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Ulsoor Lake: Impact of Strategic Urban Water Bodies on Informal Livelihoods and Climate Resilience

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Abstract - This study investigates the socio-spatial impacts of "Smart City" interventions on informal livelihoods and climate resilience at Ulsoor Lake, Bengaluru (The Times of India, 2022). Despite being a vital socio-ecological commons, the lake's recent modernization has prioritized aesthetic "beautification" over the survival of the informal workforce (Roy, 2009). Using a mixed-methods approach—comprising twenty vendor ethnographies, regulatory analysis, and environmental monitoring—the research identifies a profound "Planning Mismatch" in how urban planning and informal livelihoods interact in India (Idiculla, 2022). Findings demonstrate that vendors function as "Thermal Strategists," relying on the lake's 2 degree C cooling gradient and 71% canopy shade for economic viability (Tan et al., 2018). However, they face "Double Jeopardy": physical exclusion via high-security fencing and health risks from untreated sewage (The Hindu, 2023). The study proposes a "Bio-Remediation Vending Plaza" to integrate livelihoods into ecological restoration through a polycentric governance model (Ostrom, 2010).

Figure 1Figure 1Google Earth. (2025). Satellite view of Ulsoor Lake and surrounding CBD grid [Map].

1.INTRODUCTION

Urbanization in the Global South, particularly in India, is characterized by a sharp divide between formal planning ideals and the informal livelihoods that sustain the city's economy (Roy, 2009). In Bengaluru, this tension is most visible around its historic "tanks" or lakes, which have transitioned from essential irrigation resources for farmers, dhobis, and fishermen into contested spaces (Nagendra, 2016). The city, originally designed around a network of over 1,000 interconnected tanks, has seen the disappearance of approximately 85% of these water bodies, with only around 200 surviving in various states of degradation (Biome Environmental Trust, 2016).

1.1 The "Smart City" Paradigm

The "Smart City" initiative, launched in 2015, has accelerated the trend of lake framing restoration within a technological modernization agenda that emphasizes beautification and controlled public access (Nagendra, 2016). At Ulsoor Lake, the Area-Based Development (ABD) approach has introduced high-security fencing and hardscaped pedestrian paths that reflect a vision of urban nature as sanitized and consumable (The Times of India, 2022). This vision is often fundamentally incompatible with the "messy" and productive realities of informal work, where the rigidities of formal planning fail to account for the fluid spatial needs of the urban poor (Roy, 2009).

1.2 The Role of Informality

The informal economy constitutes the backbone of urban survival for a majority of Bengaluru's population, with estimates suggesting that 70-80% of the workforce operates in this sector (Chumo et al., 2025). Yet, planning frameworks continue to treat informality as a problem to be eliminated rather than a reality to be engaged (Idiculla, 2022). Around Ulsoor Lake, a diverse ecosystem of flower sellers, fish vendors, and food providers has persisted for generations, adapting to changing conditions through sophisticated spatial strategies that often bypass formal regulatory mechanisms (Roy, 2009).

2. CONTEXT OF THE RESEARCH

2.1 Geographical and Ecological Context

Ulsoor Lake is a 50-hectare water body situated in Bengaluru's high-density Central Business District (CBD) (Nagendra, 2016). It serves as a vital downstream capture point but receives significant volumes of untreated sewage from three major inlets: the MEG drain, the Jeevanahalli drain, and the Doddigunta drain (The Hindu, 2023). This persistent pollution directly impacts both ecological health and vendor livelihoods, creating a precarious environment for those dependent on the lake's resources (Biome Environmental Trust, 2016).

Figure 2Ranjit, P. (2025). Ulsoor Lake edge: Convergence of urban density and blue-green infrastructure [Photograph]. Author's personal collection.

2.2 Cultural and Ritual Context

The lake is intrinsically linked to the historic Someshwara Temple, creating a "ritual economy" that defines the socio-spatial character of the area (Nagendra, 2016). This connection generates non-negotiable spatial requirements for vendors, such as proximity to the temple gates for the flower trade, which is essential for both cultural practice and economic survival (Idiculla, 2022). Conventional relocation strategies often fail to accommodate this sacred geography, leading to the displacement of livelihoods that have existed for generations (Roy, 2009).

3. THEORETICAL FRAMEWORK

The research is grounded in three primary conceptual pillars:

- **Polycentric Governance:** Drawing on Elinor Ostrom's work, this model challenges monocentric hierarchies and advocates for a multi-level system where government agencies (BBMP), military entities (MEG), and local community groups manage complex resources (Ostrom, 2010). This approach suggests that the management of multifunctional landscapes is most effective when multiple authorities overlap and coordinate (Nagendra & Ostrom, 2012).
- **Thermal Justice:** This framework recognizes that access to cooling is differentially distributed across the urban population. For vendors spending 10-12 hours outdoors, the lake's 2 degree C cooling gradient is the difference between viable work and health-threatening heat stress (Tan et al., 2018). The lack of shaded zones in formal planning highlights a "blindness" to the economic value of natural cooling (Nagendra, 2016).
- **Urban Informality:** Following Ananya Roy's theory, informality is viewed not as an absence of law but as a mode of urbanization characterized by the "idiom of insurgence" (Roy, 2009). This perspective helps explain why rigid urban planning frameworks in India often fail to accommodate the informal livelihoods that sustain the city's population (Idiculla, 2022).

4. METHODOLOGY

A mixed-methods approach was adopted to capture the lake's socio-ecological complexity:

1. **Policy Analysis:** Comparing the Street Vendors Act (2014) with Smart City implementation to identify legal and spatial gaps (Idiculla, 2022). This involves examining how "Area-Based Development" (ABD) projects often overlook the statutory rights of the informal sector (The Times of India, 2022).

2. **Environmental Monitoring:** Using microclimate measurement to quantify the cooling buffer provided by the lake. This methodology aligns with established practices for partitioning the relative effects of evaporative cooling and shading in urban heat island contexts (Tan et al., 2018).

3. **Vendor Ethnography:** Conducting in-depth interviews with twenty vendors across categories like flower sellers (V1-V4), fish vendors (V5-V7), and daily wage food operators (V17-V20). These ethnographies reveal how informal workers adapt to

"insurgent" urban conditions through sophisticated spatial strategies (Roy, 2009).

4. **Stakeholder Mapping:** Identifying the 23 primary actors involved in lake governance to address institutional fragmentation. This analysis utilizes the principles of polycentric governance to highlight the overlapping jurisdictions between municipal, military, and state entities (Ostrom, 2010; Nagendra & Ostrom, 2012).

5. DATA ANALYSIS AND FINDINGS

5.1 The "Thermal Strategist"

Quantitative data confirms that vendors function as "Thermal Strategists" who rely on microclimatic infrastructure for economic survival. Analysis of the lake's cooling effect indicates that shading from the

Figure 3Ranjit, P. (2026). Precarious spatial tenure at the lake edge [Field Photograph]. Author's personal collection.

mature tree canopy contributes approximately 71% of the total cooling benefit, while the remaining 29% is derived from evaporative cooling (Tan et al., 2018). For vendors selling perishables like flowers and fish, these "thermal refuges" are essential for preventing inventory loss and maintaining product quality throughout the day (Nagendra, 2016). The strategic positioning of stalls to follow the shade highlights a sophisticated understanding of "Natural Capital" that is often overlooked in formal urban budgets (Nagendra & Ostrom, 2012).

5.2 Smart City Interventions and Spatial Exclusion

The implementation of high-security fencing under the Smart City initiative has acted as a primary tool for design-led exclusion (The Times of India, 2022). Field observations documented a significant "Planning Mismatch" where formal infrastructure was constructed within the statutory 30m lake buffer zone, yet informal vendors were simultaneously evicted for "encroachment" within that same perimeter (Idiculla, 2022). This spatial injustice is compounded by a lack of legal recognition; only 15% of surveyed vendors possessed formal identity cards, leaving the vast majority "invisible" to the planning system and without any mechanism for legal protection against displacement (Roy, 2009).

5.3 "Double Jeopardy" and "Custodian Confusion"

Vendors at Ulsoor Lake face a state of "Double Jeopardy": they are exposed to severe health hazards from untreated sewage—which frequently leads to respiratory illnesses and skin infections—while simultaneously facing economic displacement from beautification projects (The Hindu, 2023). This situation is exacerbated by "Custodian Confusion" arising from the fragmented jurisdictions of the BBMP, MEG, and BWSSB (Ostrom, 2010). Such institutional fragmentation leads to neglected pollution control at major inlets, as agencies prioritize aesthetic "clean-up" over the systemic ecological restoration required for a multifunctional landscape (Nagendra & Ostrom, 2012).

6. PROPOSED SOLUTIONS: THE BIO-REMEDIATION VENDING PLAZA

To harmonize livelihoods with restoration, the study proposes a design intervention that treats vendors as "Lake Wardens":

1. **Porous Edges:** Replacing hard fences with "Green Bridges" that filter runoff while providing shaded vending platforms (Ranjit, 2026).

2. **Lake Warden Program:** Formalizing the existing informal monitoring roles of vendors, providing them with ID cards and stipends in exchange for maintenance and pollution reporting (Ostrom, 2010).

3. **Spatial Tenure:** Updating Master Plan 2041 to recognize "Spatial Tenure," ensuring that vendors

cannot be evicted from designated "productive commons" (Idiculla, 2022).

7. CONCLUSION

7.1 Synthesis: The Socio-Ecological Paradox

The research at Ulsoor Lake reveals a fundamental paradox in Bengaluru's "Smart City" evolution (The Times of India, 2022). While restoration efforts successfully implement a visual language of "world-class" urbanism through hardscaping and fencing, they simultaneously erode the functional "Natural Capital" that sustains the city's most vulnerable workforce (Nagendra & Ostrom, 2012). The findings confirm that the $2^{\circ}C$ cooling gradient and the 71% canopy-led cooling effect are not merely environmental perks but are essential economic infrastructures for the informal sector (Tan et al., 2018). By failing to integrate these "Thermal Refuges" into formal planning, the city risks a "Green Gentrification" process (Gould & Lewis, 2017) that cleans the water but effectively displaces the people who have served as its traditional custodians through an "idiom of insurgence" (Roy, 2009).

7.2 Recommendations for Polycentric Planning

To bridge the gap between formal ideals and informal realities, the study proposes the following interventions:

Thermal Protection Zones:

Future lake designs must move away from "Hard-edged" pedestrian paths (The Times of India, 2022). Instead, they should incorporate "Soft buffers" that preserve existing mature canopies specifically for vendor use, recognizing shade as a fundamental right rather than a coincidence of nature (Tan et al., 2018). These zones would act as microclimatic shields for the perishables trade.

The "Integrated Vending Plaza" Model:

Rather than eviction, the Area-Based Development (ABD) approach should incorporate decentralized vending clusters equipped with bio-remediation tools (Biome Environmental Trust, 2016). This would allow vendors to remain in their "Ritual Economy" locations—essential for the Someshwara Temple flower trade—while actively participating in the lake's ecological upkeep through nature-based filtration systems (Nagendra, 2016).

Overcoming "Custodian Confusion":

A "Lake Governance Council" should be established, including representatives from the BBMP, BWSSB, and a newly formed Ulsoor Vendor Union. This would transition governance from a monocentric hierarchy to a polycentric system where those with the highest "stake" in the lake's health have a direct voice in its management (Nagendra & Ostrom, 2012; Ostrom, 2010). By providing legal recognition to the 85% currently "invisible" vendors, the city can leverage informal knowledge for environmental monitoring (Idiculla, 2022; Roy, 2009).

7.3 Final Reflection: Towards an Insurgent Urbanism

Ultimately, the future of urbanization in the Global South depends on the city's ability to see "informality" not as a legal vacuum, but as a sophisticated and necessary mode of survival (Roy, 2009). The vendors of Ulsoor Lake—from the flower sellers maintaining the "ritual economy" at the temple gates to the fish vendors navigating the environmental challenges by the drains—are the true experts of the lake's microclimate (Nagendra, 2016). Their daily adaptations provide a blueprint for "Thermal Justice" that formal planning currently lacks (Tan et al., 2018). Integrating these "insurgent" spatial strategies into the formal "Smart City" agenda is not merely a social obligation but the only viable path toward a truly resilient, polycentric, and just Bengaluru (Nagendra & Ostrom, 2012; Idiculla, 2022).

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