Spatial Interaction and Borderland Dynamics: A Geographical Analysis of Jhargram–Purulia–Jharkhand Region

Dr. Samir Pramanik[1]; Dr. Bela Das[2]

[1]Department of Geography, Midnapore College (Autonomous), Vidyasagar University, Midnapore, West Bengal, India

[2]Department of Geography, Raja Narendra Lal Khan Women's College (Autonomous), Vidyasagar University, Midnapore, West Bengal, India.

Corresponding Author Email: samirpramanik262@gmail.com

Abstract— The Jhargram–Purulia–Jharkhand border region exists as a living geographical area which allows people to maintain their cultural heritage while engaging in economic activities and using multiple transportation routes. The research studies how spatial patterns of interaction and border area movements create economic and environmental changes in this tri-junction territory located in eastern India. The research investigates cross-border labor movements and forest-based livelihoods and unofficial trade activities and infrastructure connections and cultural exchanges through spatial analysis and borderland theory and field research and secondary data. The results demonstrate that the area operates as a connected border corridor which displays tribal cultural bonds and resource-based economic activities and unequal development patterns between Bengal and Jharkhand. The ongoing movement of people and products and services through the area enhances regional connections between different regions of the area. The paper emphasizes the need for an integrated, border-sensitive development framework to enhance mobility, reduce inequalities, and sustainably manage natural resources in the borderland.

Keywords: Border Geography, Borderland Dynamics, Frontier Region, Informal Trade, Migration, Mobility Networks, Spatial Interaction, Tribal Livelihood.

I. INTRODUCTION

The dynamic nature of borderland regions exists because geographical boundaries interact with social and cultural and economic activities that extend beyond political borders. People in these areas develop ties through their shared historical background and cultural heritage and their ability to work together and compete with each other (Martinez, 1994; Newman, 2006). The eastern Indian Jhargram-Purulia-Jharkhand tri-border region forms a socio-spatial interface that creates distinct patterns of state border interaction through its natural environment and ethnic diversity and commercial activities. The region shows high community dependence between West Bengal and Jharkhand which consists of dense forest areas and tribal communities and developing road networks (Chakraborty, 2019). Border regions experience spatial interaction because mobility patterns and accessibility and economic interdependencies create better movement possibilities (Haggett, 2001). People in the study area view border crossing as a method to reach periodic markets and forest resources and jobs and medical services and educational institutions. The informal trade of agricultural products and non-timber forest products and daily use items creates major economic transactions between different countries. The examination of movement patterns through spatial interaction models shows how administrative borders separate two areas that maintain seamless functional connections (Fotheringham & O'Kelly, 1989). The tribal cultural traditions of the Jhargram–Purulia–Jharkhand borderland have created its historical development while seasonal labor migration and changing resource needs have shaped its evolution. The presence of Left-Wing Extremism (LWE) in earlier decades also influenced settlement patterns, state presence, and governance mechanisms in the region (Banerjee & Basu, 2017). The socio-economic effects of LWE activities which have greatly decreased still create problems for infrastructure development and service provision. The border villages face problems because they experience different levels of development and their residents struggle

with finding work and face difficulties reaching government services. The study needs to examine borderland dynamics through geographical analysis because it requires this approach. The research studies spatial interaction patterns and mobility movement plus social-economic connections and cultural unification throughout the Jhargram–Purulia–Jharkhand territory. The study uses spatial models together with GIS-based analysis and qualitative insights to examine how border areas affect daily routines and possibilities and obstacles that communities encounter in transitional zones. The research results produce valuable information which guides regional development planning and cross-border partnerships and integrated governance systems which promote sustainable development of border areas.

II. LITERATURE REVIEW

The study of borderlands has evolved from a political–administrative focus to a broader socio-spatial and cultural perspective. The researchers who studied borders during the early stages of border research considered borders to be unchanging lines that separated two countries (Prescott, 1987). The scholars who came after him believed that borders exist as evolving elements which people create through their interactions and which they use to define their economic activities and how their regions will grow (Paasi, 1996; Newman, 2003). Martinez (1994) introduced one of the most influential typologies of borderland interaction—alienated, coexistent, interdependent, and integrated—highlighting the varying degrees of cross-border exchange shaped by political relations, cultural similarities, and economic complementarities. Theoretical spatial interaction theory provides researchers with essential principles to study how people move between different border locations. The Gravity Model, which human geography experts widely use, describes how people and goods and services move based on population size and available economic opportunities and the distance between locations (Fotheringham & O'Kelly, 1989). People in borderland areas use their cultural connections and unofficial networks to decide their travel routes more than they rely on James distance (Hanson, 2000). South Asian studies demonstrate that temporary markets and family connections together with shared tribal identities enable people to cross borders even when borders face official restrictions (Singh, 2011; Banerjee & Basu, 2017). The eastern Indian borderlands, particularly the West Bengal–Jharkhand region, have received growing academic attention over the last two decades. Research shows that Santhal, Munda, and Lodha tribal groups create cross-border social networks through their marriage traditions and festival activities and their forest-related work and seasonal movement patterns (Chakraborty, 2019; Hembram, 2020). The research shows that collections of non-timber forest products and fuelwood and small agricultural operations create operational ecosystems that extend beyond established administrative demarcations according to Sarkar and Das 2018. The research shows that ecological and cultural elements maintain their existence across established state boundaries. The second body of research investigates obstacles that affect development in border regions. The research shows that border areas experience two major problems which include weak infrastructure and limited government presence and uneven economic growth, especially in areas where forests and tribal communities exist (Jha 2015). The historical presence of Left-Wing Extremism (LWE) in the West Bengal–Jharkhand border region shaped how authorities operated and how people moved and how public services were provided (Bhattacharya 2016). The research shows that development gaps in existing road infrastructure and health services and educational resources lead to ongoing challenges in both economic development and cross-border relationships according to the existing literature. Researchers increasingly rely on GIS and spatial analysis to study how people cross borders and how different regions connect with one another. Remote sensing studies demonstrate how settlement patterns and market linkages change because of land-use changes and forest fragmentation and rural road development according to Roy and Ghosh 2020. The border region transportation networks use network analysis to show how they affect both interaction levels and accessibility throughout border areas according to Jaiswal and Saha 2021. The new research methods enable researchers to create better ways to study cross-border movements and connections between different areas. The existing research on tribal livelihoods and development obstacles and regional interactions in West Bengal–Jharkhand regions lacks an all-inclusive analysis that combines spatial interaction models with GIS-based mapping and borderland theory to study the Jhargram–Purulia–Jharkhand tri-border area.there is limited comprehensive research combining spatial interaction models, GIS-based mapping, and borderland theory to analyze the Jhargram–Purulia–Jharkhand tri-border dynamics. This study addresses this gap by integrating socio-economic, cultural, and spatial dimensions to understand how borders shape movement, interaction, and development in this critical eastern Indian landscape.The study aims to analyze spatial interaction patterns, cross-border

socio-economic linkages, informal trade and labor mobility, infrastructural connectivity, cultural–ethnic–linguistic interactions, development challenges and opportunities, and ultimately propose an integrated geographical framework for sustainable borderland development in the Jhargram–Purulia–Jharkhand tri-border region.

III. METHODOLOGY

The study uses a mixed-method research design which combines spatial and socio-economic and qualitative methodologies to investigate how people interact and how border areas develop in the Jhargram–Purulia–Jharkhand region. The research team collected data from different sources to achieve thorough analysis across multiple geographical scales. The researchers collected primary data through their field observations and their discussions with key informants and their village-level interviews which they conducted in Jamboni and Belpahari and Bandwan and Balarampur and Barabazar and various surrounding villages near the Jharkhand border. These interactions provided information about how people move across borders and how they earn their living and how tribal people share their cultural heritage and how they face their particular local problems. The researchers obtained secondary data from multiple sources which included the Census of India (2011) and 2021 population projections and District Statistical Handbooks and the Economic Review of West Bengal and Forest Department records and transport and road network maps and multiple government development reports that focused on areas affected by Left Wing Extremism (LWE). The researchers used GIS datasets to analyze spatial characteristics through land use–land cover maps which included Sentinel satellite imagery and Forest Survey of India forest cover data and road network data and administrative boundary maps.The researchers used multiple analytical tools to extract meaningful interpretations from the data. The researchers used The Spatial Interaction Model (Gravity Model) to analyze how different settlements interact with each other throughout the borderland area. The researchers used network analysis to discover how people and goods moved across the area and which transport links held the highest strategic value. The study used Borderland Theory as its theoretical framework which included Martinez and Prescott and Newman as its theoretical base to study how cultural traditions continue through time. Socio-economic profiling and descriptive statistical analysis were performed to interpret demographic characteristics, migration patterns, livelihood dependence, and the extent of cross-border exchanges. Together, these methods provide a holistic understanding of spatial interaction and borderland dynamics within the tri-junction region.

Gravity Model Formula for Spatial Interaction

The general form of the Gravity Model used in spatial analysis is:

$$Iij=_k \underline{Pi\times Pj} /Dij.n$$

Where:

- Iij = Interaction between place *i* and place *j*
- Pi= Population (or economic mass) of place *i*
- Pj= Population (or economic mass) of place *j*
- Dij = Distance between place *i* and place *j*
- n = Distance decay parameter (usually 1 or 2)
- k = Constant of proportionality

IV. RESULT AND DISCUSSION

The research study investigates how people move between different socio-economic activities through their established paths and their ability to interact with each other through their physical connections and their shared cultural practices. Borderland regions display changing social and spatial patterns because people can move freely across administrative borders to participate in their daily activities (Martinez, 1994; Newman, 2006). The present research study uses field surveys together with spatial interaction modelling and GIS-based mapping and socio-economic profiling to demonstrate how the tri-border area operates as

a system which connects different parts through opportunities and limitations. The research findings show strong interdependence between the region's various elements through its periodic markets and labor mobility and forest-resource-based livelihoods which extend across state borders (Paasi, 1996; Chakraborty, 2019). Spatial interaction patterns show that cross-border linkages increase when settlements reside near transport corridors and weekly markets. Previous research established that border interactions follow functional connectivity patterns which operate independently from political boundaries (Fotheringham & O'Kelly, 1989; Hanson, 2000). The results demonstrate that ethnic groups and their cultural traditions together with Left-Wing Extremism (LWE) historical background have shaped development patterns and mobility trends and governance systems throughout the region (Banerjee & Basu, 2017). Villagers continue to experience movement restrictions and resource dependency because LWE intensity has decreased but infrastructure gaps and livelihood vulnerabilities persist. The borderland area research findings demonstrate that borderland regions exhibit their own distinctive developmental patterns. Combined, these findings underscore that the borderland functions not as a marginal or isolated zone but as an active socio-spatial interface where people, goods, and cultural practices circulate freely.

Table 1: Gravity Model

District Pair (i–j)	Population of i (in lakhs)	Population of j (in lakhs)	Distance (km)	Interaction Value (I_{ij})	Interaction Level
Jhargram – West Singhbhum	11.4	15.0	32	18.6	Very High
Jhargram – Purulia	11.4	30.0	55	13.2	High
Purulia – East Singhbhum	30.0	23.0	80	10.4	Moderate
Purulia – Seraikela-Kharsawan	30.0	12.0	62	9.8	Moderate
Purulia – West Singhbhum	30.0	15.0	110	7.1	Low

Source: Field Survey, 2025

The spatial interaction analysis reveals that inter-district connectivity across the Jhargram–Purulia–Jharkhand borderland is strongly influenced by distance, population size, market potential, and transportation infrastructure. According to the Gravity Model estimation, the highest interaction intensity is recorded between Jhargram–West Singhbhum (interaction value: 18.6) owing to their shorter travel distance and the presence of the Jhargram–Chakulia corridor, which acts as a major commercial linkage. This region hosts periodic haats and informal trade hubs that attract daily commuters, small traders, and transport operators from both sides of the border. In comparison, the interaction between Purulia–East Singhbhum (10.4) and Purulia–Seraikela-Kharsawan (9.8) remains moderate. These flows are primarily associated with the movement of agricultural labour, construction workers, and forest-resource collectors. Road connectivity such as the Balarampur–Chandil road and Bandwan–Patamda corridor enhances mid-level socio-economic transactions. However, infrastructural limitations—like broken road stretches, low bus frequency, and limited market facilities—reduce the full potential of cross-border mobility. The interaction between Jhargram–Purulia (13.2) indicates a strong intra-state flow of labour, forest products, and weekly market-based activities. Villagers from Belpahari, Jamboni, and Barabazar frequently cross the administrative boundary for accessing healthcare, forest collection zones, and agricultural fields. This shows that administrative boundaries do not act as strong barriers but rather porous lines allowing frequent social and economic exchanges. Finally, the lowest interaction is observed between Purulia–West Singhbhum (7.1) due to poor terrain conditions, dense forest cover, and limited transport facilities. The upland

plateau and forested tracts hinder daily mobility, resulting in low trade and weak market linkages. Despite this, forest products, tribal cultural events, and migration for stone quarrying still maintain a minimal level of spatial interaction. Overall, the results indicate that proximity, accessibility, tribal cultural affinity, and shared economic dependence are the major drivers shaping the spatial interaction system of the tri-border region. The borderland operates as a porous socio-economic corridor, not a rigid boundary, and plays a crucial role in sustaining inter-district linkages that are central to regional development.

Table 2: Cross-border Socio-economic Linkages, Informal Trade, and Labour Mobility in Jhargram–Purulia–Jharkhand Border Region

Indicator	Jhargram–West Singhbhum Border	Bandwan–East Singhbhum Border	Balarampur–Seraikela Border	Barabazar–Chandil Border
Daily Labour Mobility (persons/day)	450–520	300–340	220–260	180–210
Major Occupation of Migrant Workers	Construction, Mining, Farm labour	Agricultural labour, Brick kiln	Construction, Transport	Stone quarrying, Market labour
Informal Trade Volume (₹ lakh/month)	18–22	10–12	7–9	5–7
Dominant Informal Goods Traded	Forest products (mahua, kendu), vegetables, poultry	Vegetables, firewood, cattle	Fruits, fish, household goods	Stone chips, minor forest products
Key Social Linkages	Mixed tribal kinship (Santali, Ho), weekly haat networks	Shared agricultural fields, cross-border marriages	Seasonal festivals, mutual labour exchange	Tribal festivals, informal credit networks
Main Connectivity Routes	Jhargram–Chakulia Road (NH 49)	Bandwan–Patamda Corridor	Balarampur–Chandil Road	Barabazar–Chandil Rural Road

Source: Field Survey, 2025

Cross-border socio-economic linkages between Jhargram, Purulia, and adjoining Jharkhand districts show a dense pattern of daily mobility and informal economic activities. The highest labour circulation occurs along the Jhargram–West Singhbhum border, where nearly 450–520 workers travel daily for construction, farm work, and mining-related jobs. This corridor is supported by the well-connected Jhargram–Chakulia (NH 49) route, enabling smooth movement. The presence of mixed tribal communities such as Santali and Ho further strengthens interpersonal networks, making cross-border work patterns socially embedded rather than purely economic transactions. In the Bandwan–East Singhbhum corridor, agricultural dependency plays a significant role. Around 300–340 workers from Bandwan and surrounding villages routinely cross into Patamda and Bodam blocks to work in agricultural fields, brick kilns, and seasonal farm operations. Shared agricultural landscapes and cross-border marriages reinforce these linkages. Informal trade is also notable here, especially in vegetables, firewood, and cattle, generating ₹10–12 lakh per month in unofficial economic flow. In the Balarampur–Seraikela border region, labour mobility is moderate (220–260 persons/day). This corridor is dominated by construction and transport labour. Informal trade involves fruits, fish, and household products, often exchanged through weekly haats. Seasonal festivals and mutual labour exchange practices indicate a strong cultural dimension to mobility, beyond mere economic necessity. The Barabazar–Chandil zone shows the lowest labour

movement (180–210 persons/day) due to comparatively weak road connectivity and the presence of forested terrain. However, the area remains significant for stone-related informal trade, including stone chips and minor forest produce. Tribal festivals, informal credit systems, and haat-based exchanges create a community-dependent economic system. Even with lower mobility levels, social cohesion between border villages remains strong. Overall, the findings indicate that the borderland is highly porous, characterized by frequent human movement, robust informal markets, and deep cultural-ethnic linkages. Labour mobility is not simply an outcome of economic disparity but is structurally supported by tribal kinship networks, shared resource systems, weekly markets, and interdependent agricultural cycles. These dynamics reinforce the view that the Jhargram–Purulia–Jharkhand border functions as a dynamic socio-economic corridor, rather than a rigid administrative divide.

Table 3: Connectivity Infrastructure and Accessibility Indicators in the Jhargram–Purulia–Jharkhand Border Region

Connectivity Indicator	Jhargram–West Singhbhum	Bandwan–East Singhbhum	Balarampur–Seraikela	Barabazar–Chandil
Major Road Type	NH-49 (National Highway)	MDR (Medium District Road)	ODR (Other District Road)	Rural Road
Road Condition Index (1–10)	8.5	6.2	5.4	4.1
Avg. Travel Time (per 30 km)	40–45 min	55–60 min	65–70 min	75–80 min
Public Transport Frequency (buses/day)	60–70	30–35	22–26	12–15
Market Accessibility Score (1–100)	82	65	54	47
Mobile/Network Coverage (%)	92	78	63	58
Ambulance/Health Emergency Access	High	Moderate	Low	Low
Influence on Border Interaction	Very High	High	Moderate	Low

Source: Field Survey, 2025

Connectivity plays a decisive role in shaping the spatial and socio-economic dynamics across the Jhargram–Purulia–Jharkhand borderland. The analysis shows that the Jhargram–West Singhbhum corridor, equipped with the well-maintained NH-49, exhibits the highest level of accessibility. With a Road Condition Index of 8.5, travel time of 40–45 minutes per 30 km, and 60–70 buses per day, this corridor supports intense cross-border movement. This strong connectivity has led to vibrant daily labour mobility, active weekly markets, and significant informal trade. High network coverage (92%) and readily available emergency services further boost mobility, making this corridor the most dynamic interface in the borderland.The Bandwan–East Singhbhum area shows medium-level connectivity supported by MDR (Medium District Roads). The road condition (6.2) and moderate bus frequency (30–35 per day) support regular cross-border travel, mainly for agricultural and brick kiln labour. Market accessibility is reasonably high (score 65), reflecting active trade in vegetables, cattle, and household commodities. Limited health infrastructure and patchy network coverage (78%) reduce full development potential, but the corridor still maintains strong socio-economic exchanges. Connectivity weakens further in the Balarampur–Seraikela border zone. The ODR roads have a lower

quality index (5.4), resulting in longer travel times (65–70 minutes per 30 km) and reduced bus services (22–26 per day). Market accessibility is also lower (54), indicating restricted economic flow. Although this corridor still supports construction-based labour migration and some informal fish/fruit trading, the infrastructural limitations clearly reduce the intensity of border interaction. The weakest connectivity is found in the Barabazar–Chandil region, where rural roads dominate. Poor road condition (4.1), very low public transport frequency (12–15 buses/day), and limited network coverage (58%) act as barriers to mobility. As a result, this corridor records the lowest market accessibility (47) and minimal emergency access. Labour mobility occurs mainly for stone-related work, but weak transport and communication networks prevent larger economic integration. Overall, the analysis reveals a clear correlation between connectivity strength and spatial interaction intensity. Well-connected corridors host robust trade networks, frequent labour movement, and strong cultural exchanges, whereas poorly connected zones remain isolated and economically constrained. Thus, connectivity emerges as a structural driver that shapes not merely movement but also socio-economic opportunities, integration patterns, and borderland development trajectories.

Table 4: Cultural, Ethnic and Linguistic Interaction Indicators in the Jhargram–Purulia–Jharkhand Borderland

Interaction Category	Jhargram–West Singhbhum	Bandwan–East Singhbhum	Balarampur–Seraikela	Barabazar–Chandil
Dominant Tribal Groups	Santal, Ho, Munda	Santal, Bhumij	Santal, Kurmi-Mahato	Santal, Munda
Cross-border Marriages (per 1000 households)	42	35	28	24
Shared Festivals	Baha, Sohrai, Mage Porob	Baha, Sohrai	Tusu, Karam	Tusu, Jawa
Shared Languages Spoken (%)	Santali (78%), Ho (32%), Bengali (65%)	Santali (72%), Kurmali (38%), Bengali (58%)	Kurmali (55%), Santali (48%), Hindi (42%)	Santali (52%), Bengali (60%), Nagpuri (25%)
Frequency of Joint Cultural Events (per year)	22–25	18–20	12–15	10–12
Religious/Tribal Ritual Exchange Level	Very High	High	Moderate	Low–Moderate
Role of Culture in Border Interaction	Strong Integrative Factor	Strong	Moderate	Weak–Moderate

Source: Field Survey, 2025

The cultural landscape of the Jhargram–Purulia–Jharkhand border region is shaped by a long tradition of tribal coexistence, shared rituals, and linguistic overlap. The Jhargram–West Singhbhum corridor exhibits the strongest cultural integration, with dominant tribal groups—Santal, Ho, and Munda—living on both sides of the border. High levels of cross-border marriages (42 per 1000 households) reflect deep-rooted kinship networks. Shared festivals such as Baha, Sohrai, and Mage Porob are celebrated collectively, strengthening social bonding. Joint cultural events (22–25 per year) play a major role in maintaining a fluid cultural boundary, where ethnicity becomes a unifying rather than dividing factor. In the Bandwan–East Singhbhum corridor, Santal and Bhumij communities hold a strong presence. Shared rituals like Baha and Sohrai, along with mutual participation in agricultural festivals, reinforce a high level of cultural exchange. Cross-border marital relations (35 per 1000 households) and frequent

participation in joint dance programs, haat gatherings, and harvest festivals reflect strong cultural continuity. Linguistic overlap, particularly of Santali and Kurmali, facilitates everyday interaction. The Balarampur–Seraikela border zone exhibits moderate cultural integration. The Kurmi-Mahato and Santal groups form the core of cultural interaction here. Traditional celebrations such as Tusu and Karam are common to both sides, but the frequency of joint cultural events is comparatively lower (12–15 per year). Linguistically, this zone shows a blend of Kurmali, Santali, and Hindi, indicating a transitional cultural zone rather than a fully integrated one. In the Barabazar–Chandil corridor, cultural interaction is more limited. Cross-border marriage rates are lower (24 per 1000 households), and joint events occur less frequently. The region shares festivals like Tusu and Jawa, but participation remains mainly within community-specific groups rather than across communities. Linguistic interaction is present—Santali, Bengali, Nagpuri—but the cultural exchange level remains low-to-moderate due to weaker connectivity and fewer socio-economic linkages. Overall, the cultural dynamics of the tri-border region demonstrate that culture acts as an invisible integrator, facilitating movement, cooperation, and trust across administrative borders. Tribal identity, shared festivals, linguistic commonality, and ritual traditions collectively form a cultural corridor, which enhances social cohesion and plays a vital role in strengthening borderland interaction. This suggests that socio-cultural proximity is equally important as economic and infrastructural connectivity in shaping the spatial behaviour of border communities.

Table 5: Development Challenges and Opportunities across the Jhargram–Purulia–Jharkhand Borderland

Development Dimension	Jhargram–West Singhbhum	Bandwan–East Singhbhum	Balarampur–Seraikela	Barabazar–Chandil
Major Challenges	LWE influence (Moderate), forest–human conflict, limited industries	Water scarcity, seasonal unemployment, poor irrigation	Low education levels, weak transport, child migration	Poor road connectivity, quarry-based livelihood risks, weak market access
Poverty Level (% households)	42%	48%	51%	56%
Access to Drinking Water (%)	72%	58%	49%	44%
Health Facility Availability (Score 1–10)	7.2	6.1	4.9	4.2
Education Infrastructure (Score 1–10)	6.8	5.9	5.1	4.8
Livelihood Opportunities	Agriculture, forest produce, transport work	Agriculture, brick kilns, MGNREGA	Construction, local markets, small shops	Stone quarrying, forest products
Development Opportunities	Eco-tourism, agro-trade hub, forest-based enterprises	Irrigation expansion, vegetable clusters	Skill development, market upgrading	Road improvement, market linkage, alternative livelihood training

Overall Development Potential	High	Moderate–High	Moderate	Low

Source: Field Survey, 2025

Development patterns across the Jhargram–Purulia–Jharkhand border region show a distinct spatial variation shaped by infrastructural, socio-economic, and ecological factors. The Jhargram–West Singhbhum corridor exhibits relatively higher development potential due to better connectivity and market access. Despite moderate LWE influence and recurring forest–human conflict, this zone benefits from diversified livelihoods including agriculture, transport work, forest product collection, and small-scale trade. With a health facility score of 7.2 and drinking water access of 72%, the region stands ahead of other border zones. Opportunities for eco-tourism, agro-based trade hubs, and forest-based enterprises reveal a strong platform for sustainable development. The Bandwan–East Singhbhum corridor faces moderate development challenges, particularly water scarcity and seasonal unemployment. Poverty levels (48%) are relatively high, and drinking water access is limited to 58%. However, the region's agricultural potential, vegetable production clusters, and brick kiln employment provide a foundation for livelihood generation. Improving irrigation, promoting vegetable-based supply chains, and expanding MGNREGA activities can significantly strengthen local development. Development constraints become more evident in the Balarampur–Seraikela zone. This region suffers from lower educational infrastructure (score 5.1), weak transport networks, and high child migration due to limited employment opportunities. Poverty levels (51%) are among the highest in the study area. Although small markets, construction work, and local shops provide some income sources, economic stability remains limited. Skill development programs, local market upgrading, and youth employment training are vital opportunities for this region. The Barabazar–Chandil area shows the most severe development challenges. With the highest poverty rate (56%) and lowest drinking water access (44%), the region struggles with infrastructural backwardness. Poor road connectivity restricts market access, while dependence on stone quarrying exposes households to health risks and income instability. Health and education infrastructure are the weakest (scores 4.2 and 4.8). Development opportunities therefore lie in road improvement, diversified livelihood training (handicrafts, poultry, small businesses), and strengthened market linkages. Overall, the findings highlight that development in the borderland is highly uneven, shaped by variations in connectivity, natural resources, economic opportunities, and governance presence. While some corridors possess strong development potential, others remain marginalised due to structural bottlenecks. A comprehensive borderland development framework focusing on infrastructure, livelihood diversification, water security, education, and market integration is essential to reduce disparities and promote balanced regional development.

A holistic geographical framework for the Jhargram–Purulia–Jharkhand borderland must address spatial, economic, cultural, and governance-related dimensions in an integrated manner. Connectivity emerges as the foundational pillar of this framework. For instance, strengthening rural roads in the Barabazar–Chandil and Balarampur–Seraikela corridors is essential for reducing isolation and enhancing market access. Such improvements can significantly reduce travel time and stimulate local trade, thereby transforming economically lagging zones into active development nodes. Livelihood diversification is a second major pillar. In areas such as Bandwan–East Singhbhum and Jhargram–Singhbhum, traditional dependence on agriculture and forest collection often results in income insecurity. Promoting forest-based enterprises (sal leaf products, mahua processing), poultry, small-scale agro-processing units, and skill development centres can create multiple income streams, thereby reducing poverty and seasonal migration. These interventions are aligned with the region's cultural and environmental context, ensuring sustainable adoption. Water security is another critical requirement for the framework. Drought-prone areas such as Bandwan and Balarampur need the expansion of minor irrigation, check-dams, and watershed development. Improved water availability would enable farmers to diversify crops, improve productivity, and reduce distress migration—thus laying the foundation for long-term rural stability. Cross-border market integration also plays a vital role in sustainable development. Upgrading weekly haats, establishing cold storage facilities, and mobile market vans can help formalize and expand the existing informal trading networks in corridors such as Jhargram–Chakulia and Balarampur–Seraikela. This will create a more efficient flow of agricultural goods, forest products, and labour, benefiting the entire tri-border region. Cultural and tribal heritage protection forms another integral aspect of this

framework. Shared cultural traditions—Baha, Sohrai, Tusu—provide natural social cohesion across the border. Documenting this heritage, promoting cultural tourism routes, and supporting community-led festivals will not only preserve identity but also generate livelihood opportunities. Environmental sustainability is incorporated through eco-tourism and community-based forest management. Regions like Jhargram and Belpahari hold strong potential for eco-tourism, which can generate employment while encouraging biodiversity conservation. Joint Forest Management (JFM) committees can facilitate cooperative forest conservation and sustainable resource utilization. Finally, the framework highlights the necessity of inter-state governance coordination. Development in border regions often suffers due to fragmented planning between West Bengal and Jharkhand. A joint development task force and coordinated LWE mitigation strategies can strengthen governance and enhance security, ultimately supporting stable development. Overall, this integrated geographical framework emphasizes that sustainable borderland development depends on connectivity, livelihood diversification, water security, cultural cohesion, ecological conservation, and collaborative governance. When implemented together, these components can transform the tri-border region into a resilient, connected, and economically vibrant territory.

V. CONCLUSION

The current research shows that the Jhargram–Purulia–Jharkhand tri-border area functions as a complex boundary region which cross-border interactions develop through three factors: geographical closeness, shared cultural heritage, and existing infrastructure systems. The spatial interaction analysis shows that corridors with better road connectivity and shorter travel times to larger population centres such as Jhargram–West Singhbhum show increased interaction intensity which confirms existing theories about distance decay and mobility (Haggett, 2001; Rodrigue et al., 2020). The socio-economic linkages show that informal trade and weekly haats and seasonal labour migration together with forest-based exchanges function as daily methods of cross-border integration which especially occur in tribal-dominated areas according to the concept of "borderlands as spaces of flow" (Newman, 2006). The tri-border region serves as a cultural corridor which connects different social groups through cultural and linguistic elements that exist beyond its political boundaries. The shared festivals of Baha and Sohrai and Tusu together with kinship networks and multilingual practices provide evidence for the existence of "permeable borders" in areas where different cultures. The presence of such intangible elements leads to strong integration among various areas which surpasses existing administrative boundaries. The evaluation of development shows continuing economic gaps between Barabazar–Chandil and Balarampur–Seraikela because these areas suffer from poor infrastructure and restricted market opportunities together with unstable livelihoods which prevent economic development. The research findings align with the existing studies about underdeveloped border areas in South Asia (Singh & Kumar, 2018). The integrated geographical framework which we propose shows that sustainable development of border areas needs unified policies which should improve connectivity, create diverse job opportunities, secure water resources, protect cultural assets, and establish joint governance systems. Modern research supports this method which combines different organizational levels with a focus on people and multi-regional border control methods (Prescott, 2015; Sohn, 2014). The study examines borderlands by using spatial analysis together with socio-cultural and economic research to show how these areas operate as active and interconnected territories that keep changing. The tri-border region requires both infrastructure development and understanding of local cultural systems and environmental needs and international diplomatic relations for its equitable growth.

VI. RECOMMENDATIONS

- Roads linking Jhargram, Purulia, and Jharkhand remain underdeveloped, limiting mobility and trade. Improving major routes and creating better transport hubs will reduce travel time, support market linkages, and enhance access to education and health services in border villages.
- Informal trade dominates the border region, often without regulation or security. Establishing regulated rural markets, simple trade licenses, and structured agro-value chains can protect small traders and increase income for border communities.

- Many households depend on forest products and seasonal migration for survival. Promoting sal plate production, lac cultivation, and NTFP processing, along with skill development for women and youth, can create stable and local income sources.
- Seasonal migrants crossing the border lack proper documentation and welfare benefits. A shared labor registry, portability of ration and health services, and mobile health units can improve safety and reduce exploitation of migrant workers.
- Security measures often restrict local economic movements. Community-friendly policing and controlled surveillance in risk zones can maintain safety without disrupting daily trade, travel, and livelihood-related mobility.
- Separate policies by individual districts create gaps in service delivery. A Joint Borderland Development Authority and regular inter-district coordination can help synchronize planning, share data, and manage cross-border issues effectively.
- Border villages rely on nearby Jharkhand towns for basic services. Upgrading local schools, health centers, and introducing multilingual education can reduce dependency and ensure access to essential services within West Bengal.
- Border residents face difficulties in updating documents and resolving disputes. Monthly service camps and legal-aid desks in border markets can make public services more accessible and help address land and policing issues promptly.
- Shared cultural traditions link communities across the border. Supporting cross-border fairs, festivals, and youth programs can strengthen social harmony and preserve tribal cultural identities.
- Forests, rivers, and farmland in the borderland require joint protection. Collaborative forest management, watershed development, and climate-resilient agriculture can reduce resource depletion and promote long-term ecological balance.

REFERENCES

1. Banerjee A, Basu S. "State, security and development in eastern India." London: Routledge; 2017.
2. Bhattacharya R. "Development and conflict in eastern India." Econ Polit Wkly. 51(32):45–53.2016
3. Bhattarai K, Conway D. "Borderlands, migration, and regional interactions." Prog Hum Geogr.44(5):923–40.2020.
4. Chakraborty S. "Tribal livelihoods and cross-border mobility in eastern India." Indian J Reg Stud.46(2):55–73.2019.
5. Fotheringham AS, O'Kelly M. "Spatial interaction models: formulations and applications." Dordrecht: Kluwer Academic; 1989.
6. Government of India. "Census of India 2011." New Delhi: Office of the Registrar General and Census Commissioner; 2011.
7. Government of West Bengal. "District statistical handbook: Jhargram & Purulia." Kolkata: Bureau of Applied Economics and Statistics; 2022.
8. Haggett P. "Geography: a global synthesis." London: Pearson; 2001.
9. Hanson G. "Market potential, increasing returns, and geographic concentration." J Int Econ.54(1):1–22.2000.
10. Hembram D. "Santhal socio-cultural continuity in border villages." J Tribal Stud. 12(1):22–37.2020.
11. Jaiswal P, Saha S. "Road connectivity and rural accessibility in eastern India." Geogr Rev India.83(1):51–68.2021.
12. Jha S. "Border regions and development disparities in India." Asian Dev Rev. 32(2):89–114.2015.
13. Jones R, Paasi A. "Bordering, mobility and intersectionality." Polit Geogr. 48:1–10.2015.
14. Martinez O. "The dynamics of border interaction." J Borderl Stud. 9(1):1–12.1991.
15. Newman D. "On borders and power: a theoretical framework." J Borderl Stud. 18(1):13–25.2003.
16. Newman D. "Borders and bordering: towards an interdisciplinary dialogue." Eur J Soc Theory.9 (2):171–86.2006.

17. Paasi A. "Territories, boundaries and consciousness: the changing geographies of the Finnish-Russian boundary." Chichester: Wiley; 1996.
18. Prescott JRV. "Political frontiers and boundaries." London: Unwin Hyman; 1987.
19. Roy S, Ghosh A. "Land-use change and forest fragmentation in eastern India." Environ Dev J. 28(3):211–25.2020.
20. Sarkar S, Das M. "NTFP-based livelihoods in Purulia and Jhargram." For Soc. 2(2):101–14.2018
21. Singh AK. "Periodic markets and rural mobility in Jharkhand." Geogr Rev India. 73(2):47–59.2011.