

Resource Management and Development

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ABSTRACT: The significant, but still under-theorized aspect of modern resource management and development discourse is spatial disparities in the access to renewable and non-renewable resources. This paper discusses the degree, form and consequences of geographically differentiated access to the energy resources, with specific attention to the way in which such disparities are defining the environmental quality, socio-economic performance, and sustainability development pathways. The study follows a comparative, spatially oriented approach to methodology, which is built on secondary empirical evidence, and integrates the results of peer-reviewed articles on the use of renewable energy, non-renewable resources dependence, ecological footprint, and imbalances in regional development. The discussion shows that the availability of renewable resources is also conventionally clustered in economically developed and institutionally strong regions whereas peripheral and non-developed regions remain, disproportionately, dependent on non-renewable resources that are highly polluting. These spatial inequalities produce cumulative and path-dependent processes, which further entrench interregional differences in environmental conditions, human capital formation, and the capacity to be innovative. The paper also shows that renewable energy transitions, where they are instituted without any explicit spatial equity, threaten to replicate current patterns of socio-environmental marginalization. The results highlight the need to have integrated and equity-based resource governance models that anticipate spatial justice as one of the fundamental principles of sustainable development. The study, by redefining resource access as a form of inherently political and spatial phenomenon, would add to more inclusive and conflict-sensitive ways of managing and developing resources.

KEYWORDS: spatial inequality, renewable resources, non-renewable resources, resource management, sustainable development.

INTRODUCTION

Resource management and resource development have become highly contentious and multipolar intellectually multidimensional worlds, at the interface of ecological scarcity and socio-political power imbalances and institutional governance failures. The management of finite natural endowments in a world where environmental degradation is increasing at an accelerating rate, where demographic pressures are becoming increasingly intense, and where climatic volatilities are making resource-starved areas key battlegrounds, has become a source of conflict, exclusion, and structural inequity, especially in areas where resources are finite. These are often contexts where antagonistic struggles occur over access, control and legitimacy making traditional sectoral or siloed management paradigms more and more unsustainable.

Subsequently, the epistemic and practical momentum of Integrated Resource Management (IRM) as a systems-focused, holistic approach that assumes the existence of intersectoral coordination, participative governance, and adaptable decision-making has come into play. Similar to the current paradigms in human resource management, which focus on strategic alignment, integration across functions, and developmental synergy, IRM precludes the coordination of heterogeneous actors, institutions, and streams of resources toward collectively sustainable outcomes (Wilton, 2022; Lussier and Hendon, 2025). Integrated approaches aim to reduce the conflicts that have been caused by the environment by harmonizing the ecological sustainability with the social equity and the development requirements by dissolving the fragmented governance architectures. This paper thus poses the question of the operationalization of integrated resource management in reducing the level of environmental conflict in areas with scarce resources, where resource seldom suffices to meet growing demands as competition over the decreasing resources tends to worsen into social-ecological unrest.

Also pertinent to this discussion is the inequalities that persist in space in access to renewable and non-renewable resources, it is

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neither accidental nor ecologically determined, but instead is a result of social construction based on historical marginalization, institutional bias, and uneven development. Although in theory renewable resources are regenerative, their distribution in practice is often inequitable, falling short of infrastructural needs, governance marginalization, and technology asymmetries; non-renewable resources, in contrast, are often extracted via extractive regimes that favor, at the expense of other societal members, political and economic elites. The perspective of strategic human resource management scholarship highlights that inequality in access to key resources recreates systemic inequality and instills the power hierarchy, both within organizations and in socio-ecological space (Pattanayak, 2025; Meijerink et al., 2021).

Based on these integrative management views, the paper will analyze the spatial inequalities that typify access to renewable and non-renewable resources with special attention on how these inequalities enhance vulnerability and conflict in resource-starved areas.

Moreover, the growing introduction of digital and analytical capabilities into the management practice, which manifests itself in algorithmic and virtual systems in human resource development, provides conceptual analogs to strengthening transparency, coordination, and evidence-based decision-making in resource governance (Ferreira et al., 2021; Meijerink et al., 2021). Such integrative and technologically informed systems, when translated into the environmental and resource management situations, can also possess transformative capability to restructure access, accountability and conflict mitigation processes.

In this respect, the current research posits itself on the verge of an interdisciplinary analytical landscape, attempting to contribute to both the scholarly and policy-centered understanding of: (i) whether integrated resource management could be implemented in decreasing the environmental conflict in resource-scarce areas, and (ii) what the nature and the implications of resource spatial inequalities are towards access to renewable and non-renewable resources. The synthesis of the management theory with the discourse on resource governance aims at the study contributing to fairer, more resilient, and conflict sensitive models of resource management and development.

LITERATURE REVIEW

Resource Management and Reduction of Environmental Conflict in Resource -Scarce Region

Scholarly literature in the field of resource management is moving towards a common understanding that environmental conflict in resource-scarce areas is neither an exogenous anomie, nor an ecological necessity, but a structurally-mediated product of failures in governance, distributive injustices, and historically-sedimented patterns of exploitation. In such an analytical framing, natural resources serve not only as material gifts but as politically charged resources whose distribution, possession and use are enshrined in institutional structures and socio-economic power dynamics (Novoselova et al., 2020).

Novoselova et al. (2020) contribute a programmatic and preventative model of mitigating the regional conflicts by stating that conflicts on the environment arise when the key conditions converge through regulatory fragmentation, poor institutional coordination, and asymmetrical stakeholder involvement in the process of managing the natural resources. Their effort emphasises the need to have an anticipatory governance system which incorporates risk assessment, participatory planning and intersectoral coordination as pre-emptive measures to curb the escalation of conflict. In resource scarce areas where competition rises due to ecological constraints, such integrative management regimes are introduced as important tools to turn latent ecological tensions into a negotiated and cooperative form.

Khan et al. (2023) further explain the nexus between environmental degradation, systemic shocks, and conflict dynamics by putting such contemporary resource conflicts in the context of compounded crises of climate change and global health emergencies. Their discussion shows how the disruptions that were caused by the COVID-19 and imposed on the already vulnerable natural resource systems increased the scarcity issue, aggravated the livelihoods and caused socio-political instability. The authors assume that, multi-causal ecological confrontation is becoming increasingly prevalent, i.e. the ecological stressors are superimposed with economic precarity and the inability of the systems of governance which necessitates the application of adaptive and resilience-based systems of resource management.

Lavers (2023) provides a land-based approach, focusing on environmental land management as a critical domain of conflict prevention in climate-impacted and resource-limited environment. The paper emphasizes the role of disputed land-use regimes, tenure insecurity and marginalizing planning systems in triggering localized disputes that eventually escalate into socio-environmental crises of a larger magnitude. The argument that the effective management of resources should go beyond technocratic efficiency to appeal to normative issues of justice, inclusion, and long-term resilience is restated by Lavers (2023), who supports it by proposing the use of integrative land assessment frameworks that would integrate ecological sustainability, social equity, and conflict sensitivity.

Mao et al. (2023) also contextualize resource management at the global policy level that has been framed by the geopolitical and developmental discourses that have been created by COP27, and with regard to emerging economies. In their analysis, they find that resource shortage is being re- framed as security issue and the pressures which are caused by climate are adding extra pressures to cross-border tensions and domestic upheavals. The authors argue that the shift away of extractive models that are prone to conflict

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to cooperative and climate sensitive models of resource governance is a strategic necessity to sustainable development. This school of thought highlights the importance of policy tools that are integrated in such a way that they can balance environmental sustainability with economic recovery and social stability in the vulnerable areas.

The historical studies also contribute to this discussion by showing how the current conflicts tend to have their foundations in the legacy management practices. When Saatsaz (2020) discusses the long-term analysis of the water resources in Iran, the centralized governance, overextension of the infrastructures, and the disregard of the indigenous management systems led to the scarcity and socio-political conflict in the long run. The paper highlights the importance of institutional memory and path dependency in determining the current conflict over resources, which supports the need to have reform-oriented management strategies that are both context –sensitive and historically attuned.

A study by Smol et al. (2020) bring the discussion to mineral resource management with the incorporation of the idea of sustainability and the concept of the circular economy presented as conflict-reducing efforts.

Their contribution contends that unsustainable extraction activities contribute to environmental degradation and social grievances especially in the resource-dependent areas. The authors assume that the burden on the ecology, improvement of resource efficiency, and the reduction of the possibility of conflicts can be minimized by harmonizing the mineral resource governance with the circular economy model and the sustainability frameworks in general. Though placed in the European policy context, these lessons have more universal applications to the resource-deprived areas that aim to balance between development goals and environment as well as social stability.

Spatial Inequalities in Access to Renewable Vs Non-Renewable Resource

The available literature is all united on the claim that spatial disparities in availability of renewable and non-renewable resources are not incidental or epiphenomenal, but structural, and embedded in more general political-economic, technological and institutional formations. Such inequalities are embodied in the differentiated patterns of energy consumption, ecological footprints, and regional development and growth cycles, historically sedimented asymmetries in infrastructural investment, governmental capacity, and socio-economic endowments. Gradinariu et al. (2023) show that spatial differences in ecological footprints are conditionally extremely dependent on the degree of reliance on renewable versus non-renewable energy resources, where areas with higher non-renewable energy reliance have a disproportionately high amount of environmental degradation and, on the other hand, receive economic benefits. These forms of spatialized energy-use regimes both enhance the unequal ecological exchange and capture territorial inequalities in environmental quality.

Regarding socio-environmental justice, McGee and Greiner (2019) state that the shift toward renewable energy, being normatively positioned as universally positive, tends to recreate and reorganize previous inequalities. Their analysis indicates that consumption of renewable energy is highly unequal and is driven by different socio-spatial skill to internalize costs, mobilize capital and policies. Thus, the growth of renewable energy in marginalized areas can, therefore, be perceived as not a liberatory process, but a new form of resource capture and environmental injustice. Such an unequal distribution is also supported by Yao et al. (2020) who discover that the environmental quality increase linked to renewable energy implementation is spatially uneven, where the wealthy regions are reaping ecological benefits at a disproportionate rate and the less-developed areas are still bearing the impacts of the pollution-intensive non-renewable energy infrastructure.

The relevance of regional inequality in access to renewable energy is supported by empirical data in China. Li et al. (2024) note strong interregional differences in the consumption of renewable energy, referring to the difference in economic development, industrialization, and policy incentives, and the spread of technology. Their results emphasize the fact that the penetration of renewable energy is spatially concentrated, preferring economically developed areas with a high institutional capacity and infrastructural preparedness to generate and extend the developmental disparity between the core and the peripheral areas. Conversely, the less-developed regions continue to be structurally interred in non-renewable dependence on energy, continuing to descend into a cycle of environmental susceptibility and marginalization.

The nexus between renewable energy innovation and non-renewable resource exploitation also makes the spatial inequality nexus more complicated. Feng et al. (2023) assume that the beneficial effect of technological development in the field of renewable energy will be able to increase the green utility of mineral resources, but the spread of such gains is extremely uneven throughout the country. Their analysis shows that the efficiency gains associated with innovation is spatially concentrated in areas that have strong research ecosystem and capital endowment, compared to resource-dependent areas, and this has increased both territorial disparities in environmental performance and economic resilience. This imbalance brings out the paradox where the areas that are most affected by extractive non-renewable activities are the ones least prepared to move towards sustainable management of resources.

The economic concentration and urbanization also contribute significantly to the development of the spatial access to the non-renewable resources. Alvarado et al. (2020) note that the models of urban-centric development strengthen the patterns of non-renewable energy use, especially in the middle- and high-income territories, where the intensity of industrial production and economic agglomeration increases the reliance on fossil fuel. This type of spatial concentration of non-renewable energy

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consumption not only increases the environmental pressures but also prevents the rural and peripheral areas to equally enjoy the fruit of economy growth associated with energy. Such spatial polarization is enhanced by the differences in educational and social outcomes related to access to renewable energy as Ahmed (2025) shows that communities that have higher renewable energy integrate are characterized by better educational outcomes, which supports intergenerational and interregional disparities.

RESEARCH METHODOLOGY

The research methodology used in this study was comparative and spatially oriented in nature aimed at questioning the structural and geographical differences in the access of renewable and non-renewable resources in the contexts of heterogeneous regions. This approach was predominantly quantitative with the addition of integrative qualitative synthesis to ensure that the quantifiable aspects of spatial inequality are captured as well as the underlying institutional and socio-economic processes through which such inequalities are reproduced. This was explicitly suited as the access to resources, as well as energy consumption is primarily a spatial phenomenon, which is determined by the territorial-based regime of governance, the infrastructural endowment, and the developmental processes.

The study used only secondary data as the collection of peer-reviewed empirical studies, regional energy consumption databases, and environmental performance records, reported in the existing literature. These sources gave longitudinal and cross-sectional views on trends in the use of renewable and non-renewable energy, ecological footprint, emissions intensity, and related socio-economic results like the level of education, ability to be innovative, and urbanization. Because of the synthesis of information presented at varying levels of geographical scales, the study could conduct a comparative analysis of the core and periphery areas, which helped in shedding light on the spatial stratification of access to resources.

Interregional differentials in the composition of energy sources, intensity of consumption, and

Even environmental externalities were used as the operationalization of spatial inequality based on previous econometric and spatial models. The availability of renewable energy was theorized as the proportion of solar, wind, and hydro power, and other types of regenerative energy sources in a specific area, and the non-renewable energy resources were theorized as reliance on fossil fuels and extractive minerals. These variables were studied relative to general developmental parameters, which made it possible to discover systematic relationships between the dependency on the energy sources and the socio-ecological indicators.

The comparison and inferential interpretation of descriptive measures of spatial statistics and inequality estimates presented in the reviewed studies were analysed comparatively and through an inferential interpretation. Special analytical focus was on the presence of spatial clustering, divergence and path dependency in energy access and following causal accounts between technological capacity, economic development and quality of governance and recorded inequalities. Instead of re-estimating the main econometric models, the study took the logic of meta-analytical interpretation critically interpreting the reported coefficients and elasticity estimates and inequality indices to form an integrative explanatory model. Methodological rigor was ensured during the research process by means of systematic selection of sources, cross-checking of empirical data, and ability to contextualize results in terms of their place of origin, i.e., geographic, institutional contexts. The ethical concerns were handled by taking care of proper representation of original data, taking care of credible attribution of scholarly work and not going too far in analysis. Finally, this methodological framework allowed conducting a subtle and theoretically informed study of spatial disparities in the access to renewable and non-renewable resources, which is a strong empirical basis of future analysis and discussion.

RESULTS AND DISCUSSION

4.1 Research Question One

What spatial inequalities exist in access to renewable versus non-renewable resources?

4.1.1 Results

The synthesized findings reveal pronounced and persistent spatial asymmetries in access to renewable and non-renewable resources. Renewable energy consumption exhibits a strong spatial concentration within economically advanced and institutionally robust regions, whereas non-renewable energy dependence remains disproportionately entrenched in less-developed and peripheral regions.

Table 4.1: Comparative Spatial Patterns of Energy Access

Region Type Dominant Energy Source Environmental Burden Developmental Outcome

High-income / Core Renewable-dominant Low ecological footprint High human capital accumulation Middle-income Mixed energy portfolio Moderate emissions Uneven growth

Low-income / Peripheral Non-renewable-dominant High pollution intensity Structural marginalization Discussion.

These results support the hypothesis that access to renewable energy is not geographically balanced, but instead it is geographically stratified, which confirms pre-existing development hierarchies. Areas with capital, technological infrastructure and governing capacity systematically expropriate the ecological payoffs of renewable energy transitions and marginalized areas are ecologically overstretched and economically limited. This geographical division of space supports the thesis of environmental injustice whereby

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the peripheral areas serve as storage sites of non-renewable energy systems that create pollution.

4.2 Research Question Two

How do spatial inequalities in renewable versus non-renewable resource access influence environmental and socio-economic outcomes?

4.2.1 Results

The analysis shows that there is high level of spatial correlation between renewable energy penetration and good environmental and social indicators such as better environmental quality, educational level, and innovation level. On the other hand, concentration of non-renewable energy is attributed to poor environmental standards and failure of human development.

Table 4.2: Spatial Outcomes Associated with Energy Source Inequality

Energy Access Profile	Environmental Quality	Educational Outcomes	Innovation Capacity	High renewable access
Improved quality	Elevated	educational attainment	High	Mixed access
Variable outcomes	Moderate attainment	Medium	High non-renewable access	Environmental degradation
Suppressed educational outcomes	Low	Discussion		

The findings clarify a positive-feedback loop of space, in which access to renewable energy spurs human capital growth and technological change, and therefore continue to disadvantage regions. Conversely, areas reliant on non-renewable resources in terms of structure suffer a cumulative ecological damage, social deprivation that limits their potential to be transformed to sustainable energy systems. This process continues to reproduce spatial inequality, not as an economic object, but a socio-ecological state.

4.3 Synthesis of Findings

The collective evidence presented due to the examined literature leads us to a very strong and coherent story: spatial disparities in the availability of renewable and non-renewable resources are structural, multiple-dimensional, and firmly rooted in existing political-economic and technological frameworks, but not the by-products of natural endowment. In a variety of geographic and developmental settings, the literature shows that resource access is organized based on historically grounded differences in economic potential, infrastructural investment, organizational performance and innovation systems, which collectively influence disparate paths of environmental quality and socio-economic progress.

One of the prevailing empirical patterns that come out of the research is the geographical concentration of access to renewable energy in the economically developed areas in direct contrast with the endemic entrenchment of non-renewability in resources dependency in the less-developed and peripheral regions. Gradinariu et al. (2023) demonstrate that in the areas where the proportion of non-renewable sources of energy is larger, the ecological footprint is disproportionately large, which means that the environmental degradation is transferred to the territories that are least well prepared to overcome or adapt to its consequences. Yao et al. (2020) support this finding by showing that the quality of the environment can increase when renewable energy is deployed in a disproportionate manner, with the benefits being concentrated in those regions that have stronger economic and institutional underpinnings to favour the disadvantaged regions to pollution-intensive energy systems.

It is also indicated in the literature that the renewable energy changes are not necessarily fair, and the point about it is strongly expressed by McGee and Greiner (2019), who introduce the idea of renewable energy use into the realm of socio-environmental injustice. Their discussion highlights that without active redistributive processes, the growth of renewable energy can recreate the spatial inequalities through giving more weight to areas with higher political power, financial resources, and political power. This is not only an environmental but also a developmental injustice because an unequal access to clean energy infrastructures is translated into unequal access to the economic diversification, health, and social welfare. The Chinese empirical studies offer especially strong evidence of regional divergence in the use of renewable energy, and this study can help to gain an insight into the structural factor behind spatial inequality. According to Li et al. (2024), the level of economic development, the structure of the industry, the spread of technology, and policy incentives are essential factors that determine interregional differences in access to renewable energy. Their results show that there is a tendency of spatial clustering whereby the high penetration of renewable energy is clustered around the coastal and the most energy advanced areas

and regions that are locked in the energy systems that depend on fossil fuels are in the interior and less-developed regions. The effect of the spatial lock-in highlights the pathway character of transitions to energy and the challenge of breaking the non-renewable resource dependency without special effort.

The interplay between renewable energy invention and use of non-renewable resources also makes the spatial inequality picture more complicated. Feng et al. (2023) show that technological innovation in renewable energy has the potential to increase the efficiency of green utilization of mineral resources in different regions, but the benefits are not evenly spread across the geographical area. Efficiency brought

about by innovation concentrates mainly on areas where there is already an established research capacity and technological infrastructure whereas extractive areas have a little spillover effects due to low absorptive capacity. This imbalance supports a paradoxical situation where areas bearing the heaviest burden of extractions of non-renewable resources are least capable of taking

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advantage of gains made through renewable resource-based efficiency.

Elements of urbanization and concentration of economies are the other mechanisms of space that support non-renewable energy reliance. As demonstrated in Alvarado et al. (2020), the development models that are urban-centric stimulate non-renewable energy use especially in middle and high-income areas where the energy demand structure is mostly dominated by industrial production and agglomeration effects. Although such areas can potentially have higher ability to compensate the environmental effects by technological amelioration, the more comprehensive spatial implication is the relegation of rural and peripheral zones to the economic as well as environmental benefits of energy-consuming growth.

Notably, the literature is able to apply the implications of spatial energy inequality not only in environmental outcomes but also in human capital and intergenerational developmental trajectories. Ahmed (2025) suggests that the communities that possess a greater percentage of renewable energy integration have better educational results, which is a convincing piece of evidence that the availability of clean and reliable energy serves as an input in more expanded social development mechanisms. This result supports the idea that spatial differences in access to resources are not transitional but accumulative in the development of the long-term differences between areas.

Considered as a unit, the synthesized findings demonstrate that spatial disparities in the availability of renewable and non-renewable resources are perpetuated in mutually reinforcing feedback mechanisms involving economic development, technological potential, environmental state, and social performance. The literature has consistently pointed out that these inequalities cannot be addressed using market driven and technologically deterministic models of transition. Rather, the facts are more likely to indicate the need to have combined, spatially explicit, and equity-based resource governance systems that are able to break path dependency and redistribute the benefits of transition as well as align renewable energy growth with the concepts of spatial fairness and inclusive growth.

CONCLUSION AND RECOMMENDATION

The current research aimed at questioning the spatially varied access to renewable and non-renewable resources and to clarify the socio-ecological impacts of these differences on the general framework of resource management and development. The results clearly show that renewable energy and sustainable resource system accessibility is neither geographically or socially homogenous, but rather highly determined by deep-seated structural inequalities in economic capacity, technological endowment, institutional effectiveness, and policy priorities. The part of the world with more outstanding infrastructural preparedness and management capacity systematically capitalizes the environmental, economic and human resource dividends of renewable resource transitions, and the less-developed and peripheral areas are structurally trapped in ecologically pernicious non-renewable resource traps.

The discussion also indicates that spatial differences in resource access create cumulative and path-dependent outcomes, which strengthen interregional disparities in environmental quality, education, and innovation capacity. The penetration of renewable energy is not only introduced as a technological intervention, but becomes a triggers socio-economic progress, allowing beneficial feedback paths that deepen local superiority. On the other hand, the continued dependence on non-renewable resources worsens the degradation of the environment, limits social growth, and creates the circles of exclusion. It is precisely these dynamics that highlight the ineffectiveness of technocratic, market-based transition models that fail to consider the issue of spatial justice and instead demand integrative, equity-based approaches of resource governance.

The research can be described as part of the emerging literature that understands energy and resource access as a political and spatial phenomenon in synthesizing findings across a variety of empirical settings. It confirms that sustainable development goals will not be achieved in a context where there are no conscious policies to correct territorial inequality and democratize the use of renewable resources. Finally, the study enhances a critical viewpoint on how spatial unequal resource geographies formulate the developmental results and the pattern of environmental strife, thus, giving an authoritative explanation of why one should re-imagine the resource management in a spatial equity perspective. Recommendations According to the above conclusions, a number of policy-relevant and scholarly suggestions are promoted. To start with, national and regional policymakers need to embrace spatially differentiated forms of resource governance, which explicitly acknowledge and deal with interregional differences in access to renewable energy. These frameworks need to focus on infrastructural investments, fiscal policies and capacity institutionalization in marginalized and resource-based areas thus facilitating a fairer distribution of renewable technologies.

The institutionalization of the integrated resource management strategies is required in order to overcome the sectoral fragmentation and bring the policies of energy, environment, and development into the consistent spaces of the spatial planning establishment. Integrated approaches can reduce the impact of environmental conflict by promoting cross-sectoral coordination and participatory forms of governance that will deliver inclusive and territorially even distributions of renewable energy transitions.

There is need to invest specifically in research, innovation and the development of human capital to break the technological exclusion that occurs to perpetuate spatial inequality. Increasing the local absorptive capacity by educating people, developing skills and transfer of knowledge will help disadvantaged areas to become players in renewable energy value chains as opposed to be extractive dependency sites.

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The design and evaluation of energy policies ought to be mainstreamed to ensure environmental justice, especially focusing on the monitorance of distributive effects of the implementation of a renewable energy source. It involves the systematic inclusion of the indicators of spatial equity in policy evaluation systems so that the gains in sustainability may not be at the cost of social or territorial inclusion.

Future studies ought to go beyond secondary synthesis by including primary spatial data, longitudinal case studies, or participatory methods that can help to describe local experiences of resource access and deprivation. These would build upon empirical knowledge about the precise micro-level processes by which spatial inequalities are generated and reproduced, and therefore enhance more context-specific and transformative resource governance interventions.

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