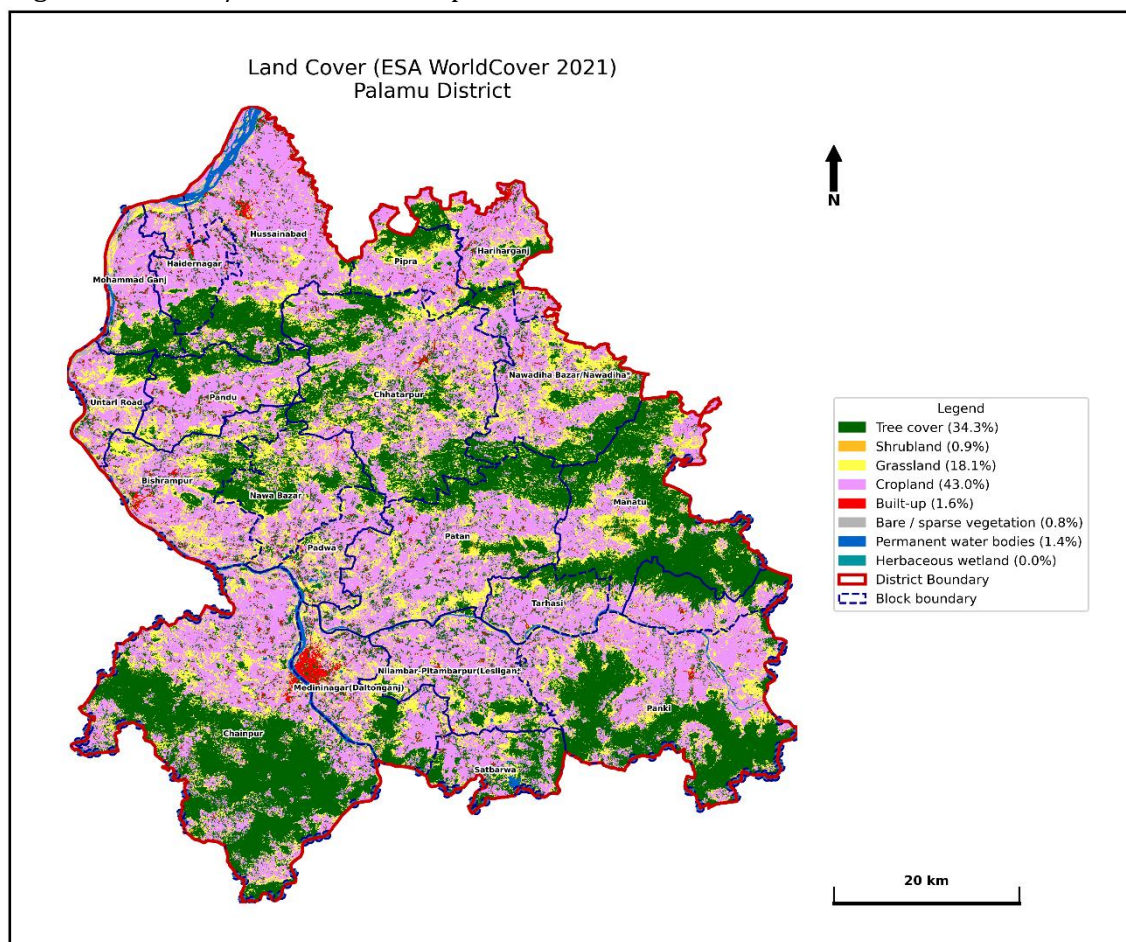
Table 43 : Vulnerability Index of all 20 Blocks – Palamu.

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Untari Road	0.76	20
2	Padwa	0.75	19
3	Manatu	0.74	18
4	Haidernagar	0.71	17
5	Satbarwa	0.69	16
6	Tarhasi	0.69	15
7	Mohammad Ganj	0.68	14
8	Pandu	0.68	13
9	Nawadiha Bazar Nawadiha	0.65	12
10	Pipra	0.65	11
11	Nawa Bazar	0.64	10
12	Patan	0.62	9
13	Chhatarpur	0.62	8
14	Panki	0.61	7
15	Bishrampur	0.59	6
16	Nilambar Pitambarpur(Lesliganj)	0.57	5
17	Hussainabad	0.56	4
18	Hariharganj	0.54	3
19	Chainpur	0.54	2
20	Medininagar(Daltonganj)	0.44	1

Figure 85 : Ranking of Blocks in Palamu District
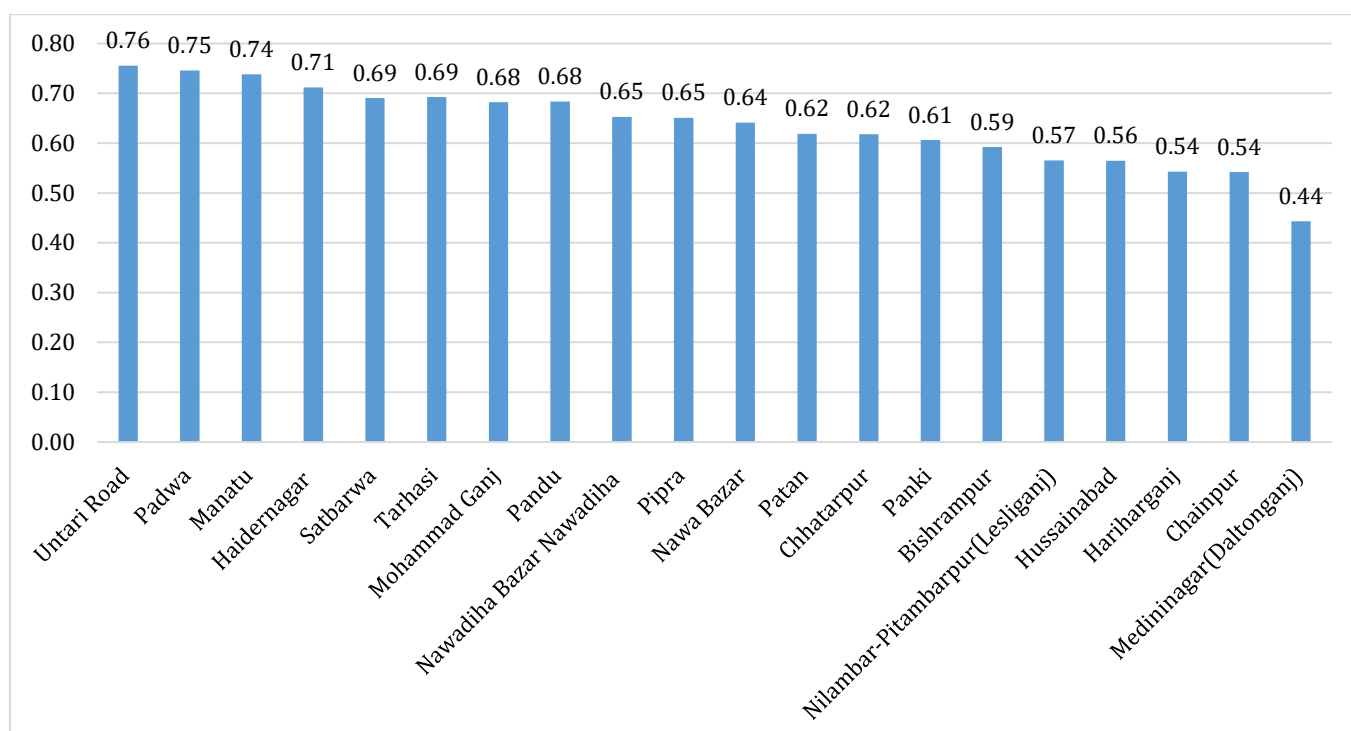
Table 44 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Untari Road	Nawadiha Bazar Nawadiha	Nilambar-Pitambarpur(Lesliganj)
Padwa	Pipra	Hussainabad
Manatu	Nawa Bazar	Hariharganj
Haidernagar	Patan	Chainpur
Satbarwa	Chhatarpur	Medininagar(Daltonganj)
Tarhasi	Panki	
Mohammad Ganj	Bishrampur	
Pandu		

5.21.1 Identification of main drivers

Palumu has six blocks within the jurisdiction of its district. Untari road is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 86 : Percentage Contribution of Different Indicators
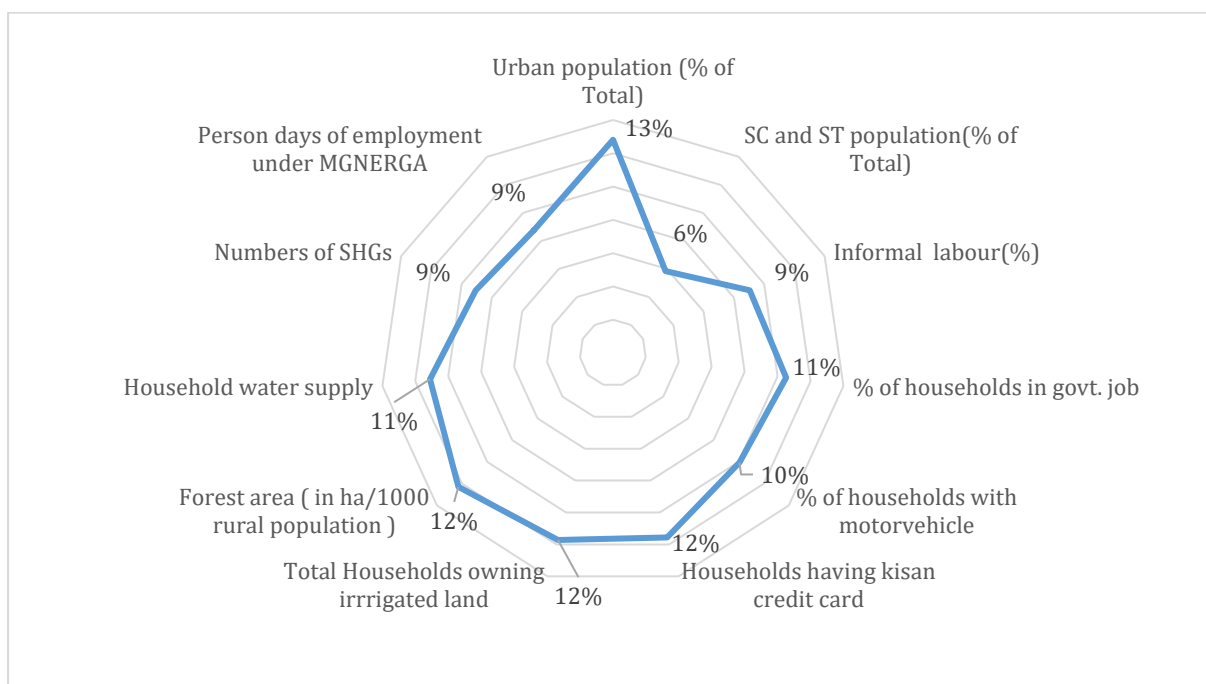
5.22   Brief Profile of the Ranchi District

This District Consist of 18 blocks: Angara, Bero, Bundu, Burmu, Chanho, Itki, Kanke, Khelari, Lapung, Mandar, Namkum, Ormanjhi, Ratu, Rahe, Silli, Nagri, Sonahatu and Tamar.

Ranchi is rich in mineral resources, including bauxite, coal, and china clay. The district is home to Heavy Engineering Corporation (HEC), a public sector undertaking that manufactures heavy machinery. Several large steel, power, and cement plants operate in the surrounding industrial belt. Though highly urbanized, agriculture remains an important activity in the rural blocks, with rice, maize, and potatoes being the primary crops.   Key natural attractions include Hundru Falls, Jonha Falls, and Dassam Falls, which draw a large number of tourists. This District falls under Western Plateau zone.

Figure 87 : Blocks in Ranchi District

District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Mr. Rahul Kumar Sinha (I.A.S.)
b.	Lok Sabha Constituencies	Ranchi
c.	Vidhan Sabha Constituencies	Ichagarh, Silli, Khijri, Ranchi, Hatia, Kanke
B)	POPULATION	
d.	Total	29,14,253
e.	Male	14,94,937
f.	Female	14,19,316
C)	AREA	
g.	Total Geographical Area	5,097 sq. km
h.	Number of sub-divisions	2
i.	Number of blocks	18

	No. of Panchayats	305
	No. of Villages	1,311
D)	**DEMOGRAPHICS**	
j.	Literacy Rate	76.06%
k.	Sex Ratio	949/1000

Land Use Pattern

II. Land		
Total Geographical Area	5,097	Sq km
Total Area Reported	5,09,700	Ha
Forest Land	1,14,062	Ha
%Forest Land	22.38%	*Indicates quantum of potential for NTFP & IFR/CFR livelihoods*

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Eastern Plateau and Hills Region (VII) (by Planning Commission) Central and North Eastern Plateau Zone (BI-4) (by NARP)
Climate	Moist sub humid to Dry sub humid sub-tropical
Soil Type	Red lateritic soils, Loam soils, Fine loam soils, Fine mixed Loam soils
Rainfall 2020(in mm)	1,323	mm

Population Profile

IV. People & their Work		Male	Female
Total		Male	Female
Population (in '000)	29,14,253	14,94,937	14,19,316
SC check with census	1,52,943	78,613	74,330
ST	10,42,016	5,20,582	5,21,434
Total Households (in '000)	3,46,242		

Agriculture profile

Net Sown Area(ha)	25,500
Gross Cropped Area(ha)	27,200

Cropping Intensity(ha)	107%
Net Irrigated Area	32,10 ha
%Net Sown Area is Irrigated	12.58%

Figure 88 : LULC/ Forest Cover Map -Ranchi
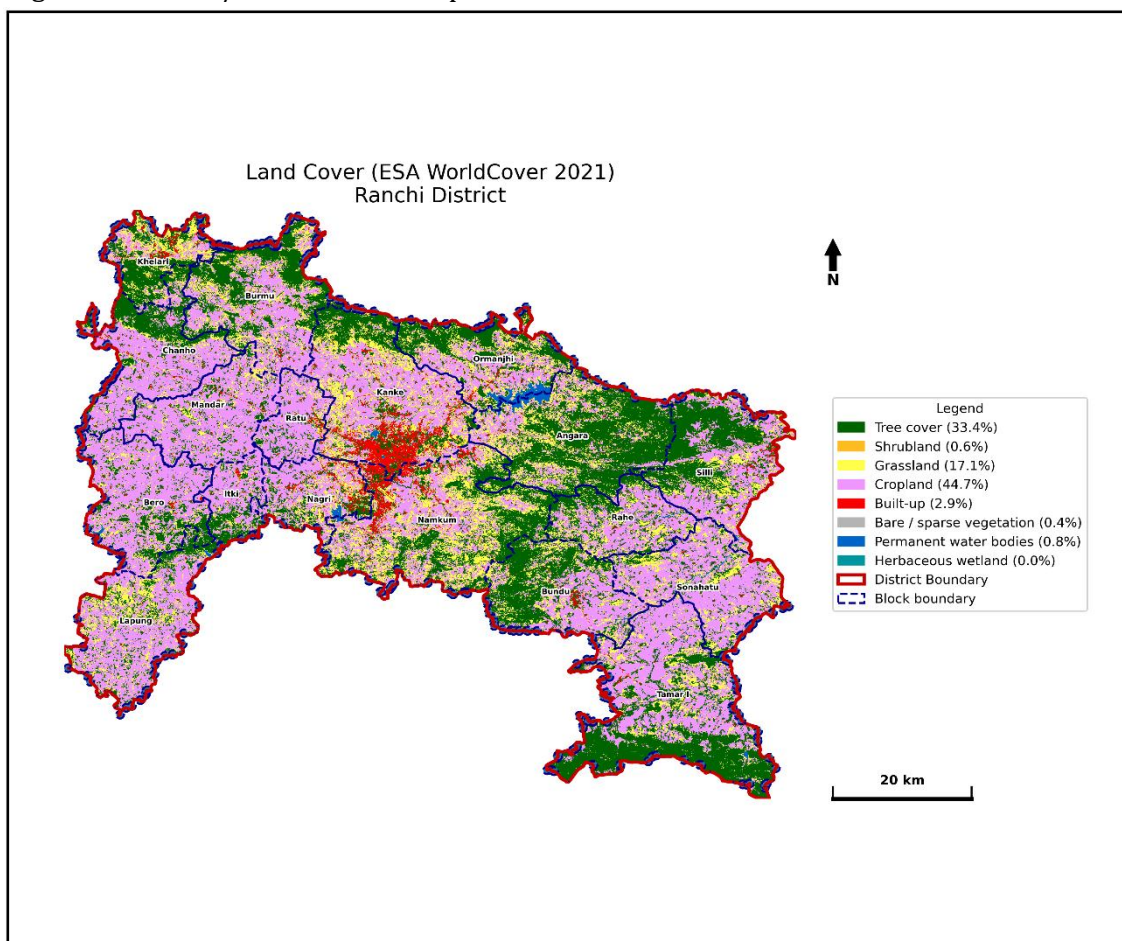
Table 45 : Vulnerability Index of all 18 Blocks – Ranchi

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Bundu	0.78	18
2	Itki	0.71	17
3	Lapung	0.69	16
4	Angara	0.63	15
5	Ratu	0.62	14
6	Tamar	0.62	13
7	Bero	0.61	12
8	Rahe	0.60	11
9	Ormanjhi	0.59	10
10	Nagri	0.58	9
11	Sonahatu	0.56	8
12	Burmu	0.55	7
13	Chanho	0.55	6
14	Namkum	0.50	5
15	Silli	0.50	4
16	Mandar	0.49	3
17	Khelari	0.35	2
18	Kanke	0.31	1

Figure 89 : Ranking of Blocks in Ranchi
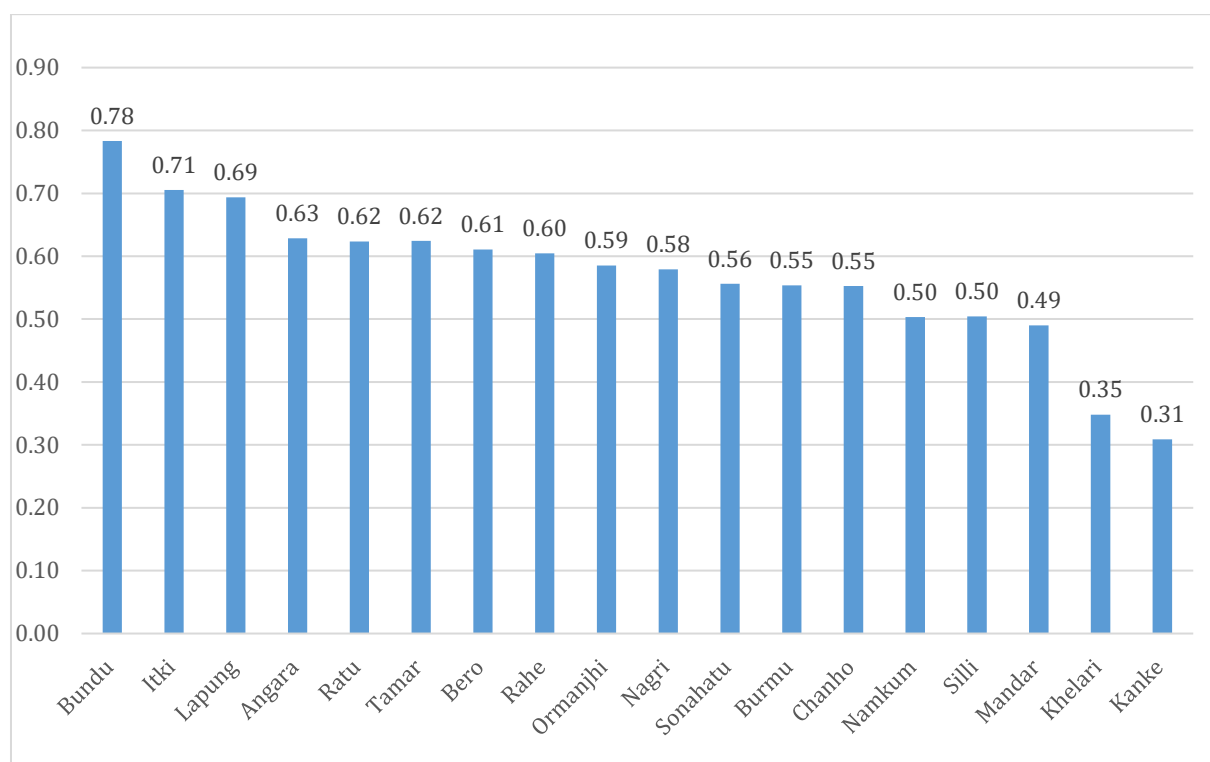
Table 46 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Bundu	Rahe	Namkum
Itki	Ormanjhi	Silli
Lapung	Nagri	Mandar
Angara	Sonahatu	Khelari
Ratu	Burmu	Kanke
Tamar	Chanho	
Bero		

5.22.1 Identification of main drivers

Ranchi has six blocks within the jurisdiction of its district. Bundu is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 90 : Percentage Contribution of Different Indicators
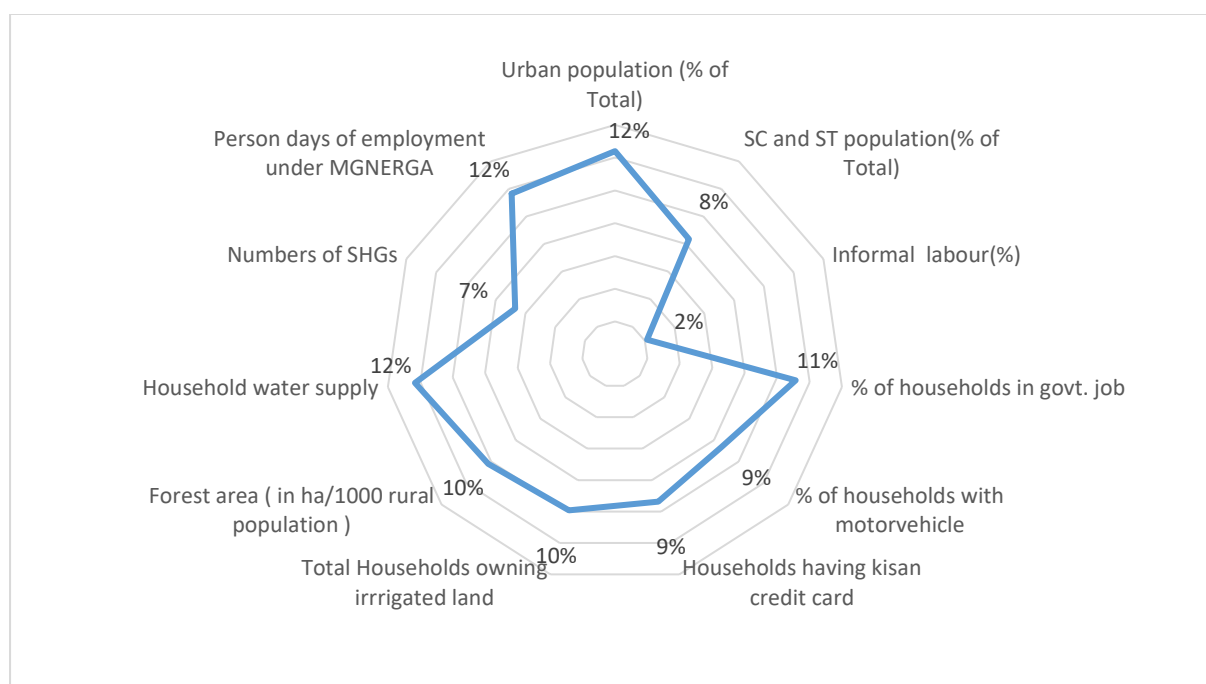
5.23 Brief Profile of the Sahibganj District

This District consists of 9 blocks: Barhait, Barharwa, Borio, Mandro, Pathna, Rajmahal, Sahibganj, Taljhari and Udhwa.

The district is supported by a network of rivers primarily the Ganga, Gumani and Bansloi. The district is rich in industrial minerals such as black stone (basalt), kaolin, China clay, and bentonite. The Rajmahal coalfield also extends into this region Sahibganj is characterized by the picturesque Rajmahal Hills and the Ganges River, making it a region of natural beauty and historical relevance. This District falls under Central and North-eastern Plateau zone.

Figure 91 : Blocks in Sahibganj District
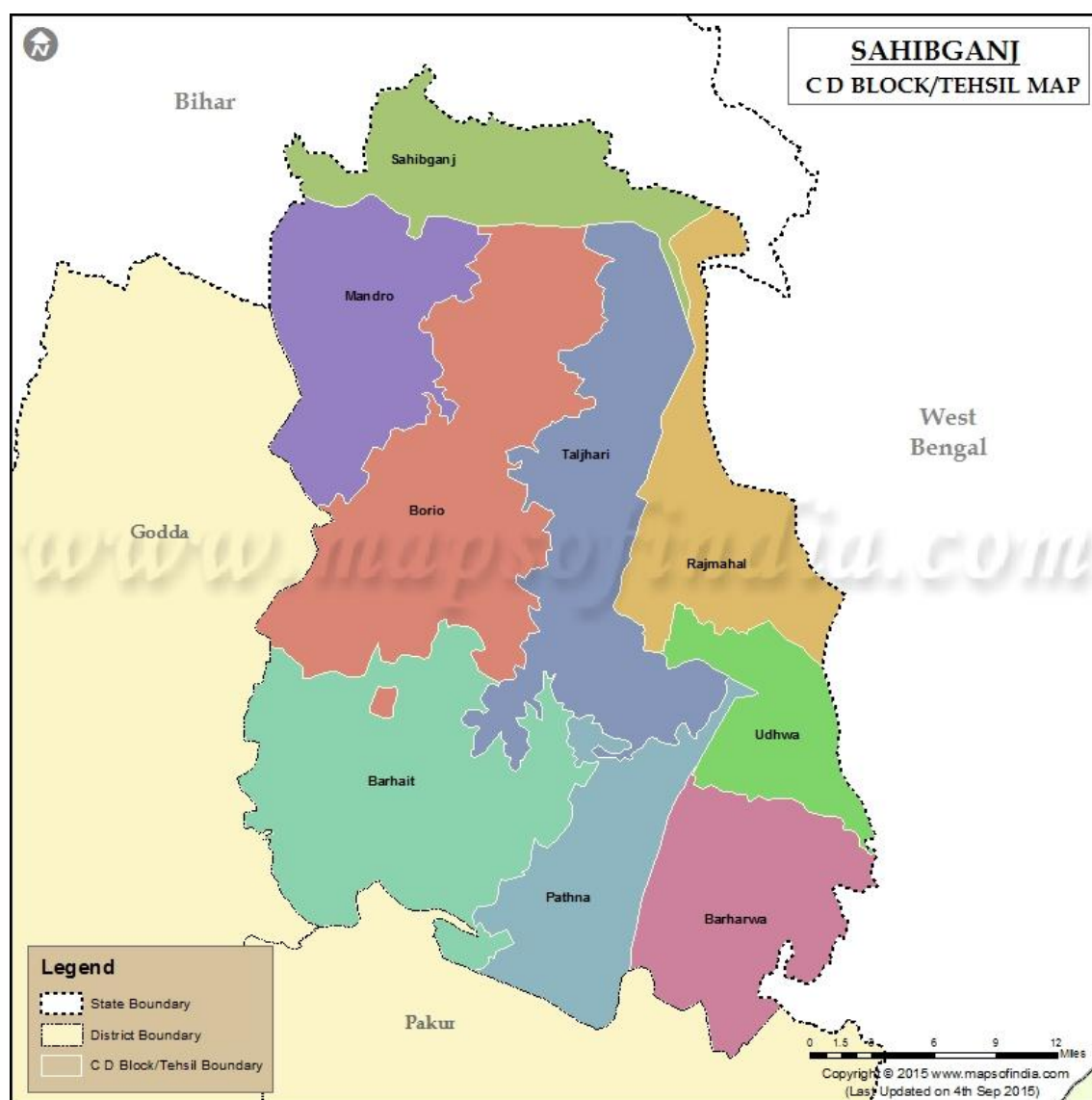
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Mr. Rahul Kumar Sinha (I.A.S.)
b.	Lok Sabha Constituencies	Rajmahal
c.	Vidhan Sabha Constituencies	Rajmahal, Borio and Barhait
B)	POPULATION	
d.	Total	11,50,567
e.	Male	5,89,391
f.	Female	5,61,176
C)	AREA	

g.	Total Geographical Area	2,063 sq. km
h.	Number of sub-divisions	2
i.	Number of blocks	9
	No. of Panchayats	166
	No. of Villages	1,819
D)	**DEMOGRAPHICS**	
j.	Literacy Rate	52.04%
k.	Sex Ratio	952/1000

Land Use Pattern

II. Land		
Total Geographical Area	2,063	Sq km
Total Area Reported	2,06,300	Ha
Forest Land	59,245	Ha
%Forest Land	28.71 %	*Indicates quantum of potential for NTFP & IFR/CFR livelihoods*

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Eastern Plateau and Hills Region (VII) (by planning commission) Central and North Eastern Plateau Zone (BI-4)
Climate	Hot Sub Humid
Soil Type	Alluvial, Sandy Loam and Black Soil
Rainfall 2020(in mm)	1,516	mm

Population Profile

IV. People & their Work			
Total		Male	Female
Population (in '000)	11,50,567	5,89,391	5,61,176
SC	72,341	37,317	35,024
ST	3,08,343	1,53,435	1,54,908

Total Households (in '000)	2,05,762	

Agriculture profile

Net Sown Area(ha)	59,200
Gross Cropped Area(ha)	62,700
Cropping Intensity(ha)	106%
Net Irrigated Area	20,251 ha
%Net Sown Area is Irrigated	34.20%

Figure 92 : LULC/ Forest Cover Map -Sahebganj
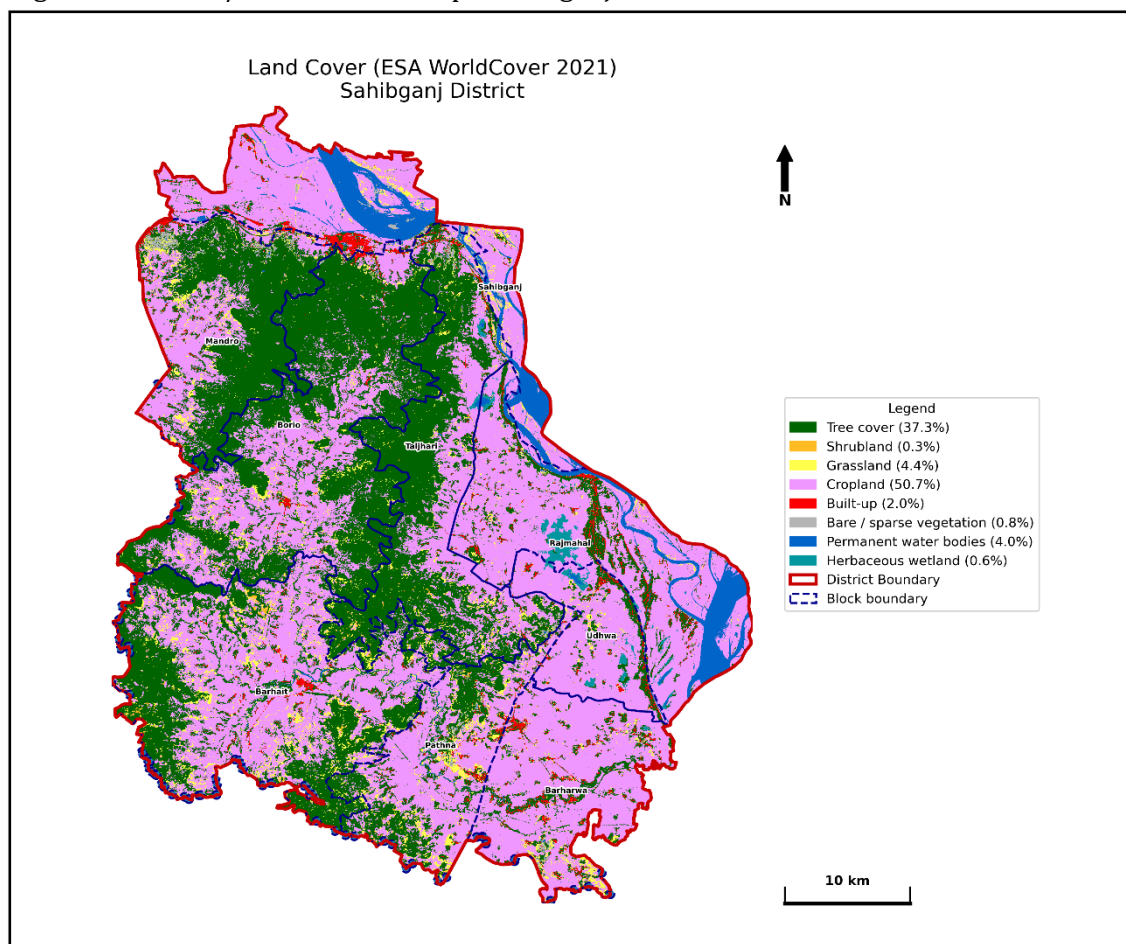
Table 47 : Vulnerability Index of all Nine Blocks – Sahebgang District

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Pathna	0.64	9
2	Mandro	0.61	8
3	Taljhari	0.57	7
4	Barhait	0.57	6
5	Udhwa	0.51	5
6	Rajmahal	0.51	4
7	Borio	0.49	3
8	Barharwa	0.42	2
9	Sahibganj	0.37	1

Figure 93 : Ranking of Blocks in Sahebganj District
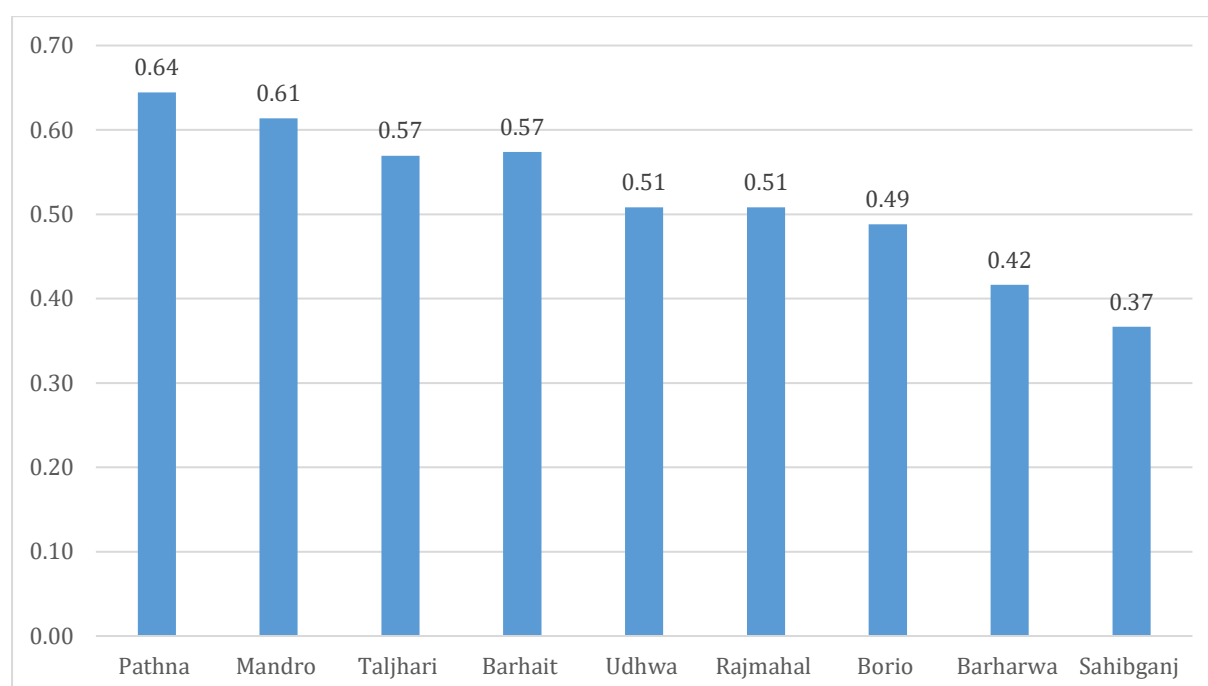
Table 48 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Pathna	Barhait	Borio
Mandro	Udhwa	Barharwa
Taljhari	Rajmahal	Sahibganj

5.23.1 Identification of main drivers

Sahibganj has six blocks within the jurisdiction of its district. Pathna is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 94 : Percentage Contribution of Different Indicators
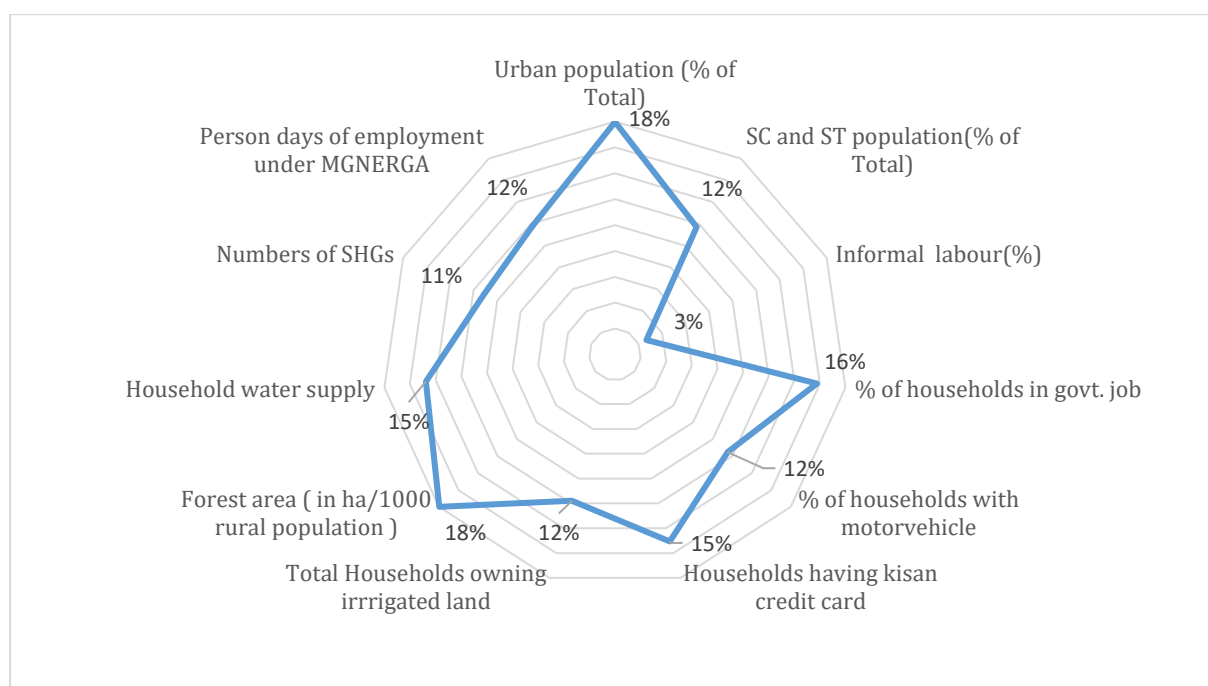
5.24 Brief Profile of the Saraikela Kharsawan District

This District Consist of 9 blocks: Adityapur (Gamharia), Chandil, Gobindpur (Rajnagar), Ichagarh, Kharsawan, Kuchai, Kukru, Nimdih and Saraikela.

The district has a mixed economy that is mainly agrarian but includes one of the largest industrial areas in Asia, the Adityapur Industrial Area. The region is rich in mineral deposits, notably kyanite, asbestos, quartz, limestone, and soap stone. A significant rural population relies on agriculture, with the land also providing various forest produce. Seraikela is situated on the bank of the Kharkai River and is surrounded by lush green forests and hillocks. This District falls under South-Eastern Plateau zone.

Figure 95 : Blocks in Saraikela-Kharsawan District

District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Shri Nitish Kumar Singh (I.A.S)
b.	Lok Sabha Constituencies	Khunti, Ranchi, Singhbhum
c.	Vidhan Sabha Constituencies	Ichagarh, Kharsawan, Saraikela
B)	POPULATION	
d.	Total	10,65,056
e.	Male	5,44,411
f.	Female	5,20,645

C)	AREA	
g.	Total Geographical Area	2,815 sq. km
h.	Number of sub-divisions	2
i.	Number of blocks	9
	No. of Panchayats	132
	No. of Villages	1,271
D)	DEMOGRAPHICS	
j.	Literacy Rate	68.85%
k.	Sex Ratio	958/1000

Land Use Pattern

II. Land		
Total Geographical Area	2,815	Sq. km
Total Area Reported	2,81,544	Ha
Forest Land	60,700	Ha
%Forest Land	21.56 %	*Indicates quantum of potential for NTFP & IFR/CFR livelihoods*

Climatic and Other Parameters

III. Characteristics		
Agro-climatic zone	Eastern Plateau and Hills Region (VII)	
Climate	Moist Sub- humid to Dry Sub-humid	
Soil Type	Red lateritic, Red Loam, Clay loam, red and yellow soils	
Rainfall 2020(in mm)	1166	mm

Population Profile

IV. People & their Work			
Total		Male	Female
Population (in '000)	10,63,458	5,44,411	5,20,323
SC	56,195	28,243	27,952
ST	3,74,642	1,87,149	1,87,493
Total Households (in '000)	1,67,827		

Agriculture profile

Net Sown Area(ha)	79803
Gross Cropped Area(ha)	86100
Cropping Intensity(ha)	109%
Net Irrigated Area	7300 ha
%Net Sown Area is Irrigated	9.14%

Figure 96 : LULC/ Forest Cover Map-Saraikela
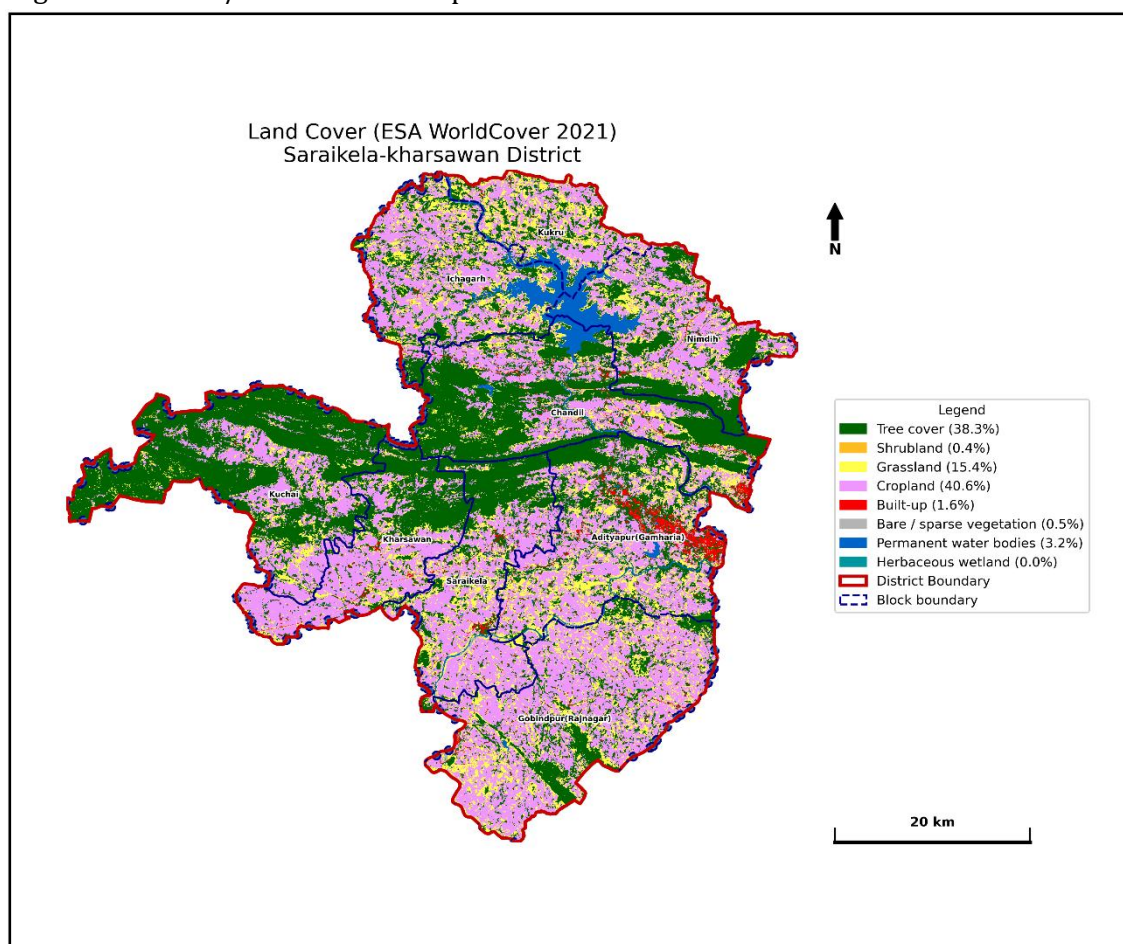
Table 49 : Vulnerability Index of all Nine Blocks – Saraikela District

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Kuchai	0.67	9
2	Ichagarh	0.65	8
3	Nimdih	0.61	7
4	Kukru	0.60	6

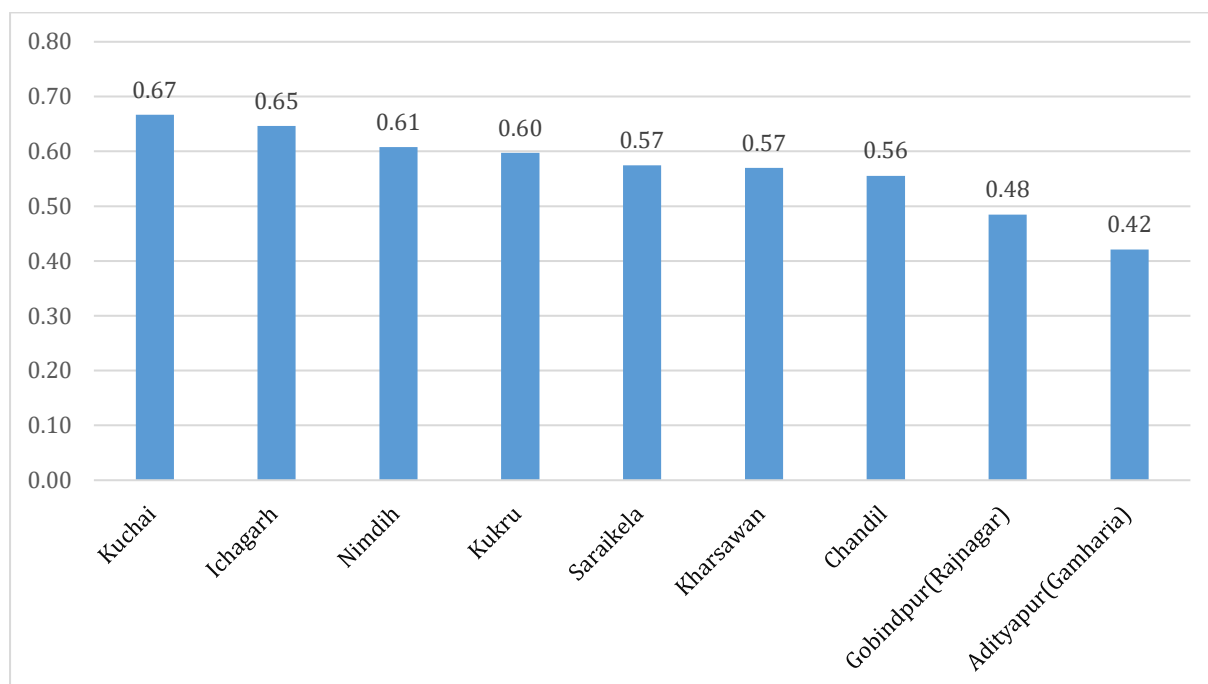| 5	Saraikela	0.57	5
6	Kharsawan	0.57	4
7	Chandil	0.56	3
8	Gobindpur (Rajnagar)	0.48	2
9	Adityapur (Gamharia)	0.42	1

Figure 97 : Ranking of Blocks in Saraikela District

Table 50 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Kuchai	Kukru	Chandil
Ichagarh	Saraikela	Gobindpur
Nimdih	Kharsawan	Adityapur

5.24.1 Identification of main drivers

Saraikela has Nine blocks within the jurisdiction of its district. kuchai is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 98 : Percentage Contribution of Different Indicators
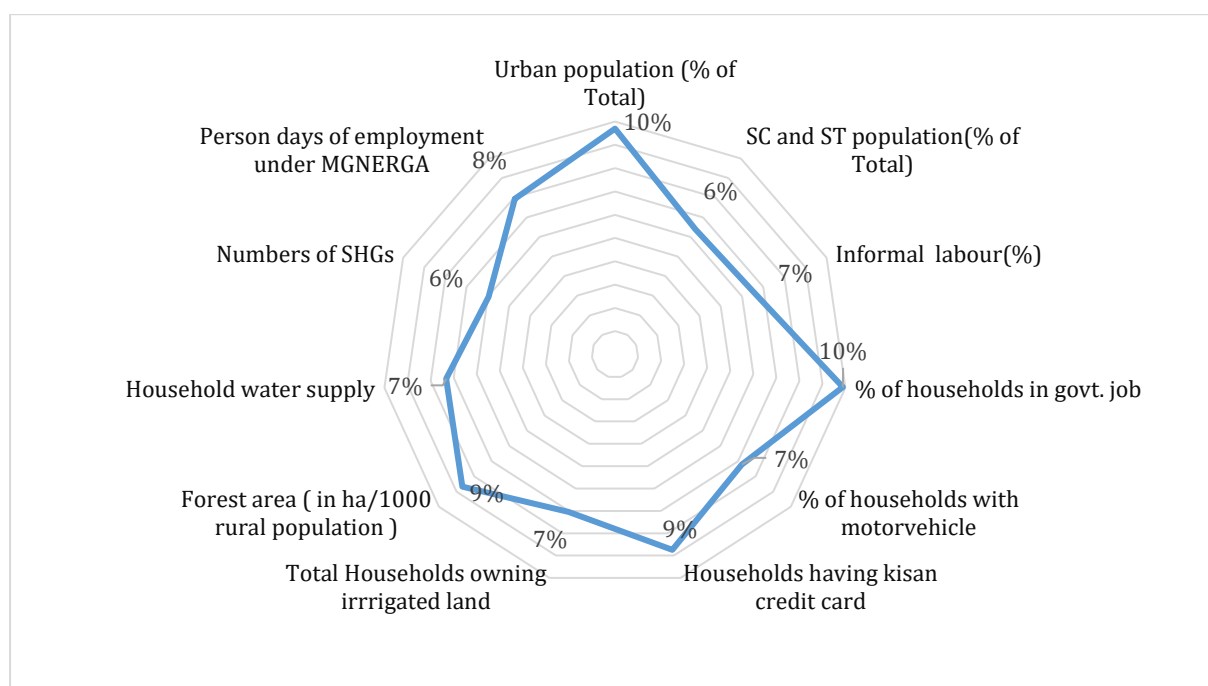
5.25 Brief Profile of the Simdega District

This District consists of 10 blocks: Simdega, Pakartanr, Kurdeg, Kersai, Bolba, Thethaitangar, Kolebira, Jaldega, Bansjor and Bano.

The economy of Simdega is primarily based on agriculture and forest produce. The main crops are paddy, maize, and pulses. The district is known for potential in horticulture, particularly mushroom cultivation and cashew farming. Simdega has extensive forest cover, providing a source of livelihood through minor forest produce like lac, kendu leaves, and sal seeds. Mineral resources include deposits of limestone, fireclay, and coal, though mining is not as widespread as in other parts of Jharkhand. The district has a high concentration of tribal communities, particularly Munda, Oraon, Kharia, and Gond tribes. This District falls under Western Plateau zone.

Figure 99 : Blocks in Simdega District
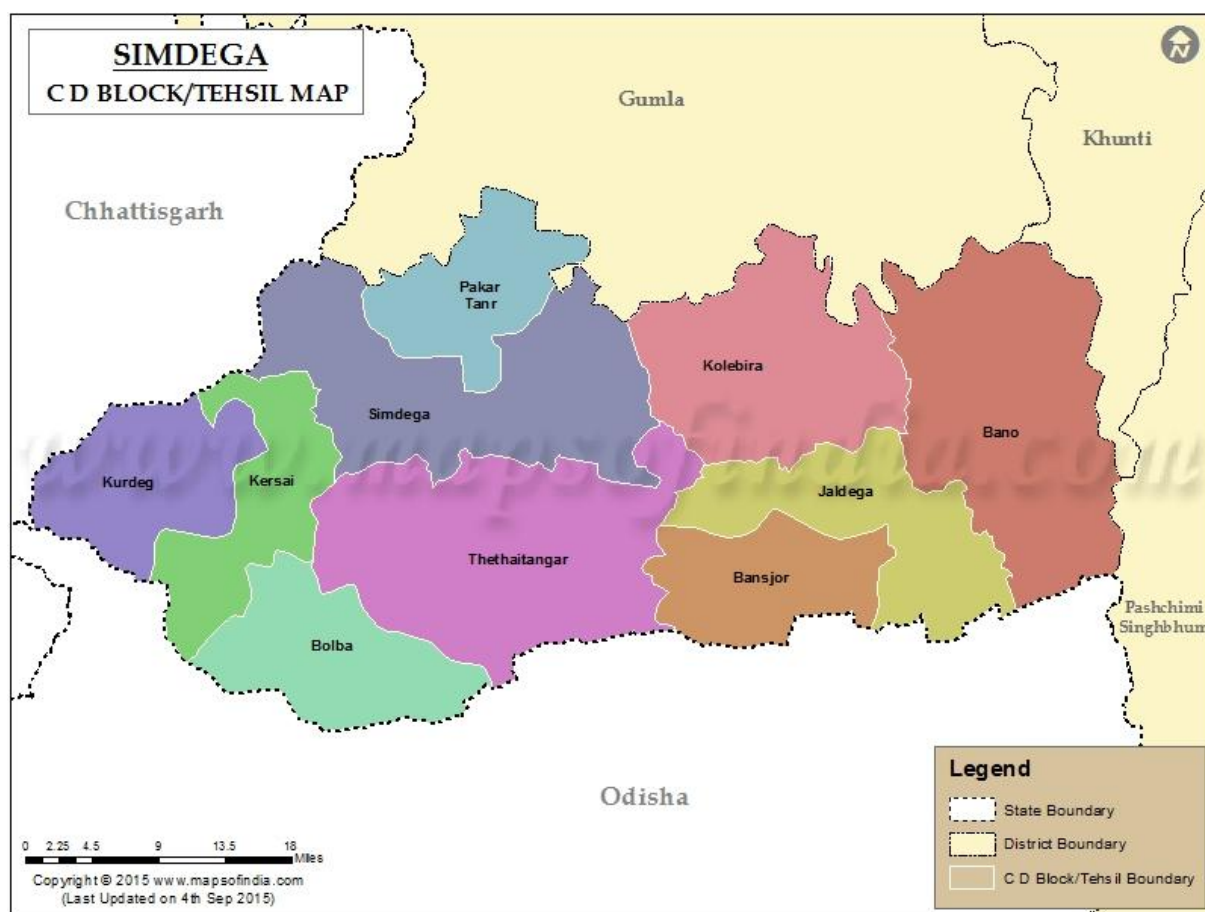
District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Smt. Kanchan Singh (I.A.S)
b.	Lok Sabha Constituencies	Khunti
c.	Vidhan Sabha Constituencies	Simdega and Kolebira
B)	POPULATION	
d.	Total	5,99,578
e.	Male	3,00,309
f.	Female	2,99,269
C)	AREA	
g.	Total Geographical Area	3,774 sq. km
h.	Number of sub-divisions	1
i.	Number of blocks	10
	No. of Panchayats	94

	No. of Villages	451
D)	**DEMOGRAPHICS**	
j.	Literacy Rate	67.99%
k.	Sex Ratio	997/1000

Land Use Pattern

II. Land		
Total Geographical Area	3,774	Sq km
Total Area Reported	3,77,400	Ha
Forest Land	1,24,651	Ha
%Forest Land	33.03 %	*Indicates quantum of potential for NTFP & IFR/CFR livelihoods*

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Eastern Plateau and Hills Region (VII) (by planning commission) Western Plateau Zone (BI-5) (by NARP)
Climate	Hot Moist/ Dry Sub humid
Soil Type	Alluvial, Grey Eroded Scrap, Red Calcareous
Rainfall 2020(in mm)	1,613	mm

Population Profile

IV. People & their Work		Male	Female
Total		Male	**Female**
Population (in '000)	5,99,578	3,00,309	2,99,269
SC	44,674	22,150	22,524
ST	4,24,407	2,11,546	2,12,861
Total Households (in '000)	1,08,003		

Agriculture profile

Agriculture profile	
Net Sown Area(ha)	81,600
Gross Cropped Area(ha)	86,900

Cropping Intensity(ha)	109%
Net Irrigated Area	4,815 ha
%Net Sown Area is Irrigated	6%

Figure 100 : LULC/Forest Cover Map -Simdega
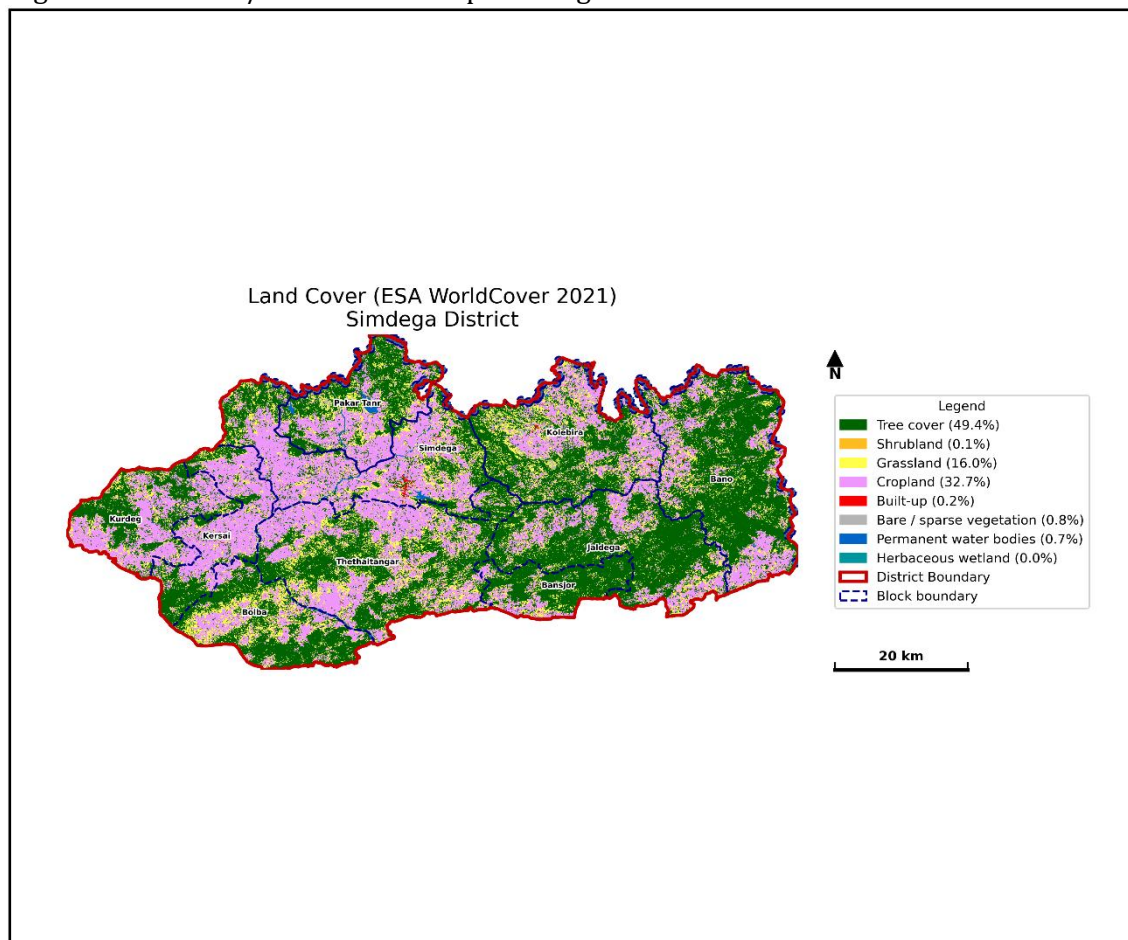
Table 51 : Vulnerability Index of all 10 Blocks – Simdega   District

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Jaldega	0.70	10
2	Bolba	0.68	9
3	Pakar Tanr	0.68	8
4	Kersai	0.66	7
5	Bansjor	0.63	6
6	Kolebira	0.62	5
7	Thethaitangar	0.62	4

8	Kurdeg	0.62	3
9	Simdega	0.44	2
10	Bano	0.37	1

Figure 101 : Ranking of Blocks in Simdega District
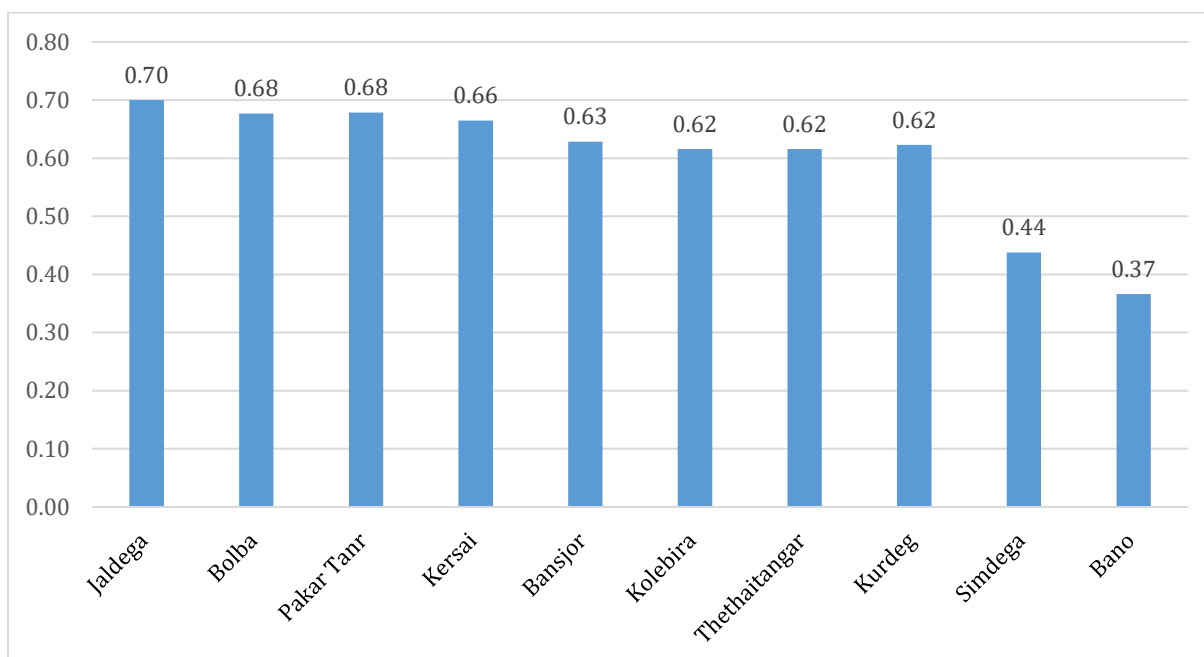

Table 52 : Classification of Blocks According to Vulnerability Index

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Jaldega	Bansjor	Thethaitangar
Bolba	Kolebira	Kurdeg
Pakar Tanr		Simdega
Kersai		Bano

5.25.1 Identification of main drivers

Simdega has six blocks within the jurisdiction of its district. Jaldega is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 102 : Percentage Contribution of Different Indicators

Figure 102 : Percentage Contribution of Different Indicators
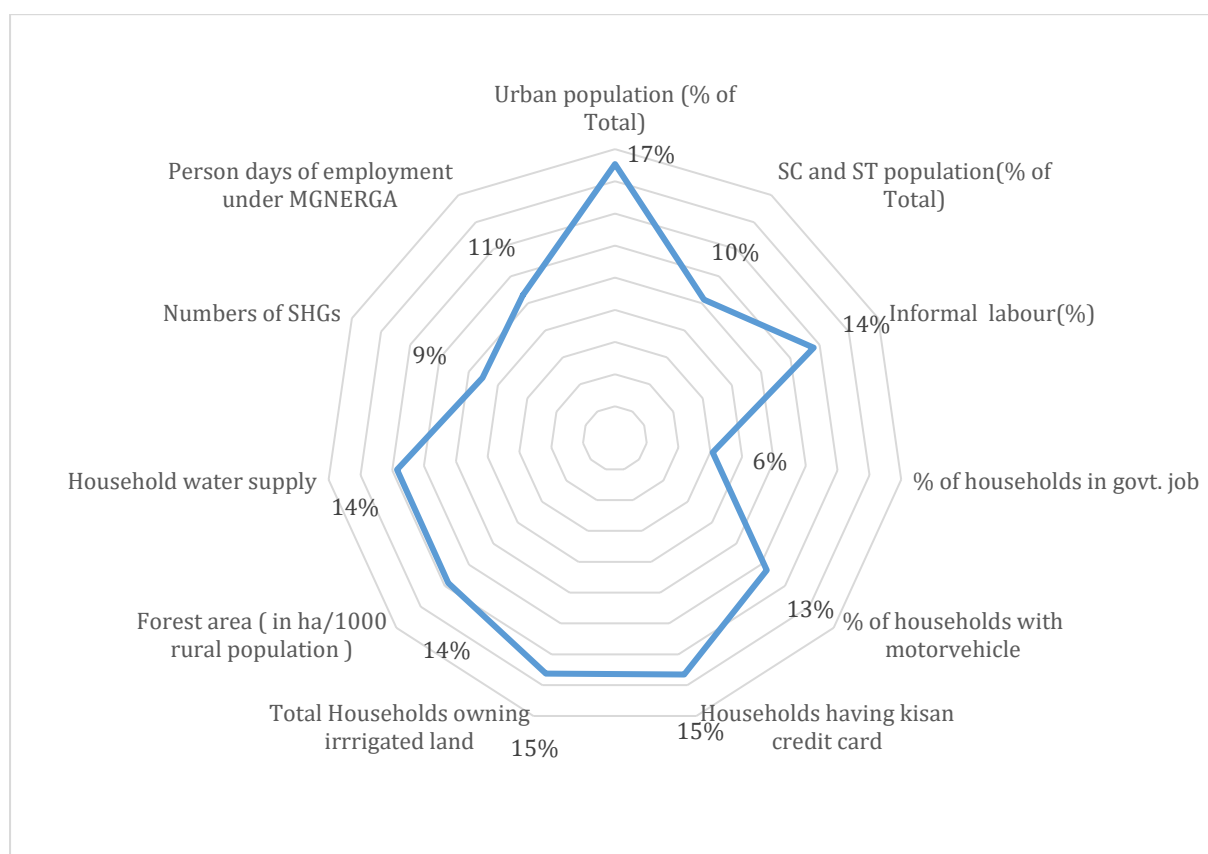
5.26 Brief Profile of the West Singhbhum District

This District consists of 18 blocks: Anandpur, Bandgaon, Chaibasa, Chakradharpur, Goelkera, Gudri, Hatgamharia, Jagannathpur, Jhinkpani, Khuntpani, Kumardungi, Manjhari, Majhgaon, Manoharpur, Noamundi, Sonua, Tantnagar and Tonto.

The district is also rich in minerals notably iron ore, manganese and chromite and holds extensive forest cover that supports a range of livelihood activities. The economy of West Singhbhum is dominated by mining and forest-based activities. The district is exceptionally rich in minerals, primarily iron ore. It is home to some of India's largest iron ore mines, including the Chiria mines. The geography is characterized by rolling hills, dense Sal forests, and the Koel, Karo, and Kharkai rivers. This District falls under South-Eastern Plateau climatic zone.

Figure 103 : Blocks in West Singhbhum District

District at a Glance

A)	ADMINISTRATION	
a.	Deputy Commissioner	Shri Chandan Kumar (I.A.S.)
b.	Lok Sabha Constituencies	Singhbhum
c.	Vidhan Sabha Constituencies	Chaibasa, Majhgaon, Jaganathpur, Manoharpur, Chakradharpur
B)	POPULATION	
d.	Total	15,02,338
e.	Male	7,49,385
f.	Female	7,52,953
C)	AREA	

g.	Total Geographical Area	7,224 sq. km
h.	Number of sub-divisions	3
i.	Number of blocks	18
	No. of Panchayats	217
	No. of Villages	1,687
D)	**DEMOGRAPHICS**	
j.	Literacy Rate	67.70%
k.	Sex Ratio	958/1000

Land Use Pattern

II. Land		
Total Geographical Area	7224	Sq. km
Total Area Reported	722400	Ha
Forest Land	337769	Ha
%Forest Land	46.75 %	*Indicates quantum of potential for NTFP & IFR/CFR livelihoods*

Climatic and Other Parameters

III. Characteristics	
Agro-climatic zone	Eastern Plateau and Hills Region (VII) (by planning commission) South Eastern Plateau Zone (BI-6) (by NARP)
Climate	Hot Sub Humid
Soil Type	Red Laterite and Clay Loam, Red Sand, Red and Yellow
Rainfall 2020(in mm)	1,376	mm

Population Profile

IV. People & their Work		**Male**	**Female**
Population (in '000)	15,02,338	7,49,385	7,52,953
SC	56,986	28,144	28,842
ST	10,11,296	5,00,949	5,10,347
Total Households (in '000)	2,47,857		

Agriculture profile

Net Sown Area(ha)	2,17,263
Gross Cropped Area(ha)	2,58,364
Cropping Intensity(ha)	118.92%
Net Irrigated Area	1,5000 ha
%Net Sown Area is Irrigated	6.90%

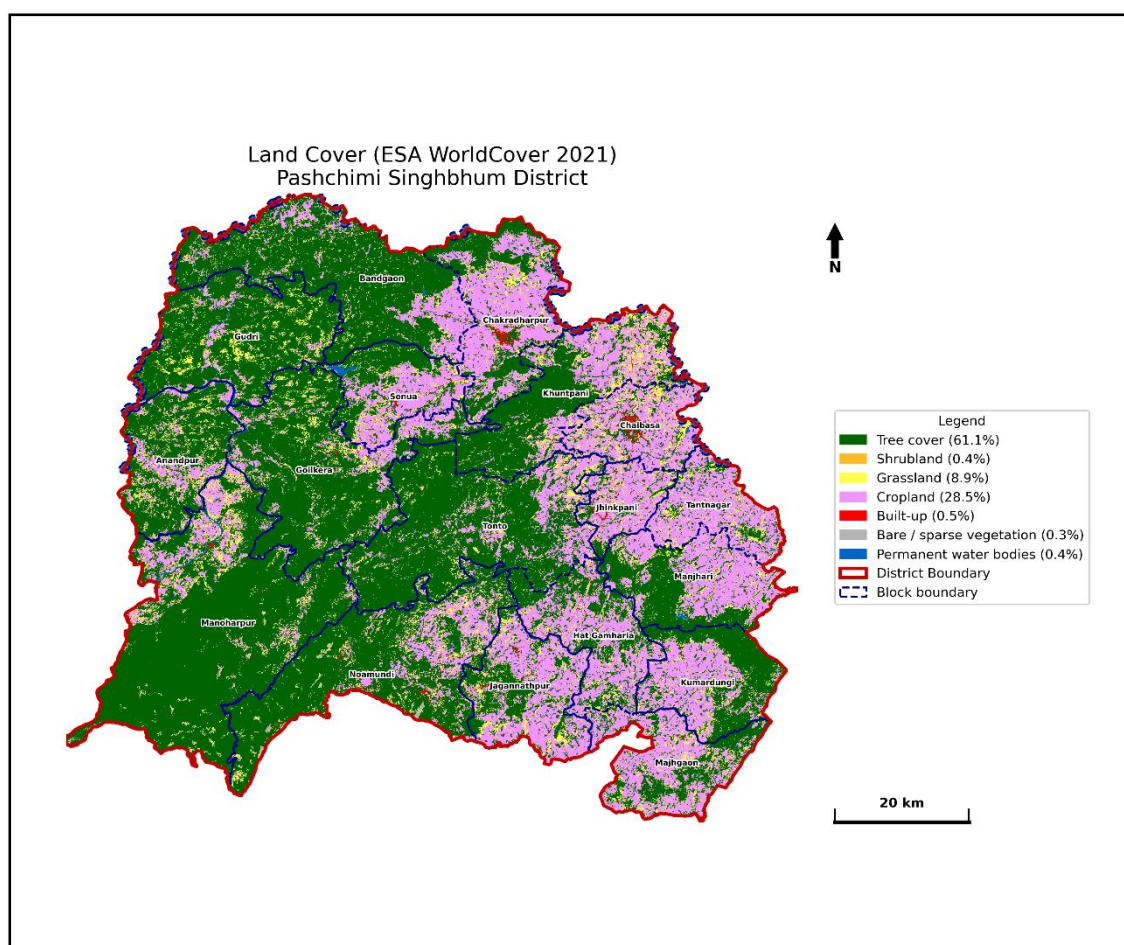Figure 104 : LUL/ Forest Cover Map- West Singhbhum

Table 53 : Vulnerability Index of all 18 Blocks -West Singhbhum

Sl. No	Blocks	Equal weights	
		Vulnerability index	Ranking
1	Tantnagar	0.78	18
2	Tonto	0.70	17
3	Khuntpani	0.70	16

4	Bandgaon	0.70	15
5	Goilkera	0.70	14
6	Hat Gamharia	0.68	13
7	Manjhari	0.68	12
8	Majhgaon	0.66	11
9	Gudri	0.65	10
10	Anandpur	0.64	9
11	Kumardungi	0.63	8
12	Jhinkpani	0.60	7
13	Sonua	0.57	6
14	Manoharpur	0.54	5
15	Jagannathpur	0.52	4
16	Noamundi	0.49	3
17	Chakradharpur	0.43	2
18	Chaibasa	0.42	1

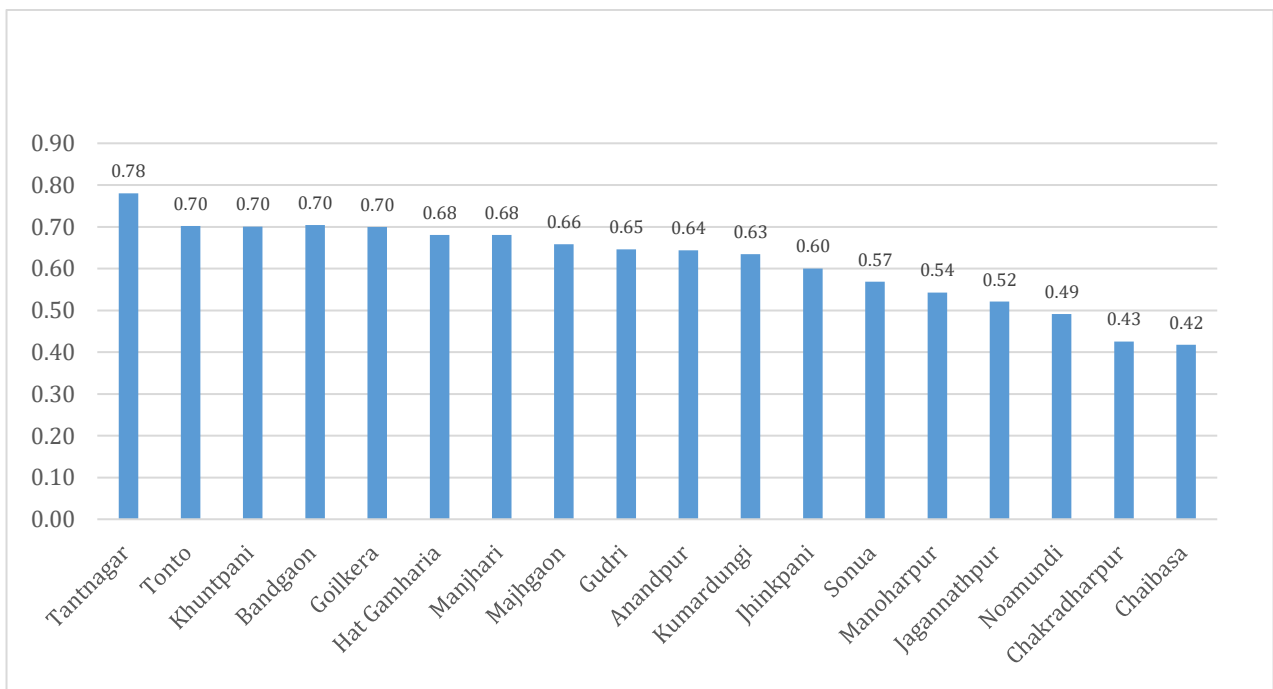Figure 105 : Ranking of Blocks in West Singhbhum District

Table 54 : Classification of Blocks According to Vulnerability Index- Singhbhum   District

High Vulnerability	Moderate Vulnerability	Low Vulnerability
Tantnagar	Manjhari	Sonua
Tonto	Majhgaon	Manoharpur
Khuntpani	Gudri	Jagannathpur
Bandgaon	Anandpur	Noamundi
Goilkera	Kumardungi	Chakradharpur
Hat Gamharia	Jhinkpani	Chaibasa

5.26.1 Identification of main drivers

West Singhbhum has 18 blocks within the jurisdiction of its district. Tantnagar is the most vulnerable one among the six blocks. The radar graph below shows the percentage contribution of each of the drivers to vulnerability.

The percentage of the Urban population, the percentage of households with government jobs, households having Kisan credit cards and households owning irrigated land pay a vital role in the determination of the vulnerability of the area. Blocks with a higher percentage of these indicators are less vulnerable to climate change.

Figure 106 : Percentage Contribution of Different Indicators
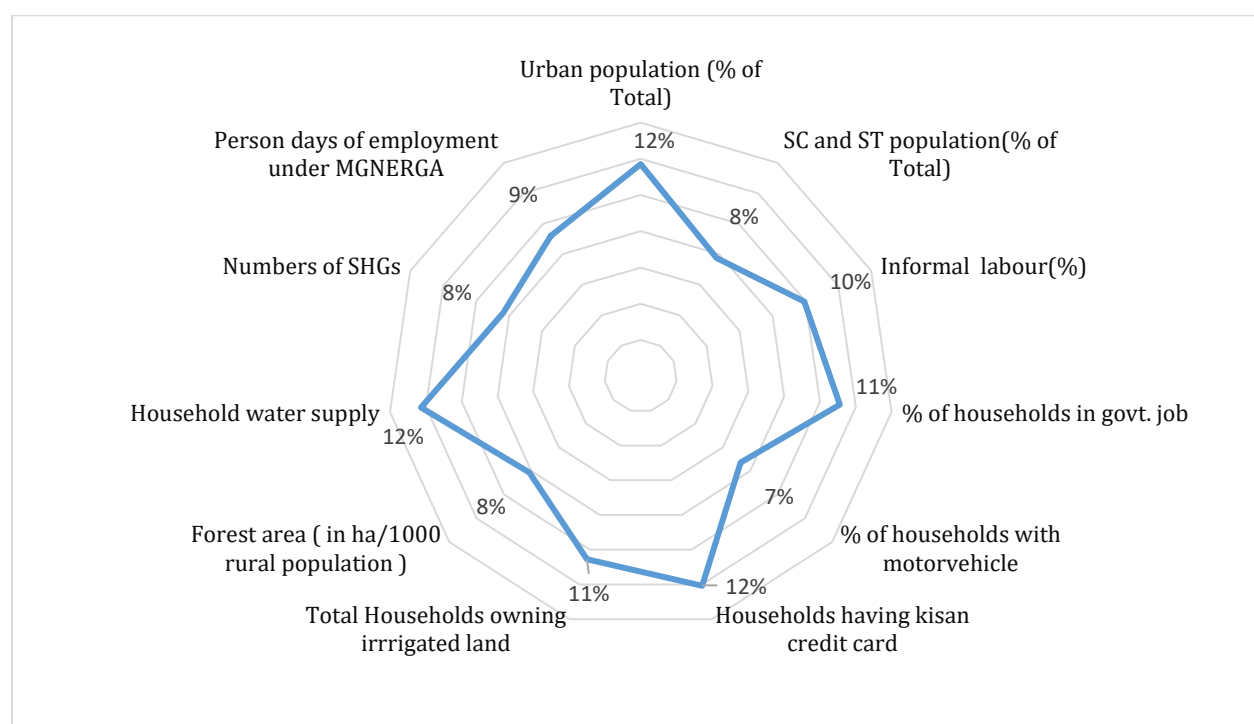
6 Conclusion & Way forward

The result of this integrated vulnerability assessment shows that vulnerability among blocks varies significantly based on the indicators considered in the study. The study's findings emphasize the need for block and district-specific climate resiliency and adaptation programs to address the unique challenges and the vulnerabilities that are identified. Efforts should be focused on reducing current climate vulnerability across all blocks and districts by designing customized adaptation plans and more resilient infrastructure across Jharkhand.

6.1   Development of Risk Index:

Future work should include developing block-wise and district-wise risk *index* and ranking of districts based on this index, considering hazard exposure and vulnerability

6.2   Enhanced Assessment Approaches:

It has been found during the analysis that there is a drastic difference in the results obtained while following the Tier I approach and the Tier II approach. A wider consultation is required all this while conducting block-level vulnerability assessments.

6.3   Sector-Specific Assessments:

A sector-wise vulnerability assessment for key sectors of the economy is required to design adaptive planning and decision-making. The focus should be on reducing future climate risks and increasing the adaptive capacity of the most vulnerable sector of the economy.

6.4   Challenges and Limitations

6.4.1   Common Framework Constraints:

The study's common framework may not fully capture state-specific conditions due to the non-uniformity of indicators and data availability. There is a need to develop the zonal framework and set of state-specific indicators.

6.4.2   Data Availability and Consistency:

Getting block-level data for all indicators is one of the biggest challenges. Ensuring uniform data availability across all districts and blocks and accessing data from concerned departments posed difficulties. Data collected from different sources and time periods might bring discrepancies in the results.

These challenges that are highlighted above requires more consistent and comprehensive data collection methods and a more flexible framework to reflect state-specific vulnerabilities accurately.
Despite these limitations, the study provides a critical foundation for understanding and addressing block-level climate vulnerability in Jharkhand.

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