



INTEGRATING SPACE AND SOCIETY: *GEOSOCIOLOGY* AS AN ANALYTICAL FRAMEWORK FOR DEVELOPMENT RESEARCH AND POLICY

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Abstract

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The longstanding separation of 'space-blind' sociology and 'socially detached' geography has constrained understanding of how spatial organization shapes social inequality, institutional accessibility, and development outcomes. While sociology has traditionally emphasized power, institutions, and social relations with limited attention to spatial processes, geography has excelled in mapping spatial patterns. However, it has often provided limited explanations of the social mechanisms underlying them. This paper addresses this disciplinary divide by advancing Geosociology as an integrative and operational analytical framework that conceptualizes geographic space as a structural determinant of social opportunity, institutional distribution, and territorial development. Drawing on classical sociology, critical spatial theory, political economy, and spatial justice, the paper adapts the concept of the Geography of Neglect to explain how uneven distributions of institutions, infrastructure, and public investment generate cumulative territorial disadvantage. Beyond theoretical synthesis, the study operationalizes Geosociology through a mathematical framework that integrates established spatial analytical methods—including Geographic Information Systems (GIS), distance-decay modelling, Moran's I, and spatial econometric models—with original Geosociological measures: the Institutional Distribution Index (IDI), Scale-Sociality Nexus Index (SSNI), Geography of Neglect Index (GNI), and the Geosociological Development Model (GDM). Together, these provide measurable and empirically testable tools for assessing institutional accessibility, socio-spatial integration, territorial neglect, and their influence on development outcomes. Illustrative evidence from Nigeria and sub-Saharan Africa demonstrates the applicability of the framework across healthcare, education, urban development, migration, and environmental vulnerability. The paper argues that Geosociology shifts development research beyond identifying where inequalities occur to explaining why they persist and how they can be systematically addressed. By integrating social theory, spatial analytics, and mathematical modelling within a unified methodological framework, the study establishes Geosociology as a theoretically grounded, operationally measurable, and empirically testable approach for advancing spatial justice, evidence-based policy, and sustainable territorial development.

Keywords: *Spatial Inequality; Accessibility; Spatial Justice; Mathematical Modelling; GIS; Spatial Statistics; Territorial Development; Sustainable Development.*

1.0 INTRODUCTION

The relationship between society and space is one of the most important yet divided areas in social science. Although human life always takes place in space, mainstream development thinking has often treated geography as just a background setting a passive container where social events happen, rather than an active force that shapes social outcomes (Soja, 1989). For over a century, sociology has focused on time, social institutions, class, culture, and rules, while ignoring how the physical shape and layout of these structures matter (Giddens, 1984). On the other hand, geography has developed advanced



tools for mapping space and measuring distance, but has often lacked a clear theory of how power and inequality create these spatial patterns in the first place (Harvey, 1973).

This split between disciplines has weakened global development research, especially in tackling lasting inequalities. Access to healthcare, education, jobs, transport, voting rights, and environmental protection is not random or evenly spread. It follows clear spatial patterns. Rural communities in developing countries often have severely limited or no government services. Poor regions stay poor even when national economies grow. City slums lack basic water, roads, and electricity, even though they sit right next to wealthy neighborhoods (UN-Habitat, 2020; World Bank, 2023). These gaps show that where you live is not just background noise. Location actively shapes your life chances, your risks, and your children's future.

To close this gap, this paper proposes Geosociology as a new framework that brings together spatial analysis and critical social theory. It rests on two simple but powerful ideas: Space is socially produced—maps, roads, city plans, and service locations are not natural or neutral. They reflect past political and economic decisions (Lefebvre, 1991). Society is spatially structured; social class, power, and access to services do not exist in the abstract. They are physically fixed in place, stretched across distance, and limited by geography (Massey, 1994).

This thinking has deep roots but has long been scattered across disciplines. Early sociologist Émile Durkheim (1893/1984) showed that how people are physically grouped shapes their shared beliefs and work patterns. Max Weber (1922/1978) traced how cities and government offices had to be in specific places to exercise power. Later, critical geographers turned this upside down. Henri Lefebvre (1991) proved in *The Production of Space* that powerful groups actively design spaces to keep their power. David Harvey (2006) showed that capitalism survives by creating ‘uneven geographical development’, pumping wealth into city centers while stripping it from the countryside.

More recently, spatial justice scholars have argued that unequal geography is itself an injustice, because it blocks people from exercising their rights as citizens (Soja, 2010). This paper builds on that tradition and adds the *Geography of Neglect*, which refers to the systematic spatial concentration of institutional underinvestment, infrastructural deficiency, and limited public service accessibility that generates persistent territorial disadvantage (Danbuzu et al., 2026). First used to study rural healthcare gaps, this idea treats the absence of schools, clinics, and roads in remote areas as a form of violence built into the system. It is not accidental. It is a deliberate withdrawal that turns physical distance into social exclusion, making the Inverse Care Law real (Hart, 1971): the people who need care most live furthest from where it is provided.

Today's crises make the old split between social and spatial thinking impossible to defend. COVID-19 showed that where you lived and how close you were to a hospital are major determinants of whether you lived or died (WHO, 2022). Climate change shows that poor people are pushed into flood zones and dry lands (IPCC, 2022). Mass migration shows that people are fleeing places where the basic spatial infrastructure has collapsed (World Bank, 2023). None of these crises can be understood if we keep treating society and space as separate.

This paper asks four questions:

1. How exactly does the layout of space turn economic and political power into inequality?
2. How does where institutions are placed affect people's rights and trust in government?
3. How can combining mapping technology with on-the-ground social research improve development studies?
4. How can a *Geosociology of Practice* change how development policies are planned?



To answer these, the paper builds a full conceptual model that and applies it across five areas: healthcare access, city slum segregation, school location, migration, and climate risk. The core argument is simple: development outcomes are shaped by both power and geometry. To fix this, policymakers must stop using national averages that ignore geography and instead adopt a local, place-based approach that can spot and fix the geography of neglect.

This study makes four principal contributions:

1. Proposes Geosociology as an interdisciplinary analytical framework;
2. Adapts/Reintroduces the Geography of Neglect as a socio-spatial explanatory concept;
3. Develops a mathematical operationalization through the IDI, SSNI, GNI, and GDM; and
4. Provides an integrated methodological framework combining GIS, spatial statistics, qualitative inquiry, and spatial econometrics.

2.0 CONCEPTUAL FOUNDATIONS OF GEOSOCIOLOGY: What is *Geosociology*?

Geosociology is the study of how social life is organized across space. It examines how social structures, political institutions, inequalities, and opportunities are created and reproduced through geography. Unlike approaches that treat space as just a static container or social structures as ideas floating in thin air, Geosociology works at the meeting point of both. Society and space shape each other constantly. Class systems, government power, and racial hierarchies leave their mark on the physical landscape, where roads go, where schools are built, and who gets electricity. At the same time, these physical arrangements feed back into society, either opening up or blocking people's access to resources, jobs, and political power.

Two Epistemological Limitations Geosociology avoids:

a) Treating space as just background (the sociology blind spots): Mainstream sociology often treats geography as secondary, just a setting, where social action happens. It fails to see that space itself actively shapes social division (Giddens, 1984).

b) Mapping without explaining (the geography blind spots): Geography often produces detailed maps and distance measurements, but misses the deeper question: what power relations and profit motives created these spatial patterns in the first place? (Soja, 1989).

By breaking down these disciplinary walls, Geosociology sees space not as empty Newtonian space, but as an active social force. It is a physical mechanism that channels and limits access to resources, government services, movement, jobs, and political power. Thus, three core ideas were established for Geosociology.

2.1 Space is a Social Product

The layout of human settlements is never natural or politically neutral. As Henri Lefebvre (1991) showed, space is continuously produced through political and economic struggle. City centers, highways, hospital networks, and school zones are the physical result of historical power struggles, budget decisions, and class priorities. Whether a community has paved roads, clean water, or a clinic is not an accident, it is an ideological statement written in concrete and asphalt.

2.2 Society is Spatially Structured

Life chances are inherently shaped by spatial geometry. Opportunities are not evenly spread. Your ability to see a specialist doctor, attend a good school, find stable work, or reach a government office varies dramatically based on where you live. Physical location acts as a hidden dividing line that can speed up or cut short a generation's economic and social progress (Massey, 1994).

2.3 Spatial Inequality is Structural Inequality

Geosociology does not treat spatial gaps as mere logistical problems or simple rural-urban distance. Unequal geography is a visible sign of deep social exclusion, built-in violence, and deliberate institutional abandonment. Remote villages, border areas, and city slums are not poor because of natural isolation. They are poor because of engineered deficits: weak investment, broken services, and the withdrawal of government presence.

Table 1: How the Disciplines Compare

Features	Sociology	Geography	Geosociology
Main Focus	Social institutions, groups, and classes	Physical landscapes and human distributions	How social and spatial structures interact
Core Question	How do people interact, exercise power, and follow norms?	Where are things located and how are they mapped?	How does the physical layout of where people live actively shape the social hierarchy of who gets access to resources?
How it Treats Space	As passive background	As a geometric container	As an active force that produces and reflects power
Main Tools	Surveys, interviews, social statistics	Satellite images, GIS maps, environmental models	Mixed methods: mapping plus on-the-ground social research (GIS, spatial regression, spatial ethnography, participatory mapping)

Source: Author's Synthesis, 2026

This paper names the pattern of systematic abandonment the *Geography of Neglect* (Danbuzu et al., 2026). By framing empty landscapes through this lens, Geosociology moves beyond simply describing where poverty is located. It provides a framework that explains *how* dominant political systems use space to protect privilege, reproduce class hierarchies, and justify lasting inequality across generations.

3.0 THEORETICAL GENEALOGY

Geosociology draws from four intellectual traditions: classical sociology, critical geography, political economy, and spatial justice theory. Historically, social sciences treated *space* and *society* as separate topics, producing fragmented explanations of inequality. Geosociology unifies these by starting from a simple premise: social life is inseparable from spatial organization, and geography is actively involved in creating, maintaining, and justifying inequality.

3.1 Classical Sociology: Durkheim and Weber

The early roots of Geosociology lie in the work of Émile Durkheim and Max Weber. Neither built a full theory of space and society, but both recognized that how people are physically arranged shapes social life.

3.1.1 Durkheim's Social Morphology (1893/1984): Durkheim argued that population density, settlement patterns, and the *moral density* of social groups shape how labour is divided, how solidarity



is formed, and how collective beliefs develop. For Durkheim, social organization is never just abstract ideas—it has a material, spatial dimension that governs how people depend on each other. *Moral density* is the intensity of social interactions and shared norms, which Durkheim linked to physical population density.

3.1.2 Weber's Spatial Anchoring of Power (1922/1978): Weber showed that economic class and institutional authority are fixed in specific places. The city is not just a random gathering of people; it is a tool for political control, legal authority, and class hierarchy. Spatial concentration is essential for bureaucratic power. Together, Durkheim and Weber established that where people are located directly affects how power is distributed.

3.2 Critical Spatial Theory

Lefebvre and Harvey the immediate foundation for Geosociology comes from the critical spatial turn of the late 20th century, which destroyed the old view of space as empty, neutral, or natural. Led by Henri Lefebvre and David Harvey, this school treated space as an active social product and a tool of political-economic control.

3.2.1 Lefebvre's Production of Space (1991): In *the Production of Space*, Lefebvre rejected the idea of space as simple geometry. He proposed three ways space operates: how we perceive it, how planners design it, and how we actually live it. Every economic system, he argued, builds its own spatial grid to survive and reproduce its ideology. City plans, highways, and zoning laws are not neutral responses to physical terrain—they are expressions of state power and class control, designed to regulate behavior and money flow.

3.2.2 Harvey's Uneven Geographical Development (2006): Harvey showed how capitalism uses spatial restructuring to solve its internal crises. Capital does not flow evenly. It deliberately floods into city centers while draining surrounding areas. This "uneven geographical development" is not a side effect—it is built into how capitalism survives. The constant need for "spatial fixes" inherently produces territorial inequality.

It is within this tradition that Geosociology places the *Geography of Neglect* (Danbuzu et al., 2026). This concept connects critical theory to today's development problems by showing that chronic underinvestment, missing infrastructure, and absent government services in peripheral regions are not accidents. They are a spatialized form of structural violence—the state apparatus deliberately isolates remote populations, blocking their ability to build social and economic capital.

3.3 Spatial Justice: Edward Soja

Contemporary spatial theory has refined these macro-economic models into the language of justice and rights. Edward Soja (2010) argued that justice and injustice are geographically organized. Spatial structures are the main mechanism through which human rights, freedoms, and resources are either delivered or denied. Soja insisted that inequality must be analyzed not only through class, race, or gender, but through territory. The concentration of public investment, hospitals, and schools in wealthy core areas forces rural and informal communities to accept a second-class form of citizenship.

Scale matters. Social and spatial processes do not work the same way at all levels. They operate across micro-scales (households, neighborhoods), meso-scales (towns, regions), and macro-scales (nations, global networks). Geosociology traces how local survival strategies are shaped, blocked, or enabled by national and global spatial structures.



3.4 The Scale–Sociality Nexus

A core idea of Geosociology is the Scale–Sociality Nexus: the quality of social relations and the effectiveness of institutions change fundamentally depending on spatial scale.

At the micro-scale (villages, tight-knit neighborhoods), physical closeness often creates strong community bonds, informal safety nets, and high trust. At the macro-scale, these same cohesive communities can be completely marginalized by uneven national infrastructure and absent government services. This reveals two key paradoxes:

a) Rural Isolation: Farming villages may exhibit strong local solidarity, mutual aid networks, and high levels of interpersonal trust, yet remain poor and vulnerable because they are geographically disconnected from healthcare facilities, financial institutions, markets, and government services.

b) Urban Decoupling: Informal settlements and urban slums may exist in close physical proximity to commercial districts and financial centres, yet remain socially, legally, and institutionally excluded from the opportunities concentrated within them.

The Scale–Sociality Nexus demonstrates that physical proximity does not necessarily translate into social inclusion, nor does strong community cohesion guarantee access to institutional resources. Macro-level spatial arrangements can therefore neutralize the benefits of local social capital by concentrating essential services and opportunities in privileged locations.

Operationally, the Scale–Sociality Nexus can be measured by comparing indicators of micro-scale social cohesion—such as community trust indices, social capital measures, mutual aid participation, and collective efficacy—with macro-scale accessibility indicators including travel time to healthcare facilities, schools, financial institutions, and government services. High levels of local social cohesion combined with poor accessibility to institutional resources indicate rural isolation, whereas close geographic proximity to institutions accompanied by low utilization, weak institutional trust, or legal exclusion indicates urban decoupling.

3.5 Toward an Integrated Framework

Despite valuable work in both fields, development studies still suffer from an artificial split. Sociology remains *space-blind*, analyzing power and class as if they happen in a placeless void.

Geography remains *social-blind*, producing sophisticated maps without explaining the power struggles and class conflicts that create those patterns.

Geosociology closes this gap by combining spatial geometry, institutional location, and social power into one framework. It shifts research from simply asking *where* poverty is located to asking *how* the deliberate political and geometric organization of space actively produces, reinforces, and justifies inequality across generations.

Geosociology asks a fundamental question: *How does the political and spatial organization of geographic space actively produce, reinforce, and legitimize social inequality across generations?*

4.0 METHODOLOGICAL FRAMEWORK: The Geosociological Approach

To overcome the limits of *space-blind* sociology and *socially detached* geography, Geosociology uses a dual approach that combines numbers and stories. It rejects the false split between quantitative mapping and qualitative social analysis. Instead, it argues that understanding development requires both: mapping where resources are located while also investigating the political power, class dynamics, and institutional decisions that created those patterns.



4.1 Quantitative Spatial Methods

Geosociology does not just plot points on maps. It uses mathematical models to show how geography actively constrains people's life chances. These tools reveal the hidden material boundaries of inequality:

a) Geographic Information Systems (GIS): GIS performs complex spatial analyses, multi-criteria evaluations, and network routing. It maps the exact location, accessibility, and clustering of critical infrastructure—hospitals, schools, paved roads—relative to where people actually live.

b) Spatial Autocorrelation (Moran's I): This statistically tests whether poverty, exclusion, and underinvestment cluster in space or appear randomly. It identifies *Hotspots of Neglect*—connected areas where low development and missing institutions reinforce each other.

c) Spatial Regression Models: Standard regression models fail in spatial research because they assume places are independent of their neighbors. Geosociology uses spatial error and spatial lag models to calculate precisely how distance from the institutional core shapes economic and social outcomes, while controlling for income, education, and other standard factors.

d) Geostatistical Inequality Mapping: Techniques like Kriging and interpolation create continuous surfaces of vulnerability, institutional density, and travel-time zones. These transform scattered data points into full regional pictures of development gaps.

4.2 Qualitative Spatial Methods

Numbers reveal the layout of inequality. Qualitative methods reveal what it feels like to live inside it. These tools humanize the map by capturing how marginalized people navigate, resist, and survive systems of exclusion:

a) Spatial Ethnography: Researchers live within the spaces they study, observing how social class, gender, and power show up in daily physical practices—how slum residents cross dangerous boundaries to fetch water, or how rural communities share scarce resources.

b) Participatory Mapping: Local communities draw their own maps of neighborhoods, assets, and gaps. This *counter-cartography* challenges official state maps, making visible the survival strategies that top-down planning ignores.

c) Place-Based Narrative Analysis: Researchers collect oral histories tied to specific locations. These stories reveal how the withdrawal of government services, environmental hazards, and territorial stigma damage people's trust in institutions, their sense of political belonging, and their hopes for the next generation.

4.3 Mixed-Methods Integration

The core innovation of Geosociology is to simply combine spatial data with stories. For example, GIS modelling might calculate the exact travel time to the nearest emergency obstetric clinic. Place-based narratives then capture what that distance means—how isolation erodes trust in government and breaks the social contract between citizen and state. This dual approach turns spatial measurements into deep indicators of social power.

Table 2: How Geosociology Applies Methods to Real Problems

Development Challenge	Spatial Tool	Social Concept	What Geosociology Reveals
Health Equity	Distance-decay modeling (network analysis)	Institutional trust and alienation	Distance-decay modelling shows that increasing travel time to health facilities reduces healthcare utilization (Abdulkarim et al., 2017). From a geosociological perspective, persistent geographic barriers may foster perceptions of institutional neglect and weaken trust in public institutions.
Urban Exclusion	Local Moran's I (cluster mapping)	Class stratification and segregation	Identifies "Hotspots of Neglect" where poverty, informal housing, and missing infrastructure cluster. Urban marginalization is structured, not random (UN-Habitat, 2020)
Education Gaps	Catchment areas and travel-time zones	Intergenerational social mobility	Maps the "geography of opportunity." Unequal school placement and travel barriers restrict poor children's future class position
Environmental Risk	Multi-criteria evaluation and GIS overlay	Socio-ecological resilience	Overlays climate hazards (floods, desertification) with poverty data to reveal <i>Vulnerability Intersections</i> where disaster risk is socially produced (IPCC, 2022)

Source: Author's Synthesis, 2026

5.0 ILLUSTRATIVE EMPIRICAL EVIDENCE FOR GEOSOCIOLOGY

As a conceptual framework, Geosociology requires empirical application and testing in future research. Rather than presenting original spatial analysis, this section draws on existing evidence from Nigeria, sub-Saharan Africa, and related contexts to illustrate how socio-spatial processes shape development outcomes. The examples demonstrate the relevance of Geosociological concepts, particularly the Geography of Neglect, across five domains: healthcare accessibility, urban inequality, educational opportunity, migration, and environmental vulnerability.

5.1 Healthcare: The Inverse Care Law in Action

Existing studies show that healthcare access in Nigeria remains highly uneven, with rural populations experiencing fewer facilities, longer travel times, and lower service utilization than urban residents. Research in Bichi Local Government Area, Kano State, found that healthcare utilization declines as distance from health facilities increases (Abdulkarim et al., 2017). These findings illustrate how spatial barriers interact with social vulnerability to produce unequal health outcomes and reflect the broader dynamics described by the Inverse Care Law (Hart, 1971).

5.2 Urban Inequality: Segregation by Design

Evidence from rapidly urbanizing African cities demonstrates how uneven infrastructure and service provision contribute to spatially concentrated disadvantage. In Lagos, informal settlements such as



Makoko and Ajegunle experience limited access to sanitation, water supply, and other public services (UN-Habitat, 2020). These patterns illustrate how urban space can reinforce social and economic exclusion.

5.3 Education: The Geography of Disadvantage

Research indicates that educational opportunities are unevenly distributed across Nigeria, with rural and northern regions often facing shortages of schools, qualified teachers, and educational resources (World Bank, 2023). These disparities demonstrate how spatial inequalities can contribute to the reproduction of social disadvantage across generations.

5.4 Migration: Moving to Survive

Migration patterns frequently reflect uneven spatial development. Population movements from rural areas to cities such as Lagos, Abuja, and Port Harcourt often follow the distribution of employment opportunities, infrastructure, and public services (World Bank, 2023). These trends illustrate how migration can be understood as a response to uneven socio-spatial opportunity structures.

5.5 Environmental Risk: Vulnerability by Location

Climate-related risks are unevenly distributed and often intersect with existing social vulnerabilities. Evidence from coastal flooding in Lagos, environmental degradation in the Niger Delta, and desertification in northern Nigeria demonstrates how environmental hazards disproportionately affect already marginalized populations (IPCC, 2022; UN-Habitat, 2020). These examples highlight the socio-spatial dimensions of environmental vulnerability.

6.0 ANALYTICAL DISCUSSION: The Global Geography of Neglect

The evidence from healthcare, cities, schools, migration, and climate risk reveals a clear pattern: development outcomes are shaped by the physical layout and location of institutions and infrastructure. Space is not a neutral background. It is a structural tool through which power operates, privilege is protected, and marginalization is enforced. Three core propositions emerge from this analysis.

6.1 Spatialized Inequality: Spatial Proximity as a Component of Stratification

The first proposition is that inequality is systematically spatialized across all development sectors. Standard economics often reduces disadvantage to money—income levels, spending power, or purchasing capacity. Geosociology shows that deep poverty is fundamentally geographic.

Disadvantage is not just lack of cash. It is lack of physical proximity to the engines of development. When governments and markets concentrate hospitals, universities, banks, and government offices in wealthy city centers, they impose a structural penalty on peripheral populations. For those trapped in the *Geography of Neglect*, every basic right requires overcoming distance, travel costs, and lost time. Physical distance becomes a hidden mechanism of social stratification, turning geography into a barrier to mobility.

6.2 Institutional Structuration: Location as Structural Power

The second proposition is *Institutional Structuration*, which posits that the geographic distribution of infrastructure and public institutions significantly shapes, though does not wholly determine, life chances. Conventional policy frameworks often treat the placement of highways, schools, water facilities, hospitals, and other public services as primarily technical or engineering decisions. Geosociology challenges this assumption by arguing that spatial allocation is simultaneously a social and political process with long-term developmental consequences.



Decisions regarding where resources are located influence patterns of accessibility, economic opportunity, social inclusion, and state presence. Communities that host key institutions often benefit from improved access to services, local economic activity, enhanced connectivity, and stronger engagement with public systems. Conversely, communities with limited institutional presence frequently experience higher transaction costs, reduced service accessibility, and weaker integration into broader development networks. While individual and collective agency can mitigate some of these disadvantages through adaptation, migration, innovation, or social mobilization, such efforts occur within spatially structured opportunities and constraints. Consequently, location should be understood not as an absolute determinant of outcomes but as a powerful structural force that conditions the distribution of social and economic possibilities across space.

6.3 Policy Myopia: The Consequences of Space-Blind Planning

The third proposition is Policy Myopia, which argues that development interventions are often less effective when planners inadequately account for geographic variation. For decades, national governments and international development agencies have frequently relied on aggregate indicators, national averages, and generalized policy frameworks to design interventions. Such approaches implicitly assume that policies implemented at the national level will produce relatively uniform outcomes across different territories.

Geosociology contends that this assumption overlooks the spatial contexts within which policies are experienced. Physical distance, transportation networks, terrain conditions, seasonal accessibility, and settlement patterns can significantly influence the effectiveness of public programmes and service delivery. For example, the formal provision of free education or subsidized healthcare may not translate into meaningful access where schools or health facilities remain geographically distant or difficult to reach. As a result, spatially uniform policies may generate uneven outcomes across regions. By failing to adequately account for geographic disparities, space-blind planning can inadvertently reinforce existing inequalities, particularly between well-connected urban centres and more remote or underserved communities. Effective development policy therefore requires not only social and economic analysis but also careful attention to the spatial distribution of opportunities, services, and infrastructure.

6.4 The Geography of Neglect as Structural Violence

These three propositions unite in the concept of the *Geography of Neglect* (Danbuzu et al., 2026). This moves analysis beyond simply describing poor regions toward explaining why territories are abandoned.

The Geography of Neglect argues that the chronic absence of state services in peripheral areas is not accidental. It is not caused by logistical difficulty or low population density. It is a spatialized form of *structural violence*: the state or dominant economic system deliberately withdraws its presence, creating zones of institutional abandonment.

This neglect weaponizes distance, turning geographic isolation into social exclusion. Marginalized populations are forced to rely on informal, expensive, and risky alternatives—unlicensed water vendors, private transport, or untrained healers. This dynamic applies the Inverse Care Law across all sectors: those who need institutional support most are forced to live furthest from it.

Ultimately, the Geography of Neglect shows how political systems use geographic geometry to protect privilege, minimize investment in marginal groups, and maintain inequality over

time. Geosociology provides the tools to expose these mechanisms and the framework to disrupt them.

7.0 CONCEPTUAL MODEL

To turn theory into a usable tool, Geosociology uses a formal conceptual model. This model translates abstract ideas about space and society into clear, causal pathways. Instead of measuring development through simple, space-blind statistics, it maps how structural power uses geographic geometry to distribute life chances, enforce containment, or abandon peripheral territories.

The model has two connected parts: a macro-level system loop (Figure 1) and a micro-level distance function (Figure 2).

7.1 The Global Geosociological Loop: How Inequality Reproduces Itself

The first part models the lifecycle of spatialized inequality. National geography is not an organic accident. It is a continuous, self-reinforcing cycle where political and economic power shapes physical landscapes, and those landscapes then shape society in ways that reproduce the original power.

This cycle moves through four phases:

- 1. The Production of Space via Structural Power:** Dominant groups, political coalitions, government bodies, and business interests exercise power by designing the physical and legal shape of the territory. State budgets, zoning laws, and economic priorities determine where roads, buildings, and services go. This is ideology made concrete.
- 2. The Spatial Configuration of Institutional Distribution:** The main result is a highly uneven distribution of vital institutions like hospitals, schools, transport, banks, and government offices. Under the *Geography of Neglect*, these cluster in wealthy city centers while peripheral areas and informal settlements face institutional deserts.
- 3. The Shaping of Social Access and Opportunity by Spatial Location:** Once institutions are fixed in place, their location determines who can reach them. Proximity lowers the cost in time, money, and effort of getting services and building capital. Distance raises the cost, turning geographic isolation into social exclusion.
- 4. The Determination of Development Outcomes and Multi-Scalar Feedback:** Unequal access produces unequal outcomes—gaps in health, education, income, and environmental safety across regions. These outcomes are not static. They feed back into the power structure through large-scale demographic shifts. Poor peripheries trigger mass migration to cities, putting pressure on urban systems, destabilizing governance, and forcing policy changes—thereby restarting the cycle.

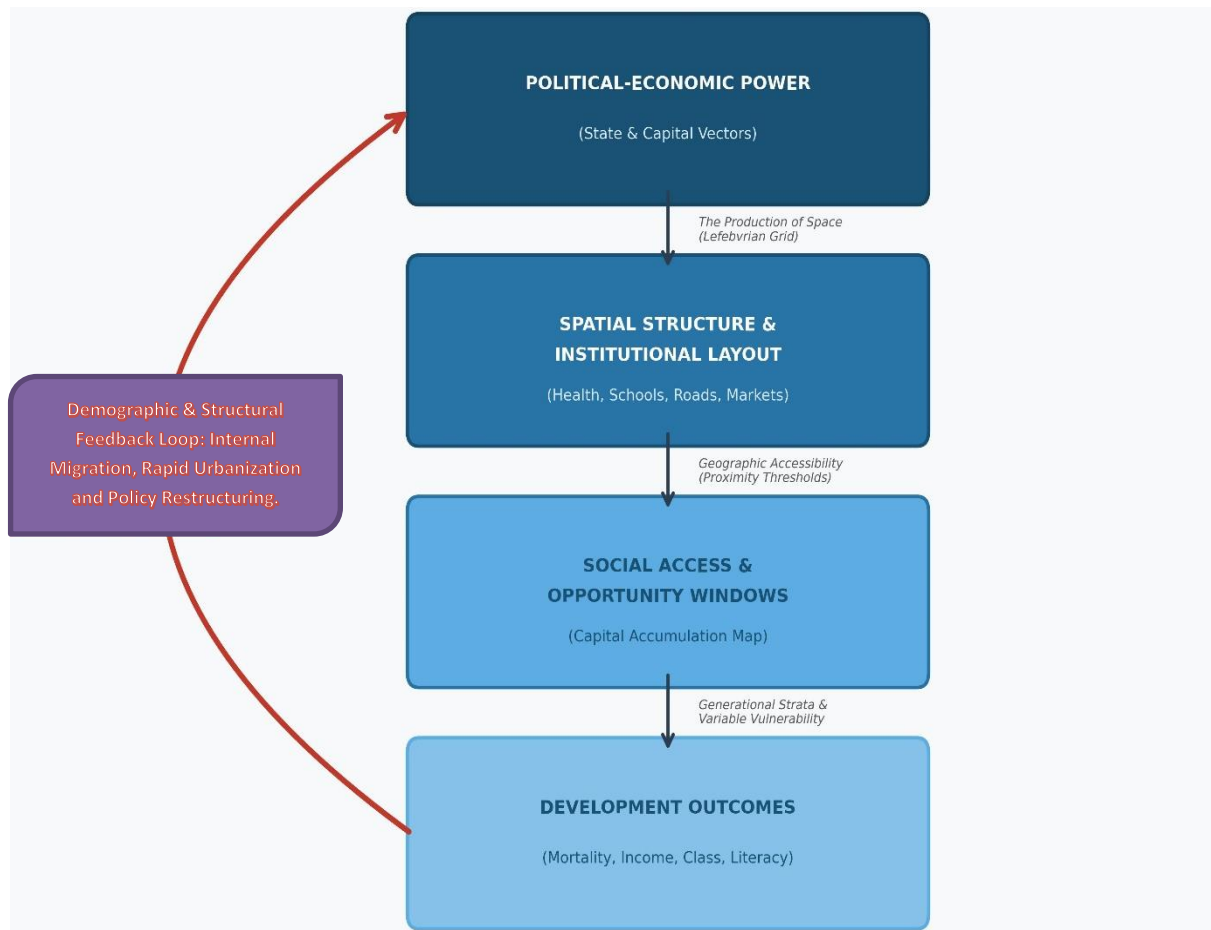


Figure 1: Geosociological Macro-Circuit

7.2 The Vaporization of Access: Why Distance Kills Rights

While Figure 1 shows the macro-system, the second part formalizes the micro-mechanism of exclusion. The *Vaporization of Access* argues that rights to healthcare, education, legal protection, and environmental safety are not absolute. Their real-world delivery decays non-linearly with distance from the institutional core.

This model combines the geographic principle of distance-decay with the sociological reality of trust and alienation. Near the core (Distance $\rightarrow 0$), rights are fully realized: services are close, travel is easy, use is high, and the bond between citizen and state is strong.

As people move into the peripheral *Geography of Neglect*, access does not fade gradually. It hits a critical threshold and vaporizes sharply. Beyond this point, the combined burden of travel costs, physical difficulty, and isolation makes service use practically impossible. This structural distance-decay cancels out progressive laws, showing that rights written in capital cities can be destroyed by the simple geometry of uninvested space.

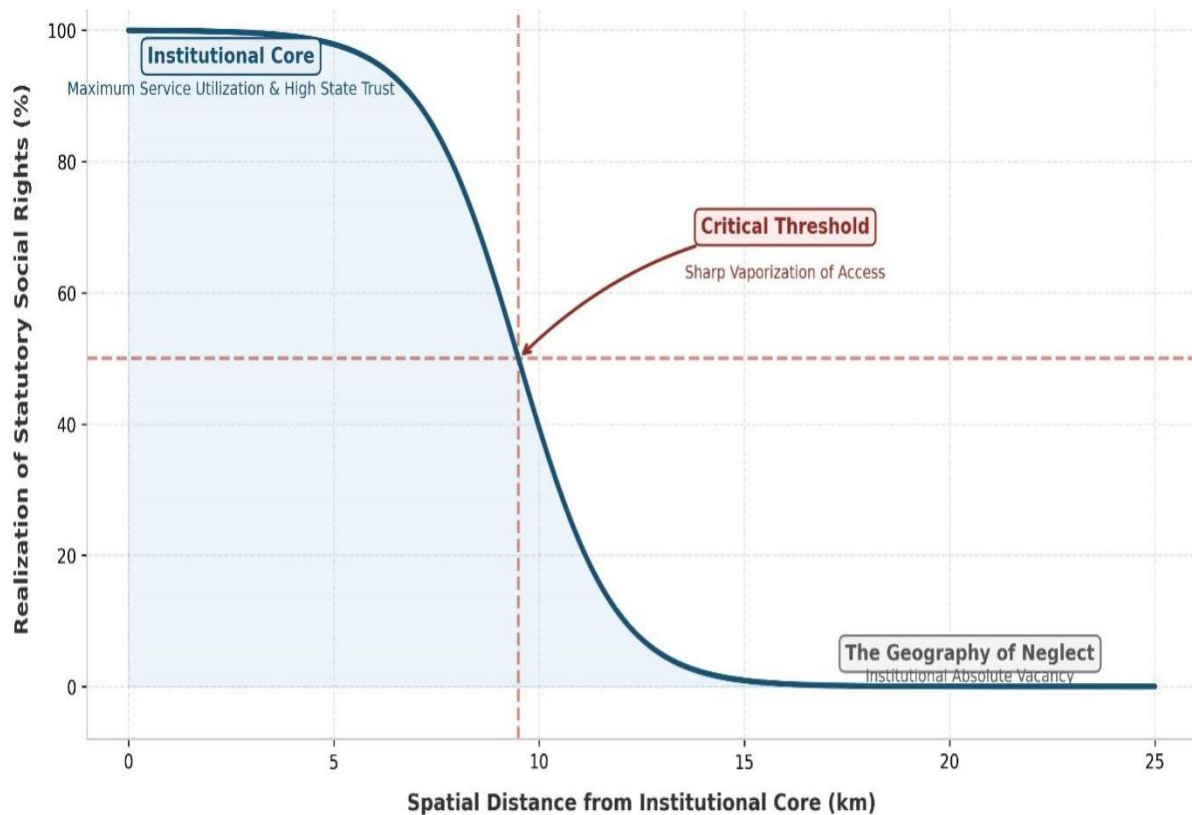


Figure 2: The Vaporization of Access (Socio-Spatial Distance-Decay Function)

The Vaporization of Access: A non-linear geostatistical model illustrating the socio-spatial distance-decay effect, demonstrating that the material realization of basic constitutional and social rights (e.g., healthcare utilization, educational attainment) diminishes exponentially as a function of physical geographic distance from the state's institutional cores (Figure 2).

8.0 MATHEMATICAL OPERATIONALIZATION OF THE GEOSOCIOLOGICAL FRAMEWORK

A major contribution of Geosociology is the transformation of socio-spatial theory into a measurable analytical framework that can be empirically tested using spatial statistics, Geographic Information Systems (GIS), and quantitative social science methods. Unlike conventional development models that treat geographic location as a contextual variable, Geosociology conceptualizes space as a structural determinant that conditions institutional accessibility, opportunity structures, and development outcomes. Accordingly, this framework integrates established spatial analytical methods with original Geosociological indices to provide a comprehensive operational model for analysing spatial inequality and territorial development.

The framework is organized into six complementary components: (i) institutional accessibility, (ii) institutional distribution, (iii) the Scale-Sociality Nexus, (iv) spatial dependence, (v) the Geography of Neglect Index, and (vi) the Geosociological Development Model.

The mathematical formulations presented in this section are intended to operationalize the conceptual propositions of Geosociology. While the distance-decay function, Moran's I , and spatial econometric models are established methods in spatial analysis, the Institutional Distribution Index (IDI), Scale-Sociality Nexus Index (SSNI), Geography of Neglect Index (GNI), and Geosociological Development

Model (GDM) are original analytical constructs proposed in this study. Their purpose is to provide measurable representations of socio-spatial processes that can be refined and empirically validated in future research.

8.1 Institutional Accessibility Function

Institutional accessibility is conceptualized as the effective opportunity available to individuals or communities to utilize essential public services. Consistent with the geographical principle of distance-decay, accessibility declines exponentially as travel distance or travel time increases. This relationship is expressed as

$$A_i = A_0 e^{-\beta d_i}$$

Where

- A_i = Effective accessibility for community i
- A_0 = Maximum accessibility at the institutional source ($d = 0$)
- d_i = Network travel distance or travel time between community i and the nearest institution
- β = spatial friction coefficient representing the combined influence of transportation quality, terrain, travel cost, infrastructure condition, and security constraints

The exponential specification is widely adopted in spatial interaction modelling because it realistically captures the rapid decline in service utilization observed with increasing travel impedance. Larger values of β indicate stronger geographical barriers and consequently lower institutional accessibility.

Where multiple public institutions jointly influence accessibility, the cumulative accessibility function becomes

$$A_i = \sum_{k=1}^m w_k e^{-\beta d_{ik}}$$

Where

- m = The number of institutional categories
- w_k = The relative importance assigned to institution k
- d_{ik} = The travel distance from community i to institution k

The weighting coefficients satisfy

$$\sum_{k=1}^m w_k = 1$$

This formulation permits the simultaneous incorporation of healthcare facilities, educational institutions, transportation infrastructure, financial services, potable water sources, security services, and administrative centres within a unified accessibility framework.

8.2 Institutional Distribution Index (IDI)

Beyond accessibility, Geosociology recognizes that territorial inequality also reflects the uneven spatial allocation of public institutions. To quantify institutional provision, this study proposes the Institutional Distribution Index (IDI):

$$IDI_i = \sum_{k=1}^m \omega_k \left(\frac{I_{ik}}{P_i} \right)$$

Where

- IDI_i = Institutional Distribution Index for community i
- I_{ik} = Number of institutions of category k
- P_i = Population served
- ω_k = Policy weight assigned to institution k , subject to

$$\sum_{k=1}^m \omega_k = 1.$$

The IDI measures institutional availability on a per-capita basis while accounting for the relative strategic importance of different public services. Higher values indicate better institutional provision and stronger integration into formal development systems.

The weighting scheme may be determined using expert judgement, Analytic Hierarchy Process (AHP), principal component analysis (PCA), or national policy priorities, depending on data availability and research objectives.

8.3 Scale-Sociality Nexus Index (SSNI)

A defining theoretical innovation of Geosociology is the Scale-Sociality Nexus, which explains how local social cohesion interacts with institutional accessibility across spatial scales.

The operational indicator is defined as

$$SSNI_i = \frac{SC_i}{A_i + \varepsilon}$$

Where

- $SSNI_i$ = Scale-Sociality Nexus Index
- SC_i = Standardized community social cohesion score
- A_i = Institutional accessibility score
- ε = Constant

The social cohesion score may be constructed from standardized indicators, including

- Interpersonal trust;
- Collective efficacy;
- Participation in community organizations;
- Mutual assistance;
- Civic engagement; and
- Perceived neighbourhood solidarity.

Interpretation follows three broad conditions:

- High SSNI indicates Rural Isolation, characterized by strong community cohesion but poor institutional accessibility;
- Intermediate SSNI indicates balanced socio-spatial integration; and
- Low SSNI indicates Urban Decoupling, where institutions are geographically accessible but social cohesion and institutional trust remain weak.

Unlike purely theoretical formulations, the SSNI can be estimated directly from household survey data combined with GIS-derived accessibility measures.

8.4 Spatial Dependence Model

Development outcomes frequently exhibit spatial dependence because neighbouring communities share similar historical, environmental, political, and economic characteristics. Spatial clustering is evaluated using Global Moran's I :

$$I = \frac{N \sum_{i=1}^N \sum_{j=1}^N w_{ij} (x_i - \bar{x})(x_j - \bar{x})}{W \sum_{i=1}^N (x_i - \bar{x})^2}$$

Where

- N = Number of spatial units
- x_i and x_j = Observed values at locations i and j
- $\bar{x}$ = Sample mean
- w_{ij} = Spatial weight describing neighbourhood relationships
- $W = \sum_i \sum_j w_{ij}$

Values approaching +1 indicate positive spatial clustering, values near zero indicate spatial randomness, and negative values indicate spatial dispersion. Where significant clustering exists, Local Moran's I (LISA) may subsequently be employed to identify statistically significant clusters of institutional deprivation or development advantage. Within Geosociology, these statistically significant low-low clusters constitute Hotspots of Neglect, representing priority areas for policy intervention.

8.5 Geography of Neglect Index (GNI)

To operationalize territorial marginalization, Geosociology adapted the Geography of Neglect Index (GNI) from Danbuzu et al. (2026), a composite indicator integrating spatial accessibility, infrastructure availability, socio-economic deprivation, and mobility constraints.

The index is computed as

$$GNI_i = \sum_{j=1}^n \omega_j Z_{ij}$$

Subject to

$$\sum_{j=1}^n \omega_j = 1$$

Where

- GNI_i = Geography of Neglect Index for spatial unit i
- Z_{ij} = Standardized value of indicator j
- ω_j = Normalized weight assigned to indicator j

Each variable is standardized using the conventional z-score transformation

$$Z = \frac{x - \mu}{\sigma}$$

Where

- x = Observed value
- μ = Sample mean
- σ = Sample standard deviation

Typical indicators incorporated within the GNI include:

- Institutional accessibility deficit;
- Infrastructure deficiency;
- Travel-time burden;
- Multidimensional poverty;
- Educational disadvantage;
- Healthcare coverage; and
- Environmental vulnerability.

Higher GNI values indicate greater structural neglect and increasing socio-spatial exclusion. For policy interpretation, GNI scores may be classified using standard deviation thresholds or percentile classifications and visualized through GIS to identify priority intervention zones.

8.6 Geosociological Development Model

The central proposition of Geosociology is that development outcomes are jointly determined by institutional distribution, accessibility, social cohesion, and territorial neglect. This relationship is represented by the Geosociological Development Model:

$$Y_i = \beta_0 + \beta_1 IDI_i + \beta_2 A_i + \beta_3 SSNI_i + \beta_4 GNI_i + \sum_{k=1}^p \gamma_k X_{ik} + \varepsilon_i$$

Where

- Y_i = Development outcome for community i (e.g., healthcare utilization, educational attainment, multidimensional poverty, quality of life, or human development)
- IDI_i = Institutional Distribution Index
- A_i = Institutional Accessibility Score
- $SSNI_i$ = Scale-Sociality Nexus Index
- GNI_i = Geography of Neglect Index
- X_{ik} = Vector of socioeconomic control variables (income, education, age structure, employment, urbanization, population density, household characteristics, etc.)
- β_0 = intercept
- $\beta_1, \dots, \beta_4$ = Structural coefficients
- γ_k = Coefficients associated with control variables
- ε_i = Stochastic error term

Where significant spatial dependence exists, conventional Ordinary Least Squares (OLS) estimation should be replaced by spatial econometric models.

The Spatial Lag Model is specified as

$$Y = \rho WY + X\beta + \varepsilon$$

While the Spatial Error Model is

$$Y = X\beta + \lambda W\varepsilon + \mu$$

Where

- W = The spatial weights matrix
- ρ = Spatial spillover effects
- λ = Spatially correlated disturbances



Model selection may be guided by Lagrange Multiplier diagnostics, Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and residual spatial autocorrelation tests.

8.7 Operational Workflow

The proposed mathematical framework follows a sequential empirical workflow that integrates GIS, spatial statistics, and quantitative social analysis:

1. **Measure Institutional Accessibility:** Compute network-based accessibility using the exponential distance-decay function.
2. **Estimate Institutional Distribution:** Calculate the Institutional Distribution Index (IDI) for each spatial unit.
3. **Construct Social Cohesion Measures:** Derive standardized community cohesion scores from household survey data and estimate the Scale-Sociality Nexus Index (SSNI).
4. **Assess Spatial Dependence:** Apply Global Moran's I and Local Moran's I to identify statistically significant spatial clusters.
5. **Compute the Geography of Neglect Index:** Standardize relevant indicators, assign weights, calculate the composite index, and generate GIS-based neglect maps.
6. **Estimate Development Outcomes:** Fit the Geosociological Development Model using OLS or spatial regression techniques to quantify the influence of socio-spatial determinants on development indicators.
7. **Validate Model Performance:** Evaluate model robustness using goodness-of-fit statistics, residual diagnostics, multicollinearity tests, heteroscedasticity tests, and spatial dependence diagnostics.

8.8 Conceptual Significance

The proposed mathematical framework provides the operational foundation for Geosociology by integrating established spatial analytical methods with original theoretical constructs. The distance-decay function, Moran's I , and spatial regression models are established techniques within geography and spatial econometrics, while the Institutional Distribution Index (IDI), Scale-Sociality Nexus Index (SSNI), and Geography of Neglect Index (GNI) constitute original operational contributions of the Geosociological framework. Collectively, these models shift analysis beyond descriptive mapping toward quantitatively explaining how spatial organisation structures institutional accessibility, reproduces inequality, and shapes development outcomes. By providing explicit computational procedures, measurable indicators, and empirically testable relationships, the framework offers a robust methodological foundation for future research and evidence-based policy design in geography, sociology, regional science, public health, and development studies.

9.0 CONCLUSION: Toward a Geosociology of Practice

This paper advances Geosociology as an integrative and operational framework that unifies spatial organization and social structure to explain development processes and territorial inequality. By bridging the longstanding divide between sociology and geography, it demonstrates that geographic space is not merely a backdrop to social life but a structural dimension through which institutions, opportunities, and inequalities are produced and reproduced. Geosociology therefore extends development research by positioning spatial organization as a fundamental determinant of life chances and development outcomes.



A principal contribution of this study is the operationalization of Geosociology into a measurable and empirically testable framework. The integration of established spatial analytical methods—including distance-decay modelling, Moran's I , and spatial econometric models—with the newly developed Institutional Distribution Index (IDI), Scale–Sociality Nexus Index (SSNI), Geography of Neglect Index (GNI), and Geosociological Development Model (GDM) transform abstract socio-spatial concepts into quantifiable constructs. Collectively, these mathematical models provide a coherent methodological architecture for measuring institutional accessibility, territorial neglect, socio-spatial integration, and their influence on development outcomes using GIS, census data, administrative records, and household surveys.

The paper further introduces the Geography of Neglect as a theoretical lens for explaining how uneven institutional distribution generates cumulative territorial disadvantage. Rather than viewing spatial disparities as merely logistical or infrastructural challenges, the framework demonstrates that institutional accessibility and public investment shape opportunity structures across space. The illustrative evidence from Nigeria and sub-Saharan Africa, although not intended as definitive empirical validation, shows the applicability of the framework to healthcare accessibility, educational opportunity, urban segregation, migration, and environmental vulnerability, illustrating how Geosociology moves analysis beyond identifying where inequalities occur to explaining why they persist.

The policy implications are substantial. Development strategies based solely on national averages and administratively aggregated statistics often obscure localized inequalities in institutional accessibility and service provision. By integrating spatial accessibility, institutional distribution, and socio-spatial indicators into development planning, the proposed framework offers practical tools for identifying priority intervention areas, guiding equitable resource allocation, and monitoring territorial disparities. Such an approach is particularly relevant for advancing the Sustainable Development Goals, especially SDG 3 (Good Health and Well-being), SDG 10 (Reduced Inequalities), and SDG 11 (Sustainable Cities and Communities).

While the proposed framework establishes a rigorous theoretical and methodological foundation, its mathematical models require further empirical validation across different geographical contexts and scales. Future research should estimate and validate the proposed indices using high-resolution spatial datasets, longitudinal analyses, and comparative studies to evaluate their predictive performance and policy relevance.

In conclusion, this study establishes Geosociology not simply as a conceptual synthesis of sociology and geography, but as a theoretically grounded, mathematically operationalized, and empirically testable framework for analysing socio-spatial inequality. By integrating social theory, spatial analytics, and quantitative modelling within a unified framework, it provides both scholars and policymakers with robust tools for understanding how institutional distribution and spatial organization shape development outcomes. As contemporary development challenges become increasingly spatial in nature, a Geosociology of Practice offers a scientifically rigorous foundation for more equitable, place-sensitive, and evidence-informed research, planning, and public policy.

However, the major limitations of the paper are the fact that, the mathematical indices (IDI, SSNI, GNI) await empirical validation; the illustrative evidence is drawn from secondary sources; and the framework's applicability to Global North contexts remains to be tested.



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